Essential Question:
What happened on American Airlines flight 587?

27 May, 2 June 2021

Questions/Key Points	Notes
This incident occurred rather soon after 9/11, and was thus overshadowed. Should ATC have increased the separation between the two aircraft to avoid a wake turbulence encounter?	https://www.theatlantic.com/national/archive/2011/11/remembering-americas-second-deadliest-plane-crash/248313/ https://aviation-safety.net/database/record.php?id=20011112-0 https://reports.aviation-safety.net/2001/20011112-0_A306_N14053.pdf ● Background/key terms ○ Vertical stabilizer - the "tail" of the aircraft ○ Rudder - the rearmost section of the vertical stabilizer that deflects left and right in response to control inputs from the pedals ○ Wake turbulence - turbulence caused by another aircraft, usually a heavy one. Turbulence is a disruption in smooth airflow. In some cases, wake turbulence from a large aircraft can be strong enough to invert a small aircraft. ○ Prior flight on this a/c was uneventful ● Basics ○ Date: 12 November 2001 ○ Flight: New York Kennedy/KJFK/JFK - Santo Domingo, Dominican Republic/MDSD/SDQ ○ Aircraft: A300 N14053; written off ○ Occupants/casualties: 260/260 onboard, 5 ground ○ Weather: VMC ○ Crew: ■ FO: PF (pilot flying) ■ C/A: PM (pilot monitoring) ● Synopsis ○ A/c was fueled at 0710. Walkarounds were completed both by crew and ramp agents; no abnormalities found ○ Maintenance was called between 0730 and 0800; found an issue with the #2 pitch trim and yaw damper. The circuit breaker was reset and the problem was resolved. ○ Pushback was around 9:00, 1 hr delay. During pushback, rudders were checked (as routine). They operated normally and returned to the neutral position. ○ JAL 747 (flight 47) takes off before AA587 on 31L. ○ AA587 is cleared for takeoff at 0913, 2 mins after JAL. ○ FO is concerned about separation distance from the JAL a/c, but the c/a isn't worried and says that the aircraft will be 5 miles out by the time they take off. ○ AA587 starts takeoff roll at 0913 and lifts off 40 secs later, which is 1:40 after the JAL a/c. ○ AA587 is instructed to fly the same departure as JAL - fly bridge climb and contact NY departure. 587 climbs to 500 ft MSL and enters a climbing left turn to hdg 220. They contact departure at 0915 and inform them that they are at 1300 climbing 5000. They are then told to climb and maintain 13000. c/a says to FO that the aircraft is clean trimmed - no gear, flaps, or slats ○ At 0915:35, they are climbing thru 1700 MSL, wings level. They are told to

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Was the FO aware that using sudden rudder inputs could damage the aircraft structurally? Why did AA give poor safety advice during their training program? "I didn't know any better" is usually a terrible excuse.	proceed direct WAVEY (a waypoint). No more ATC transmissions after this. ○ Then, the aircraft experiences some wake turbulence during the turn direct WAVEY from the JAL aircraft. The FO uses rudder inputs to try and correct it. He wants the airspeed to be 250kt, which is the maximum allowed airspeed for flight below 10,000 feet, as dictated by the FAA ○ The aircraft enters an unusual attitude as the FO fights harder and uses larger control inputs to try to recover from it. The FO calls for full power but the C/A never actually does it ○ The wake turbulence encounter takes place at 2300 ft MSL. ○ During the attempted recovery, the right main attachment point of the vert. Stab. snaps and fractures. Then, it falls off completely. ○ As the aircraft descends, both engines fall off ○ The entire struggle occurs for about one minute. The aircraft hits the ground at 0916 in daylight at Beach 131st St., Queens ● Probable cause and other factors ○ The probable cause of the accident was the separation of the vertical stabilizer during flight, which was caused by the First Officer's unnecessarily large rudder inputs in reaction to wake turbulence. ○ Contributing factors: the design of the A300's empennage assembly, and American Airlines' training program. ● Takeaways/recommendations ○ Update laws to regulate yaw axis safety; set a limit for rudder pedal sensitivity ○ Review designs for existing aircraft to determine whether their rudder systems are safe ○ For the A300, consider options to modify it so that similar incidents won't happen again ○ Warn ATP pilots against using alternating full rudder deflection and that it isn't necessary in a transport-category aircraft ○ Clarify in documentation that operating at or below maneuvering speed doesn't provide structural protection against using full control inputs ○ Write documentation to guide trainers in upset recovery training ○ Train airmen not to use full rudder deflection, but make sure that they are still using proper rudder deflection during the right circumstances ○ Add FDRs to A300/A310 and B747 to aid in investigation

Summary

On November 12, 2001, American Airlines flight 587 took off from JFK airport. Upon experiencing a wake turbulence encounter from a preceding Boeing 747, the first officer, who was the pilot flying, attempted to recover from the situation by using aggressive rudder inputs. However, the rudder inputs structurally damaged the vertical stabilizer, causing it to completely separate during flight. The aircraft subsequently impacted the ground from an altitude of 2300 feet.