



National Transportation Safety Board Aviation Accident Final Report

Location:	El Paso, TX	Accident Number:	FTW02LA198
Date & Time:	06/10/2002, 2130 MDT	Registration:	N681FE
Aircraft:	Airbus Industrie A300-600F	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 None
Flight Conducted Under:	Part 121: Air Carrier - Non-scheduled		

Analysis

The flight crew briefed the departure, completed the taxi-out and pre-departure checklist and entered the V-speeds (V1 was 139 knots and Vr was approximately 143 knots) into the flight management system (FMS) with both crewmember's primary flight display (PFD) displaying the V-speeds with the standard blue lines and no discrepancies noted. The captain entered the V2 speed (approximately 143 knots) into the flight control computer in the glare shield and entered 250 knots for the extended speed to 10,000 feet msl. The first officer did not recall being distracted during the checklist or before takeoff procedures. The flight crew requested and was cleared for departure on runway 04. The PF aligned the airplane on the runway and applied standard take-off power. The flight instruments were cross-checked at 80 knots and the V-speeds were correctly displayed on the PFD. The first officer checked the engine diagnostic page to observe the #2 engine vibrations. According to the first officer, when he looked back at the PFD, the V-speeds were not displayed, and V2 had reset to 100 knots. The first officer did not look at the speed index (correct raw speed data) on the left side of the PFD. The first officer called V1 rotate, and the captain responded to an aircraft pitch of approximately 12 degrees. The captain realized the airplane was not climbing or accelerating properly. The first officer realized the airspeed was approximately 120-125 knots (below V2) and called for the captain to lower the nose of the airplane. The captain lowered the nose, and executed a rejected take-off by pulling the throttles to idle. The flight control computer automatically applied maximum auto brakes, the airplane slowed, and the captain taxied the airplane off the runway. Neither flight crewmember recalled the aft end of the airplane strike the runway. The flight crew deplaned, entered the discrepancy "rejected T/O due to FMS speeds dumping and blue A/S line rolling back to 100. Rejected @ 120 knots Raw data still indicated properly." in the Aircraft Maintenance Log (AML) and departed the airport. The flight release weight and balance indicated the takeoff gross weight was 297,184 pounds. The takeoff center of gravity was 24.9. The DFDR revealed the following (1) The airplane became airborne for about 4 seconds. During the takeoff roll, pitch attitude reached 13.4 degrees airplane nose up with control column position recorded as 7.1 degree aft and elevator position recorded as 16.6 degree trailing edge up. (2) Pitch attitude decreased and was approximately 6 degrees upon touchdown of the left and right main landing gear, at which time the airplane experienced a vertical acceleration of 1.844 g's. (3) Airspeed was recorded as 114 knots when

the nose gear initially left the ground. Airspeed continued to increase and was recorded as 131 knots. Following touchdown of the nose landing gear, airspeed reached its maximum recorded value of 138 knots. (4) Engine 1 and engine 2 thrust reversers were briefly unlocked before both were unlocked again and remained in that state. (5) Longitudinal acceleration reached -0.584 g's and lateral acceleration reached -0.151 g's during the rejected takeoff sequence. According to the operator's representative, the "test results for the Flight Control Computer, Flight Management Computer, Flight Warning Computer, ECAM, Flight Augmentation Computer, and Signal Generator Unit found no faults. Examination of the aircraft found no anomalies that would have prevented it from operating per design prior to the tail strike.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight crew's failure to obtain the Vr speed prior to rotation which resulted in insufficient lift and the subsequent tail strike.

Findings

Occurrence #1: DRAGGED WING, ROTOR, POD, FLOAT OR TAIL/SKID
Phase of Operation: TAKEOFF

Findings

1. (C) AIRSPEED(VR) - NOT OBTAINED - FLIGHTCREW
2. ABORTED TAKEOFF - PERFORMED - FLIGHTCREW

Factual Information

HISTORY OF FLIGHT

On June 10, 2002, at 2130 mountain daylight time, an Airbus Industrie A300-600F, transport category airplane, N681FE, owned and operated as Flight 1255 by FedEx Express of Memphis, Tennessee, as a Title 14 CFR Part 121 cargo flight, experienced a tail strike during a rejected takeoff (RTO) at the El Paso International Airport (ELP), El Paso, Texas. The captain and first officer were not injured, and the airplane sustained substantial damage. Bright night visual meteorological conditions prevailed for the scheduled flight, and an instrument flight rules (IFR) flight plan was filed and activated. The flight was originating at the time of the accident, with Memphis as their intended destination.

During a review of company records, the completed Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2), flight crewmember statement, and interviews with company personnel following their safety debrief with the flight crewmembers, the following information was revealed. The captain was the pilot flying (PF), and the first officer was the non-flying pilot (PNF). The flight crew briefed a high (ELP elevation 3,958 feet msl), hot (approximately 90 degrees Fahrenheit), and heavy departure (TOGW 297,000 pounds; 375,880 MTOGW), as well as an engine-out departure procedure. The flight crew completed the taxi-out and pre-departure checklist without any anomalies and entered the V-speeds (V1 was 139 knots and Vr was approximately 143 knots.) into the flight management system (FMS). Both crewmember's primary flight display (PFD) displayed the V-speeds with the standard blue lines with no discrepancies noted. The PF entered the V2 speed (approximately 143 knots) into the flight control computer in the glare shield and entered 250 knots for the extended speed to 10,000 feet msl. The PNF did not recall being distracted during the checklist or before takeoff procedures. The flight crew requested and was cleared for departure on runway 04.

The PF aligned the airplane on the runway and applied standard take-off power. The flight instruments were cross-checked at 80 knots (PNF called out 80 knots) and the V-speeds were correctly displayed on the PFD. The PNF checked the engine diagnostic page to observe the #2 engine vibrations. According to the PNF, when he looked back at the PFD, the V-speeds were not displayed, and V2 had reset to 100 knots. According to company personnel, the PNF did not look at the speed index (correct raw speed data) on the left side of the PFD. The PNF called "V1 rotate," and the PF responded by establishing an aircraft pitch of approximately 12 degrees. The PF realized the airplane was not climbing or accelerating properly, and the PNF realized the airspeed was approximately 120-125 knots (below V2), called for the PF to lower the nose of the airplane. The captain [PF] lowered the nose, determined the best and safest course of action was to reject the take-off, and executed a rejected take-off by pulling the throttles to idle. The flight control computer automatically applied maximum auto brakes, the airplane slowed, and the PF taxied the airplane off the runway at high-speed taxiway P.

The safety debrief disclosed no evidence that would have prevented either flight crewmember from obtaining sufficient rest in the 72 hours before the flight. The PF stated that he had never operated a large transport aircraft at speeds well below V2 and was thinking a stall was imminent. According to company personnel, neither flight crewmember recalled the aft end of the airplane strike the runway.

FedEx maintenance personnel and the ARFF personnel observed two tires had deflated during the rejected takeoff. The airplane was taxied to the ramp for maintenance repairs. The flight

crew deplaned, entered the discrepancy "rejected T/O due to FMS speeds dumping and blue A/S line rolling back to 100. Rejected @ 120 knots Raw data still indicated properly." in the Aircraft Maintenance Log (AML) and departed the airport.

Maintenance personnel at El Paso removed and replaced the #1 (serial number 98079908) and #2 (serial number 9902A147) FMC's, removed # 1, #2, #3, #4 wheel and tire assemblies, completed inspection of wheel brake assemblies and axels. Installed new #1 and #4 wheel and tire assembly, installed new #3 main tire, remove and replace #4 brake assembly, inspection left main landing gear. All maintenance was performed in accordance with A300-600 maintenance manual. At 2324 on June 10, 2002, the aircraft was released for service per MEL for newly installed FMS NAV data base out of currency.

Next morning, at about 0754, the first officer found evidence of a tail strike during the walk-around inspection. The FAA inspector, who responded to the accident site, and FedEx maintenance personnel found a 1/4 inch gash approximately 100 yards long with purple paint transfer (consistent with the aircraft paint) approximately 3,000 feet beyond the approach end of runway 04. Maintenance personnel removed the DFDR and CVR which were forwarded to the NTSB for readouts. During the on site examination of the aircraft, no discrepancies were found with the flight controls.

PERSONNEL INFORMATION

The captain (PF) held an airline transport pilot certificate with type ratings for the Airbus 310 and Boeing 727. The captain obtained his Airbus 310 type rating on April 15, 1996. His most recent FAA first-class medical certificate was issued on June 5, 2002.

During a review of company records, the completed Pilot/Operator Aircraft Accident record (NTSB 6120.1/2), and interviews with company personnel, the following information was revealed. The captain, hired in March 1978 by FedEx as a second officer on the DC8, was upgraded to first officer on the DC8 in February 1979, and second officer on the Boeing 747 in December 1980. He was upgraded to first officer on the Boeing 727 in May 1984, and captain on the Boeing 727 in April 1993. He has served as captain on the A300 since April 1996. He was current and qualified (ground, emergency, flight line) as captain for the CFR Part 121 flight. The captain's most recent recurrent ground and flight training was accomplished in May 2002 at the facilities of FedEx Express at Memphis, Tennessee. On October 12, 2001, the captain satisfactorily completed his most recent flight line check in the Airbus 300. He had accumulated a total of 3,545 hours of which 1,740 were in the Airbus 300. He had flown 41 and 106 hours in the past 30 days and 90 days, respectively.

The first officer (PNF) held an airline transport pilot certificate with a type rating for the DC9. His most recent first-class medical certificate was issued on April 17, 2002.

During a review of company records, the completed Pilot/Operator Aircraft Accident record (NTSB 6120.1/2), and interviews with company personnel, the following information was revealed. The first officer, hired in March 1996 by FedEx as a second officer on the Boeing 727, was upgraded to second officer on the DC10 in January 1997. He has served as first officer on the Airbus 300 since April 15, 1999. He was current and qualified (ground, emergency, line) to act as second-in-command of the Airbus 300 airplane for the CFR Part 121 flight. The first officer's most recent recurrent ground and flight training was accomplished in March 2002. He had accumulated 3,173 total flying hours of which 1,632 were in the Airbus 300. He had flown 41 and 106 hours in the past 30 days and 90 days, respectively.

AIRCRAFT INFORMATION

N681FE, an Airbus A300-600, serial number 799, was issued an airworthiness certificate on May 19, 1999. The airplane was configured to carry cargo and 2 flight crewmembers. The airplane was equipped with two General Electric, model CF6-80C2A5F engines (left S/N 705274, right S/N 705275) rated at 61,000 shaft horsepower for maximum continuous and normal takeoff. The last continuous airworthiness inspection was the A check performed on May 25, 2002, at the accumulated time of 4,627 hours, and 2,427 cycles. At the time of the tail strike, the airplane had accumulated 78 hours since the last A check.

The flight release weight and balance indicated the takeoff gross weight was 297,184 pounds. The takeoff center of gravity was 24.9 (allowable range 18.1-35.3).

AERODROME INFORMATION

Runway 04/22 is an asphalt/grooved surfaced runway 12,010 feet long and 150 feet wide. Runway 04 elevation is 3,916.7 feet, and runway 22 elevation is 3,949.2 feet. Runway 04 (latitude 31 degrees 48.09 north; 093 degrees 49.36 west) is equipped with a 4-light precision approach path indicator (PAPI) with a 3.00 degree glide path, runway end identifier lights (REIL), and runway edge lights (high intensity).

FLIGHT RECORDERS

The DFDR recorder which was readout by the NTSB specialists revealed the following: (1) The airplane became airborne for about 4 seconds. During the takeoff roll, pitch attitude reached 13.4 degrees airplane nose up with control column position recorded as 7.1 degree aft and elevator position recorded as 16.6 degree trailing edge up. (2) Pitch attitude decreased and was approximately 6 degrees upon touchdown of the left and right main landing gear, at which time the airplane experienced a vertical acceleration of 1.844 g's. (3) Airspeed was recorded as 114 knots when the nose gear initially left the ground. Airspeed continued to increase and was recorded as 131 knots. Following touchdown of the nose landing gear, airspeed reached its maximum recorded value of 138 knots. (4) Engine 1 and engine 2 thrust reversers were briefly unlocked before both were unlocked again and remained in that state. (5) Longitudinal acceleration reached -0.584 g's and lateral acceleration reached -0.151 g's during the rejected takeoff sequence.

TEST AND RESEARCH

The Honeywell, Inc., Advanced Flight Management Computer (AFMC, part number 4052510-970) FMC-1 (serial number 98079908) and FMC-2 (serial number 9902A147) were run on the Honeywell Advanced Flight Management Test Stations (AFTS) part number 4050502-906 and 4050502-911, respectively. The FMC MX BITE DUMP revealed no abnormal faults or test failures during the period leading up to the RTO.

The Flight Control Unit (FCU) [A/P Glareshield Control panel] : Thales (Sextant) part number K157ABM6, serial number 0554, was bench tested on an EADS (Aerospatiale) ATEC 50000 (Automatic Test Equipment for Concorde) at Memphis. No discrepancies were found during the bench test. Following the bench test, the unit was disassembled, and reassembled. The unit was then heat soaked at 55 degrees Celsius for several hours, then tested, with good results. The unit was then forwarded to Sextant at Thales, France, for further examination

According to the operator's representative, the bench testing of the FMU-1 and FMU-2 did not record a software exception or a reset that would have indicated that both FMC's withdrew the

pilot entered v-speeds (V1, Vr, V2). The EFIS SGU's were also reviewed for related FCC and FMC faults. EFIS SGU-1 had a single FCC-1 fault on leg 00 (takeoff roll). But the reported loss was on the F/O's PFD, and according to Airbus Industrie would have no effect on the event

Airbus Industrie accomplished a FCC MIPS (Maintenance Interface Printer System) printout of what was in the FCC Fault Logs. From the beginning of the recording and during the whole sequence described, the selected CAS is recorded as 100 knots, rotation 107 knots, tail strike 119 knots, pitch 12 degrees, aircraft 15 feet radio-height, pitch decreasing, 128 knots, touchdown 131 knots, speed reaches 136 knots, and the reversers are extended. The Bite data from the FAC's, FCC's, and the TCC do not show any data concerning the incident flight. However, it should be noted that bite would only be recorded here if there was a failure of the FCU above 70 knots wheel speed. The #1 FCU was found to have a fault on the heading select encoder. According to the Airbus Industrie's representative, this "fault would have no effect on this event."

According to the operator's representative, the "test results for the Flight Control Computer, Flight Management Computer, Flight Warning Computer, ECAM, Flight Augmentation Computer, and Signal Generator Unit found no faults. Further, the Flight Control Unit (part of FCC where pilot's enter target airspeeds and altitudes on glareshield) did not log any faults and tested ok."

Pilot Information

Certificate:	Airline Transport	Age:	52, 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:	12/11/2001
Occupational Pilot:		Last Flight Review or Equivalent:	10/12/2001
Flight Time:	3545 hours (Total, all aircraft), 1740 hours (Total, this make and model), 2529 hours (Pilot In Command, all aircraft), 81 hours (Last 90 days, all aircraft), 41 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	Age:	45, Male
Airplane Rating(s):	Multi-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):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last Medical Exam:	04/17/2002
Occupational Pilot:		Last Flight Review or Equivalent:	03/12/2002
Flight Time:	3173 hours (Total, all aircraft), 1632 hours (Total, this make and model), 106 hours (Last 90 days, all aircraft), 41 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Airbus Industrie	Registration:	N681FE
Model/Series:	A300-600F	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	799
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	05/25/2002, Continuous Airworthiness	Certified Max Gross Wt.:	375880 lbs
Time Since Last Inspection:	78 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	4627 Hours	Engine Manufacturer:	General Electric
ELT:	Installed, not activated	Engine Model/Series:	CF6-80C2A5F
Registered Owner:	FedEx Express	Rated Power:	61000 lbs
Operator:	FedEx Express	Air Carrier Operating Certificate:	Supplemental
Operator Does Business As:		Operator Designator Code:	140A

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Bright
Observation Facility, Elevation:		Observation Time:	
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:	Scattered / 12000 ft agl	Temperature/Dew Point:	33° C / 2° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	5 knots, 250°	Visibility (RVR):	
Altimeter Setting:	29.81 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	El Paso, TX (KELP)	Type of Flight Plan Filed:	IFR
Destination:	Memphis, TN (KMEM)	Type of Clearance:	IFR
Departure Time:	2130 MST	Type of Airspace:	Class B

Airport Information

Airport:	El Paso International (KELP)	Runway Surface Type:	Asphalt
Airport Elevation:	3958 ft	Runway Surface Condition:	Dry
Runway Used:	04	IFR Approach:	Unknown
Runway Length/Width:	12010 ft / 150 ft	VFR Approach/Landing:	Unknown

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	31.806667, -106.377778

Administrative Information

Investigator In Charge (IIC):	Joyce Roach	Adopted Date:	07/25/2007
Additional Participating Persons:	Brian Iorg; FAA FSDO; Albuquerque, NM Matt Duke; FEDEX Flight Safety Department; Memphis, TN Mike Bender; Air Line Pilots Association, International; Memphis, TN Geoffrey Corlett; Airbus Industrie; France, Paul Arslanian; Bureau Enquetes Accidents (BEA); France, Sarah McComb; National Transportation Safety Board; Washington, DC		
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/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.