
Tailstrike during rejected takeoff, Airbus Industrie A300-600F, June 10, 2002

Micro-summary: This Airbus Industrie A300-600F experienced a tail strike during a rejected takeoff.


Event Date: 2002-06-10 at 2130 MDT

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

Investigative Body's Web Site: <http://www.nts.gov/>

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		NTSB ID: FTW02LA198		Aircraft Registration Number: N681FE	
		Occurrence Date: 06/10/2002		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place El Paso		State TX	Zip Code 79900	Local Time 2130	Time Zone MDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Airbus Industrie		Model/Series A300-600F		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>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.</p>					
<p>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.</p>					
<p>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.</p>					
The safety debrief disclosed no evidence that would have prevented either flight crewmember from					
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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

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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

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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."

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Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
El Paso International	KELP	3958 Ft. MSL	04	12010	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach: Unknown					
VFR Approach/Landing: Unknown					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Airbus Industrie		A300-600F		799	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 2	Certified Max Gross Wt.	375880 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	General Electric	CF6-80C2A5F	61000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	05/2002	78 Hours	4627 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
FedEx Express		3131 Democrat Road, Build. C			
		City	State	Zip Code	
		Memphis	TN	38194	
Operator of Aircraft		Street Address			
Same as Reg'd Aircraft Owner		Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: 140A		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Supplemental					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Non-scheduled; International; Cargo					
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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 52
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 10/2001
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 12/2001
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	3545	1740								
Pilot In Command(PIC)	2529	1719								
Instructor										
Last 90 Days	81	106								
Last 30 Days	41	41								
Last 24 Hours	1	1								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier KELP	Departure Time 2130	Time Zone MST
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Destination Memphis	State TN	Airport Identifier KMEM	
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Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing: Unknown


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Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation Ft. MSL	WOF Distance From Accident Site NM	Direction From Accident Site Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			12000 Ft. AGL	Condition of Light: Night/Bright	
Lowest Ceiling: None		Ft. AGL		Visibility: 10 SM	Altimeter: 29.81 "Hg
Temperature: 33 °C	Dew Point: 2 °C	Wind Direction: 250		Density Altitude: Ft.	
Wind Speed: 5	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation:			
Restrictions to Visibility: None					
Type of Precipitation: None					

Accident Information		
Aircraft Damage: Substantial	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					
Other Crew					
Passengers					
- TOTAL ABOARD -				2	2
Other Ground					
- GRAND TOTAL -				2	2

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Administrative Information

Investigator-In-Charge (IIC)

Joyce Roach

Additional Persons Participating in This Accident/Incident Investigation:

Brian Iorg
Aviation Safety Inspector
FAA FSDO
1601 Randolph Road SE, Suite 200N
Albuquerque, NM 87106

Matt Duke
Sr. Air Operations Safety Specialists
FEDEX Flight Safety Department
3131 Democrat Road, Bldg. C
Memphis, TN 38118

Mike Bender
Chief Accident Investigator
Air Line Pilots Association, International
1869 Kirby Parkway, Suite 202
Memphis, TN 38120

Geoffrey Corlett
Director
Airbus Industrie
1 Rond Point Maurice Bellonte 31707 Blagnac Cedex
France,

Paul Arslanian
Director
Bureau Enquetes Accidents (BEA)
Bat 153- Aeroport Du Bourget 93352 Le Bouget Cedex
France,

Sarah McComb
Mechanical Engineer, Vehicle Recorder Division
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594