Massive tire blowout on landing, Airbus A300F4-605R, March 11, 2004

Micro-summary: This Airbus A300F4-605R blew out all 8 main landing gears on landing.

Event Date: 2004-03-11 at 0653 EST

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

Investigative Body's Web Site: http://www.ntsb.gov/

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA04IA056	Aircraft Registration Number: N682FE
Occurrence Date: 03/11/2004	Most Critical Injury: None
Occurrence Type: Incident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Fort Lauderdale	FL	33315	0653	EST	

Airport Proximity: On Airport	Distance From Landing Facility: 1	Direction From Airport: 90

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Airbus Industrie	A300F4-605R	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

On March 11, 2004, about 0653 eastern standard time, an Airbus Industrie A300F4-605R, N682FE, operated by Federal Express Corporation as flight 1954, a Title 14 CFR Part 121 scheduled domestic cargo flight, had a failure of all eight main landing gear tires, during the landing roll on runway 27 right at the Fort Lauderdale/Hollywood International Airport (FLL), Fort Lauderdale, Florida. Visual meteorological conditions prevailed. An instrument flight rules flight plan was filed. The airplane received minor damage. The two airline transport-rated pilots reported no injuries. The flight had originated from Newark, New Jersey, at 0430.

The Captain stated to the NTSB Operations Group during an interview that she deadheaded to FLL on March 9, 2004, to begin the flight sequence. She had never met, nor flown with, the FO before this sequence of flights. They flew together from FLL to EWR, the night before the landing incident. There was a crew break at EWR but no hotel was provided. She stated that she slept for 1 hours and the FO slept for about 2 hours. They gathered the flight paperwork and proceeded to the aircraft together. The airplane preflight was accomplished. The flight was catered. She stated that the #2 battery had been replaced. They were given the paperwork for the alternate brake check. They started to pushback. They then started to taxi and had not moved 10 feet when they received a #2 battery overheat warning. It took about an hour for maintenance to resolve the problem. Again, the airplane was pushed back and a takeoff was made on runway 4L. Inbound to EWR, she heard popping and clicking sounds in the cockpit, perhaps caused by the pressurization system. She stated that she decided to try to narrow down these sounds on the next flight leg.

On the flight leg from EWR to FLL, leaving 10,000 feet, a vibration could be felt in the floorboard every 3 to 5 seconds. She wrote it up in the maintenance log. It could also be felt in the circuit breaker wall and other places. The flight was normal at FL 350. At the top of descent, the FAA alternate brake check was accomplished. She stated that she gave the written procedure to the first officer to read while she accomplished the procedure. The First Officer had never seen the form. It was daylight by this time. The BRK-A/SKID switch was pulled out and positioned to the ALTN-OFF position. The BRAKE FAIL light came on. The brake pedals were then depressed. A chime was heard. She stated that when the brake pedals are depressed, you get "ECAM." Usually the brake pressures were about 2,500 psi; however, this time, the left brake pressure indication was 2,100 and the right brake pressure indication was 2,500. During a normal preflight, the alternate brake system is checked. This was accomplished in FLL and EWR. Both times the brake pressures were symmetrical with 2,500 PSI indicated on the gauge but during this in-flight check, they were not. She stated that she wrote it up in the maintenance log. The BRK-A/SKID switch was then returned to the NORM/ON position. The procedure was discussed with the First Officer. He had never seen this procedure before. She stated that she wanted to trouble shoot the system. The BRK-A/SKID switch was then selected to ALTN/ON, like she does on the preflight. A chime was audible. The BRK-A/SKID switch was then selected to NORM/ON. She stated that she wrote it up as she saw it and then asked

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

the First Officer to review the write-up.

The First Officer was the flying pilot. A descent clearance was obtained and a descent was initiated. The checklist was accomplished by the pilot-not-flying, the captain, at 18,000 feet. Everything was normal. They landed on runway 27R at FLL, running about an hour late. The Before Landing checklist was accomplished. At the point where it says, brakes checked, she normally points to the items while she is looking at them. The BRK-A/SKID switch was NORM/ON and there was no pressure indication on the alternate system pressure gauges. She checked the REL bars on the ECAM; they were there and she called, "checklist complete." Before landing, she commented that the runway was clear. The First Officer made a nice landing in the touchdown zone. She called, "spoilers deployed," and asked the First Officer, "are you braking?" He said, no. The deceleration was noticeable. Tower said they were "rolling the equipment." She asked the First Officer to ask the tower what they saw. "Smoke and Fire," was the answer. When the airplane came to a stop, she set the parking brake, moved the throttles to idle, and positioned the fuel levers "down." The First Officer got out of his seat and unlocked the cockpit door. She ran through the evacuation checklist by shutting things down. She noticed emergency equipment arriving in front of the airplane. She told the First Officer that we will evacuate. The First Officer pulled the APU fire handle. The First Officer asked to fire the "bottle" but she said, no. The First Officer asked which door to open. She said, the right side, and then told him not to open it until she said so. She also told the First Officer to make sure he had the HAZMAT paperwork. She then turned the battery switch back on and asked the tower if there was still fire. She never got a reply from the tower. The battery switch was turned back off. The cabin door only partially opened. The First Officer had to push the door open. The slide started to deploy and inflated normally. She never did smell any smoke or see any fire. After the evacuation, the First Officer walked over to a fireman and said, "Here's the HAZMAT paperwork."

The Captain stated that after landing, she expected a normal rollout but got uncommanded braking instead. She had performed the in-flight alternate braking system operational check before but it had been a while. She has been on the A-300 almost 9 years. She has performed the procedure more than once but she was not sure how many times. She had never written one up before. The brake pressures were always about 2,500 psi and symmetrical. This has never been a problem on the ground either. No other abnormal indications were noted. Both the Captain and First Officer confirmed that indications were normal on landing. The Captain stated that the parking brake was not set until after landing. She stated that she did not set the parking brake in flight. She positioned the BRK-A/SKID switch from NORM/ON to ALTN/ON and got a "ding" and a message. She made note of the brake pressure and then positioned the BRK-A/SKID switch back to NORM/ON. She did not recall how many chimes there were during the test. She stated that there were no unrelated abnormals during this brake checking sequence. The brake pressures went back to zero and were zero on the brake check before landing. She stated that it was not "challenge and response" on the landing check. I said, "brakes checked," and the first officer verified it. She stated that she did not set the parking brake until after the airplane was stopped and the evacuation was being accomplished. She stated that there is no formal training on this procedure. "We have a flight test department." If we are going to do it, we should see it in the simulator. The form should spell out what lights and what ECAM indications you should get. It only asks, "pressure or no pressure?" On the Before Landing checklist, "Brakes Checked," you are looking for no pressure, zero pressure.

On rollout, there was "some releasing." She stated that there were no landing gear system warnings. It looked like everything was going fine. She did not use the brakes but she always has her feet on the pedals. The winds were calm, light. No auto brakes were used; they discussed that they were going to use manual braking. She asked if the first officer was braking. She stated that it felt like a "non event," not that severe, and the nose came down normally. The deceleration was not as severe as when medium auto braking was used. She stated that she did not use the brakes. She did not callout 80 and 60 knots because they went "right through them." After the airplane came to a stop, she pulled hard on the parking brake. She stated that the reason she selected the ALTN/ON position was to get further indications in order to make the write up complete.

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

During the in-range call to "ramp," she stated that there were two write-ups, one more significant than the other. At 18,000 feet on the in-range check, she pressed the "recall" button. The only things indicated were autothrottles inoperative and battery inoperative. She expected to see this and then cleared the ECAM. She stated that the emergency evacuation checklist was not performed using the "challenge and response" method. She did it and then read the checklist from the QRH [Quick Reference Handbook]. The first officer was taking care of the door operation. The parking brake was not previously set. She set the parking brake. She left it set and did not release it. You must be told that the chocks are in before you release the parking brake. She has not seen the maintenance sign-off of the write-ups she made. On deceleration during landing rollout, she observed, "spoilers deployed," on the ECAM. She was unsure if the reverser unlock lights appeared or how much engine reversing was accomplished. The airplane tracked straight down the runway. She thought the emergency checklist was adequate. No injuries were sustained as a result of going down the slide.

The In-Flight Alternate Braking System Operational Check procedure was different from the Alternate Braking preflight check. During the Alternate Braking preflight check, the parking brake is normally already set. The BRK-A/SKID switch is selected to ALTN/ON, the brake pedals are pressed, and then the parking brake is set. She stated that no one would ever set the parking brake in flight. She did not recall the number of chimes that were heard. A chime "reminds you to look at something." On the Before Landing checklist, she said, "brakes checked," and the FO said, "yep." On landing, she did see a "flash" of the brake release bars after touchdown.

The First Officer stated to the NTSB Operations Group during an interview that they arrived at EWR from FLL for a "hub turn" on the flight leg just prior to the incident flight. When leaving, they received a battery overheat warning and had to return to a parking gate. He thought they changed the battery during the "hub turn." At the gate, it seemed to take two hours and they were dispatched with one battery inoperative along with the autothrottles inoperative. Maintenance advised them of the need to perform the alternate brake check prior to the top of decent. He stated that he read the procedure and the captain accomplished it. Everything was normal to touchdown. Soon after touchdown, it felt as if the auto brakes came on. He glanced at the ECAM and saw "release bars." The Captain asked him if he was braking and he replied, no. The tower advised that they were "rolling the equipment." He was thinking, "Why are they doing that?" The captain took control of the airplane and instructed him to find out the reason for the equipment. The reason was because Tower saw smoke and flames. The aircraft was shutdown, they ran the checklist, and they left.

The incident flight leg to FLL was the third leg that they had flown the incident airplane. They began the trip by deadheading to FLL before flying FLL-EWR-FLL. There was nothing out of the ordinary during the flights. He stated that he had never performed the in-flight brakes operational check before. He recalled that the captain had handed him the instructions and he read each step as she performed the procedure. He was not sure why they had to do this check. "ALTN/OFF, brake pedal, pressure, brake pedal off, switch to normal." She noticed a pressure difference between the left and right sides. She wrote the additional comments on the AD form. He stated that she then moved the BRK-A/SKID switch to ALTN/ON. It was hard to recall, but he thought that she had gotten some pressure readings and then put the switch back to normal. Everything looked absolutely normal. The First Officer stated that he heard a couple of chimes but he could not recall how many. He thought that there was a chime every time she moved the switch-like going down with the switch. He did not recall if she did this more than once. He did not think anything of the pressure differential. The ECAM did not say, "hey, bad thing." The ECAM would say switch position. There was nothing unusual, nothing that he would not expect. The ECAM "came up and got the brake light and Anti-Skid OFF." He stated that it is not part of his preflight. He watches the test on taxi out. While on final, the Before Landing checklist is performed partly challenge and response, and part of it is accomplished by the pilot-not-flying or the pilot-monitoring. He glanced over at the brake indications and controls but did not notice anything out of the ordinary. He stated that he

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

did not lean over or stare at the pressure gauges. There was no pressure indication after the test, nothing out of normal. The ECAM showed no other indications other than the autothrottles and battery-off, nothing abnormal. The right ECAM showed "release bars" and gear down and locked lights. Nothing unusual. He glanced at the ECAM but did not look at it in detail. On final, things proceeded as expected. He maintained good speed control, even with manual throttles. After touchdown, the captain asked if he was braking? He replied, no. He stated that he very seldom "gets on the brakes" prior to the application of reverse thrust above 60 knots. He stated that he never used the brakes on the incident flight. He stated that after performing the maintenance procedure, he did not observe the captain applying the parking brake.

After the aircraft stopped, the captain accomplished most of the Emergency Evacuation checklist. When tower said smoke and flames, that got his attention. He asked to run the checklist. After shutdown, the captain grabbed the QRH and he got up to open the cockpit door. He then stepped through the doorway. When he returned to the cockpit, everything was done. He recalled that he pulled the APU fire handle. There was no "challenge and response." After the aircraft stopped, the captain started the checklist. He came back in and helped to finish up. He saw the captain pull the fire handles. He did not see every single movement that the captain made. When asked if he had seen the captain set the parking brake, he thought he did, right after the airplane came to a stop. He was 99 percent sure of it; he had to be in his seat until the engines were shutdown and the brake was set. When performing the in-flight brakes operational check, he recalled seeing the Brake Fail light under the switch and a warning on the ECAM but he could not recall what it said. He heard a "ding" that he thought was associated with moving the switch down, and he saw "Antiskid Off/Fail or something like that." After landing, the airplane went straight down the runway. Soon after touchdown, the spoilers deployed and he felt deceleration. He did not notice the brake temperatures. He looked at the REL bars but did not recall anything else that caught his attention. There were no injuries as a result of going down the escape slide. When he got down to the bottom of the slide, he observed, "no smoke, no flame, a bunch of flat tires." He asked a fireman as to whom he should give the Hazmat paperwork. He felt the evacuation checklist was sufficient. After the in-flight brakes operational check, the captain was concerned about the differential brake pressures. She did some troubleshooting while he watched. He attributed this to her being thorough. He watched the entire process and heard multiple chimes. He looked at the ECAM but nothing caught his attention. He was pretty sure that she started writing it up right away. He did not recall when manual/auto brakes were discussed but he usually uses manual brakes on dry runways. On the Before Landing checklist, the brake pressures were normal but he did not examine the gauges closely. The captain had the habit of pointing to things while doing it. He glanced at the brake pressure needles but felt if they had been "sticking up there," it would have caught his attention. He stated that the captain went back into the cockpit after deciding to evacuate but he did not know why.

Review of the cockpit voice recorder (CVR) by NTSB showed that at approximately 0612 the Captain initiated a test of the braking/anti-skid system. Approximately 9 seconds later the captain commented to the First Officer that an anti-skid fail message was being displayed in the cockpit. The Captain spent the next 6 minutes troubleshooting the problem. At 0616:52, the sound similar to bumps or clicks is recorded and 3 seconds later the sound of a single chime is recorded. At approximately 0617:03 the Captain commented that "brakes brake antiskid fault let's try, no guess that clears this up, alright." At approximately 0648 the First Officer called for slat extension and then confirmed with the Captain that they were cleared for the approach. At approximately 0650 the First Officer stated: "autobrakes are off. speedbrake is armed. landing gear is down three green.." Approximately 6 seconds later the First Officer states: "and the brakes all check." At approximately 0653 loud thumping sounds are recorded on the cockpit area microphone channel, and the captain states "brakes, I guess I don't know what that is." Approximately 9 seconds later the First Officer states: "the brakes are on." The Captain then states: "they shouldn't be. they're not on." The First Officer then states: "somethin's stoppin' us. I'm not touchin' the brakes at all." At approximately 0654 the Captain calls for the emergency checklist. Approximately 1 minute later the Captain states; "batteries off." Additionally recorded on the CVR at 0654:12, a pilot on

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

Jetblue flight 244 reported to the local air traffic controller that "looks of it here you can see their tire prints right where they touched down. Like their brakes were locked or somethin'."

Personnel Information

The Captain was hired by Federal Express Corporation on December 19, 1983, and was promoted to Captain on the A-300 in 1995. She did not fly as copilot on the A-300 prior to being promoted to Captain on the airplane. She has about 13,000 total flight hours and 3,000 total flight hours as Captain on the A-300. She holds an FAA Airline Transport Pilot certificate last issued on July 12, 1995 and an FAA First Class medical certificate issued on October 3, 2003, with no limitations. She holds airplane multiengine land and airplane single engine land ratings. She also holds type ratings in the A-310, B-727, DC-10, MD-11 and EMB-110. Additionally she holds a Flight Engineer Turbojet rating.

The First Officer was originally hired by Flying Tigers Airlines, which was acquired by Federal Express Corporation in 1989. He has about 8,000 total flight hours and 600 total flight hours in the A-300, all as First Officer. He holds an FAA Airline Transport Pilot certificate last issued on October 23, 1985 and an FAA First Class medical certificate issued on November 25, 2003, with no limitations. He holds airplane multiengine land and airplane single engine land ratings. He also holds type ratings in the EMB-110 and CE-500. Additionally he holds a Flight Engineer Turbojet rating, a Flight Instructor rating, a Ground Instructor rating, and a Airframe and Powerplant Mechanic certificate.

Aircraft Information

The airplane was an Airbus Industrie model A-300F4-605R, serial number 800, FAA registration N682FE, manufactured in June 1999. The airplane is registered to State Street Bank and Trust Company, Boston, Massachusetts. The airplane is operated by Federal Express Corporation, Memphis, Tennessee. At the time of the incident the airplane had accumulated about 7,622 total flight hours. The airplane is equipped with 2 General Electric model CF6-80C2A5F engines rated at 60,000 pounds of thrust.

Federal Express Flight Safety Group provided the NTSB with a document showing the incident aircraft's landing gear/brake system maintenance history from December 21, 2003 to the date of the incident. The landing gear/brake system maintenance history was reviewed for repetitive items, maintenance trends or discrepancies with the landing gear and brake control system. The review showed that there were no maintenance discrepancies with the landing gear, landing gear indication, or the brake control system prior to the incident.

Meteorological Information

Visual meteorological conditions prevailed at the time of the incident. The Fort Lauderdale/Hollywood International Airport, 0653, surface weather observation was winds from 330 degrees at 8 knots, visibility 10 statute miles, skies clear, temperature 12 degrees c, dew point temperature 10 degrees c, altimeter setting 30.20 inches Hg. Sun and Moon data indicates that on the day of the incident sunrise was at 0634.

Communications

There were no reported problems with communications between the flight crew and FAA air traffic controllers.

Airport Information

The Fort Lauderdale/Hollywood International Airport is located approximately 3 miles southwest of

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

the City of Fort Lauderdale, Florida, at an elevation of 9 feet msl. The airport is owned and operated by Broward County, Florida. Fort Lauderdale/Hollywood International Airport has 3 asphalt runway, 09L/27R, 09R/27L, and 13/31. Runway 09L/27R is 9,000 feet long and 150 feet wide. The incident flight landed on runway 27R.

Flight Recorders

The incident airplane was equipped with a Smith Industries Combi CVR/FDR, serial number 0000166. The recorder was removed from the airplane after the incident and sent to the NTSB Vehicle Recorders Laboratory, Washington, D.C. A Cockpit Voice Recorder Group was formed, and on March 25, 2004, a transcription of the CVR from 0612:27 to 0618:03 and 0648:29 to 0655:10 was prepared.

The incident airplane was also equipped with a Honeywell Solid State Flight Data Recorder, model 980-4700, serial number 5584. The SSFDR was removed from the airplane after the incident and sent to the NTSB Vehicle Recorders Laboratory, Washington, D.C. Plots of data pertaining to the incident flight were prepared.

The SSFDR data showed that between 0616:15 and 0616:29 the brake pedals were deflected to 14 degrees. At 0649:45, the landing gear is extended. At 0652:38, the aircraft weight on wheels switches change to ground mode and the aircraft decelerates to a stop in about 14 seconds. The engine thrust reversers are not deployed during this period.

Wreckage and Impact Information

Examination of the landing runway (27 Right) after the incident revealed four sets of heavy skid marks (two per bogie) that started from the initial touchdown point and were continuous to the aircraft's final resting point. There was evidence of wheel rim contact, from both the left and right main gear wheels, beginning about 500-600 feet after touchdown and continuing to the location where the aircraft came to rest.

The first set of two skid marks started at about 1,200 feet from the threshold of the runway and was consistent with right main landing gear touchdown first. The total distance for the right skid was 2,383 feet. The second set of two skid marks started about 81 feet further down the runway and was consistent with a left main landing gear touchdown. The total distance of the left skid was 2,302 feet.

Examination of the aircraft showed the left and right main gear bogies, tire and wheel assemblies, and brakes revealed the following: all eight main landing gear tires had blown, deflated, and come apart. The damage was confined to the side of the tires that was in contact with the runway and all eight tires were worn down to the wheel assembly; there were no flat spots or other indications of damage on the opposite side of each tire. All eight wheel assemblies were symmetrically worn down about 10 percent, all eight brakes, wheel speed transducers shafts, and brake fans were damaged; there was no damage to either the left or right bogie beams.

Prior to changing the tires and removing the airplane from the runway, Federal Express maintenance personnel performed a Built In Test Equipment (BITE) test on the Braking and Steering Control Unit (BSCU). The BITE test revealed the following fault codes: 075, 076, 077, 078, 231, 232, 233, 234, 235, 236, 237, 238, and 492 (492 is not a fault code but tells the system configuration: 49 means 49 inch tires and 2 means carbon brakes). The fault codes did not have a date or time stamp associated with them.

After removal of the airplane from the runway, maintenance technicians replaced several brake system components and performed functional tests on : the normal brake system, alternate brake system with and without antiskid on, the parking brake system, and cockpit indication test for aural/visual alerts. No defects or anomalies were noted during the test. Additionally, examination

National Transportation Safety Board
FACTUAL REPORT
AVIATION

NTSB ID: MIA04IA056
Occurrence Date: 03/11/2004
Occurrence Type: Incident

Narrative (Continued)

and testing of the removed components showed no evidence of pre-incident failure or malfunction of these removed components.

Medical and Pathological Information

The Captain and First Officer reported no injuries. No post incident drug testing was performed.

Tests and Research

The parking brake system is controlled through a two-position control handle. When locked in the applied position, the parking brake system deactivates all other braking modes (normal, automatic, alternate, and anti-skid) and supplies each of the four alternate servo-valves with 2,100 +/- 150-psi yellow hydraulic system pressure. This pressure is reduced from the normal 2,465-psi yellow hydraulic system pressure by a brake pressure limiter valve. The parking brake system also closes the return lines trapping the hydraulic fluid for at least 12 hours. In the applied position, two micro-switches (at the handle) are activated and the parking brake operated valve is mechanically shuttled to block alternate brake hydraulic pressure.

The BSCU monitors the signal output of both parking brake handle microswitches; when the switches are activated, the BSCU provides electrical signals to: isolate the normal braking system by de-energizing the solenoid within the brake selector valve, immediately inhibit each of the four alternate servo-valves for 10-12 seconds, and provide parking brake applied indication in the flight deck. When the BSCU inhibits the alternate servo-valves, for the first ten seconds immediately after applying the parking brake, it monitors the integrity of each alternate servo-valve by measuring the output current from both coils (two per servo-valve) contained within each servo-valve. The BSCU expects a current greater than 16 mA. If the current in any coil is below 16 mA, the BSCU triggers all failure codes linked to the discrepant alternate servo-valve. The fault codes associated with this are: servo-valve itself (7X), and command current (23X), where (X) is a number from 1 to 8.
.
Parking Brake Indication:

On Ground with parking brake in the applied position:
- Left ECAM memo (brakes) page is displayed, in green letters,
showing "PARKING BRAKE ON".
- On the Triple Indicator, the two lower needles read 2100 psi
- When the throttles are advanced beyond 22 degrees:
The takeoff warning horn sounds.
Master Warning light (flashing red).
Left ECAM warning page: "Parking Brake ON" (red).

In-Flight with landing gear down:

a. Initial indications when Parking Brake handle is in raised
position.
- Triple Indicator lower needles read 2100 psi.
- ECAM Warning page:
"Auto Brake Fault" (amber) first, followed by:
"Brake-A/Skid Fault"
"Brake/Anti skid ALTN/ON (in blue).
- ECAM Wheel page: The eight green Anti-skid Release bars
disappear.
- ECAM Memo page: "Parking Brake ON" (green).
- Brake Fail light illuminates (amber)
- Master Caution light illuminates (steady amber).

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

- Single Chime.
- Maintenance Panel shows BSCU Bite display light
b. Approximately 10 seconds after the Parking Brake is set:
- All ECAM warning page messages disappear.
- Brake Fail light extinguishes.
- Master Caution light extinguishes.
- ECAM Wheel page: Anti-skid Release bars reappear.
- Only remaining indications:
 Parking Brake handle in raised position.
 ECAM Memo page: "Parking Brake ON" (green).
 Triple Indicator lower needles read 2100 psi

In-Flight with landing gear up:

a. Initial indications when Parking Brake handle is in raised position.
- Triple Indicator lower needles read 2100 psi.
- ECAM Warning page:
 "Auto Brake Fault" (amber) first, followed by:
 "Brake-A/Skid Fault"
 "Brake/Anti skid ALTN/ON (in blue).
- ECAM Wheel page: The eight green Anti-skid Release bars disappear.
- ECAM Memo page: "Parking Brake ON" (green).
- Brake Fail light illuminates immediately (amber)
- Master Caution light illuminates (steady amber).
- Single Chime sounds after approximately 2.0 to 3.0 seconds.
b. Approximately 10 seconds after the Parking Brake is set:
- All ECAM warning page messages disappear.
- Brake Fail light extinguishes.
- Master Caution light extinguishes.
- ECAM Wheel page: Anti-skid Release bars reappear.
- Only remaining indications:
 Parking Brake handle in raised position.
 ECAM Memo page: "Parking Brake ON" (green).
 Triple Indicator lower needles read 2100 psi.

The in-flight alternate brake system test is a mandatory check required by Airworthiness Directive (AD) 2001-15-10. The AD states to perform an in-flight operational check of the alternate braking system in accordance with Airbus All Operator Telex (AOT) 32-19, Revision 4, dated April 29, 1999. All Airbus Model A300 B2, A300 B4, A310, A319, A320, A321, A330, and A340 series airplanes; and Model A300 B4-600, A300 B4-600R, and A300 F4-600R (collectively called A300-600) series airplanes are affected by this AD. Approximately 367 airplanes of U.S. registry are affected by this AD. AOT 32-19 provides the results of an investigation in which an Airbus A320 aircraft over-ran the runway just after landing due to an absence of braking in the normal and alternate braking modes. The absence of braking on the alternate braking system resulted from the failure of an alternate brake dual distribution valve (BDDV) caused by frozen water in the BDDV cover; it was assumed that during cruise, the water froze and caused the valve to seize. The AOT recommends that an in-flight test be accomplished on the alternate brake system every 500 flight-hours to identify valves that may potentially be affected by water ingress. The check must be done at the end of the cruise, and before descent. This is the part of the flight in which valve freezing will be the most likely to occur. Federal Express indicated that they accomplish the in-flight alternate braking system test on their A300-600, A310-200, A310-300 aircraft every 500 flight hours, as required by the AD, via Engineering Order15 (EO) 6-3240-7-3309 B. Federal Express's in-flight alternate braking system test contains the following steps:

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

A. At the end of cruise, before descent, place the BRK/A/SKID switch in the ALTN/OFF position.
B. Depress the brake pedals
C. Check brake pressure available on the brake pressure indicator.
D. Release the Brake pedals.
E. Place the BRK-A/SKID switch in NORM/ON position.
F. If no pressure was indicated, use the normal braking system or follow operational recommendations of Airbus FOT 999.0061/98.
G. If pressure was indicated, follow normal braking procedures.
H. Record result of operational check.

Federal Express check pilots conducted flight and simulator tests on March 17th, and 24th 2004, to identify all of the aural and visual warnings/indications that would be present in the flight deck when the parking brake was applied and the BRK-A/SKID selector switch was moved from "NORM ON" to "ALT ON", and then to "ALT OFF" position. Airbus accomplished a test flight on a A300-600 aircraft to verify that when the parking brake is applied after the main landing gear is down and locked, fault codes , identical to those seen on the incident aircraft, would be triggered and recorded on the BSCU.

On March 17th, 2004 Federal Express check pilots performed the in-flight alternate brake test, as prescribed in EO 6-3240-7-3309B, on a Federal Express A300-600 aircraft N718FD. The pilots also performed four other tests in which the position of the BRK-A/SKID selector switch was varied from the "NORM ON", "ALT ON", and "ALT OFF" positions with the parking brake applied. After the flight test was completed, a Federal Express maintenance technician performed a BITE check on the BSCU; no faults or brake system malfunctions were recorded. The BITE check was done to determine if setting the parking brake in flight with the main landing gear in the up and locked position would trigger and record faults.

On March 24th, 2004 the check pilots performed the in-flight alternate brake test, as prescribed in EO 6-3240-7-3309B in their flight crew training simulator. The pilots also performed four other tests in which the position of the BRKA/ SKID selector switch was varied from the "NORM ON", "ALT ON", and "ALT OFF" positions with the parking brake applied. The check pilots also performed an additional test, on a Federal Express A300-600 aircraft N665FE, in which they first applied the parking brake and then immediately put down the landing gear (prior to 10 seconds). This test was accomplished in order to trigger the fault codes, 075, 076, 077, 078, 231, 232, 233, 234, 235, 236, 237, 238, on the BSCU. After the flight test, a Federal Express maintenance technician performed a BITE check on the BSCU; no faults or brake system malfunctions were recorded.

The BSCU manufacturer, Messier Bugatti, was questioned as to why no fault codes were triggered on the BSCU from aircraft N665FE. The manufacturer responded that the scenario performed (by the Federal Express check pilots) would not trigger any faults on the BSCU because the scenario requires very precise timing. The time between the moment the landing gear lever is selected "down" and the moment that the landing gear is properly down and locked is greater than 10 seconds. If the parking braking is first selected "ON" and then landing gear is commanded down, the criteria is not valid to trigger the faults on the BSCU. To trigger the faults on the BSCU, the landing gear should first be selected down and then wait enough time before setting the parking brake to "ON".

Airbus also accomplished a test flight in order to reproduce the BITE fault codes that were downloaded from the incident aircraft's BSCU. The test flight was done in Toulouse on an A300-600 aircraft where the following scenario was simulated: "Aircraft in flight, landing gear extended, parking brake set ON. This test did trigger the fault codes, 075, 076, 077, 078, 231, 232, 233, 234, 235, 236, 237, and 238, on the BSCU.

Additional Information

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Narrative (Continued)

The incident aircraft, N682FE, was released by NTSB to Matt Duke, Senior Air Operations Safety Specialist, Federal Express Corporation, on March 30, 2004. All components retained by NTSB for further testing were returned to Federal Express Corporation.

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Fort Lauderdale/Hollywood	FLL	9 Ft. MSL	27R	9000	150

Runway Surface Type: Asphalt

Runway Surface Condition: Dry

Type Instrument Approach: NONE

VFR Approach/Landing: Straight-in

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Airbus Industrie	A300F4-605R	0800

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	5	377870 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Fan	General Electric	CF6-80C2A5F	60000 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	03/2004	26 Hours	7648 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?
No	No	No

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
State Street Bank and Trust	2 International Place	Boston	MA	02110

Operator of Aircraft	Street Address	City	State	Zip Code
FEDERAL EXPRESS CORP	3610 Hacks Cross Road	Memphis	TN	38125

Operator Does Business As:

Operator Designator Code: FDEA

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): Cargo; Flag Carrier/Domestic; Supplemental

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Part 121: Air Carrier

Type of Flight Operation Conducted: Scheduled; Domestic; Cargo

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	47

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number: On File

Certificate(s): Airline Transport; Flight Engineer

Airplane Rating(s): Multi-engine Land; Single-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? 10/2003

Medical Cert.: Class 1 | Medical Cert. Status: Valid Medical--no waivers/lim. | Date of Last Medical Exam: 10/2003

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	13000	3000								
Pilot In Command(PIC)		3000								
Instructor										
Last 90 Days	124	124		124						
Last 30 Days	32	32		32						
Last 24 Hours	6	6		6						

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
NEWARK	NJ	KEWR	0430	EST

Destination	State	Airport Identifier
Same as Accident/Incident Location		KFLL

Type of Clearance: VFR

Type of Airspace: Class D

Weather Information

Source of Briefing: Company

Method of Briefing: Telephone

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
KFLL	0653	EST	9 Ft. MSL	1 NM	270 Deg. Mag.

Sky/Lowest Cloud Condition: Clear Ft. AGL

Condition of Light: Day

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 30.20 "Hg

Temperature: 12 °C

Dew Point: 10 °C

Wind Direction: 330

Density Altitude: -500 Ft.

Wind Speed: 8

Gusts:

Weather Condtions 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: Minor

Aircraft Fire: Ground

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

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA04IA056

Occurrence Date: 03/11/2004

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

Jeffrey L. Kennedy

Additional Persons Participating in This Accident/Incident Investigation:

Matt Duke
Federal Express Corporation-Flight Safety
Memphis, TN 38125

Michael Bender
ALPA
Memphis, TN 38125

Geoff Corlett
Airbus Industrie
Toulouse, France,

Thomas Laird
FAA FSDO
Fort Lauderdale, FL 33315