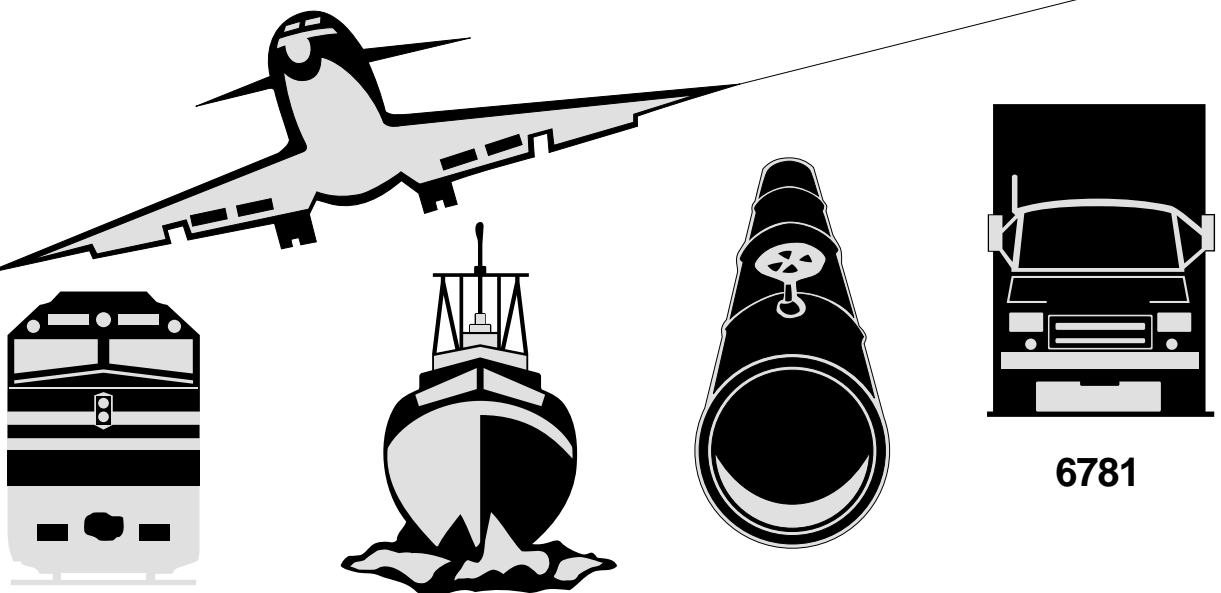


NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

GROUND SPOILER ACTIVATION IN FLIGHT/HARD LANDING
VALUJET AIRLINES FLIGHT 558
DOUGLAS DC-9-32, N922VV
NASHVILLE, TENNESSEE
JANUARY 7, 1996



6781

EXECUTIVE SUMMARY

About 1620 central standard time, on January 7, 1996, a Douglas Aircraft Company DC-9-32, N922VV, operated by ValuJet Airlines, Inc., as flight 558, touched down hard in the approach light area short of runway 2R at the Nashville International Airport in Nashville, Tennessee. Flight 558 was operating under the provisions of Title 14 Code of Federal Regulations Part 121, as a scheduled, domestic passenger flight from Atlanta, Georgia, to Nashville. The flight departed the William B. Hartsfield Atlanta International Airport at approximately 1540, with five crewmembers and 88 passengers on board. The flight attendant who occupied the rear cabin jumpseat and four passengers reported minor injuries; no injuries were reported by the remaining 88 occupants. The airplane sustained substantial damage to the tail section, nosegear, aft fuselage, flaps, slats, and both engines. Visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan.

The National Transportation Safety Board determines that the probable cause of this accident was the flightcrew's improper procedures and actions (failing to contact system operations/dispatch, failing to use all available aircraft and company manuals, and prematurely resetting the ground control relay circuit breakers) in response to an in-flight abnormality, which resulted in the inadvertent in-flight activation of the ground spoilers during the final approach to landing and the airplane's subsequent increased descent rate and excessively hard ground impact in the runway approach light area.

Contributing factors in the accident were ValuJet's failure to incorporate cold weather nosegear servicing procedures in its operations and maintenance manuals, the incomplete procedural guidance contained in the ValuJet quick reference handbook, and the flightcrew's inadequate knowledge and understanding of the aircraft systems.

The safety issues discussed in this report include the adequacy of ValuJet's operations and maintenance manuals, specifically winter operations nosegear shock strut servicing procedures; the adequacy of ValuJet's pilot training/crew resource management training programs; flightcrew actions/decisionmaking; the role of communications (flightcrew/flight attendants/operations/dispatch/air traffic control); ValuJet's flightcrew pay schedule; Federal Aviation Administration oversight of ValuJet; and the adequacy of cockpit voice recorder duration and procedures.

3. CONCLUSIONS

3.1 Findings

1. The flightcrew was certificated, trained and qualified for the flight, and in compliance with the Federal regulations on flight and duty time.
2. The airplane was properly certificated and operated in accordance with applicable Federal regulations.
3. The nosegear shock strut extension during the initial climbout was insufficient to actuate the ground shift mechanism, shift the airplane systems to the flight mode, and release the gear lever anti-retraction mechanism.
4. Preflight visual inspections by flightcrews cannot be relied upon to detect underserviced/underinflated DC-9 nosegear struts, and more frequent and detailed maintenance inspections of the DC-9 nosegear shock strut should be included in cold weather maintenance procedures.
5. ValuJet Airlines and the Federal Aviation Administration should have recognized the possibility of airplanes being exposed to cold weather conditions and the potential nosegear problems from such exposure, and ValuJet should have developed cold weather nosegear servicing procedures similar to those in the DC-9 maintenance manual to address these problems.
6. Although the first officer's performing pilot flying duties did not jeopardize the safety of the flight, the captain's decision to allow the first officer to act as the flying pilot indicates a lack of awareness and/or regard for the guidelines contained within the ValuJet company operating manual.
7. Had the pilots adhered to ValuJet's company operating manual procedures and notified system

operations/dispatch of the landing gear irregularity during their departure from Atlanta, they would probably have received sufficient maintenance advice and guidance from technical specialists to land uneventfully at either Atlanta or Nashville.

8. There was adequate information available on page A-38 of the quick reference handbook for the flight to have landed uneventfully at Nashville

9. The flightcrew's decisions and actions in this case demonstrate insufficient concern for adherence to and a lack of company guidance about the guidelines and procedures set forth in the Federal Aviation Administration (FAA)-accepted ValuJet company operating manual and the FAA-approved ValuJet aircraft operating manual.

10. Although the pilots had sufficient time to assess their circumstances, seek assistance from other resources, review the options available to them, and make a thoughtful decision, the pilots' decisions, procedures, and actions resulted in the inadvertent in-flight activation of the ground spoilers while the airplane was on short final approach for the runway.

11. Valujet's pilot training, as performed by FSI, conformed with the FAA's requirements.

12. The pilots' actions and statements illustrate that their knowledge and understanding of the aircraft systems and the effects those systems have on each other were inadequate.

13. The pilots' failure to communicate with and utilize some of the other resources available to them (such as the more detailed written procedural guidance located in the aircraft operating manual, or in-flight maintenance advice through ValuJet system operations/dispatch in Atlanta or from contract maintenance personnel in Nashville) raises questions about the effectiveness of the crew resource management training provided.

14. Valujet's pay schedule was fairly constant in the months preceding the accident.

15. There were no preexisting (preimpact) communication/navigation radio anomalies; rather, the radio difficulties that the flightcrew encountered during the go-around were, directly or indirectly, the result of the airplane's impact with the ground in the approach light area short of runway 2R

16. Had the flightcrew turned off power to the cockpit voice recorder after the airplane was safely stopped on the ground, investigators would have had access to valuable documentation of the hard landing, and the events leading up to it.

17. The 30-minute closed loop cockpit voice recorder tape on board the accident airplane was of inadequate duration to be helpful in the investigation of this accident, because pertinent impact-related audio information and conversation had been recorded over and was unrecoverable.

18. The FAA's oversight of ValuJet's procedures and operations was inadequate.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the flightcrew's improper procedures and actions (failing to contact system operations/dispatch, failing to use all available aircraft and company manuals, and prematurely resetting the ground control relay circuit breakers) in response to an in-flight abnormality, which resulted in the inadvertent in-flight activation of the ground spoilers during the final approach to landing and the airplane's subsequent increased descent rate and excessively hard ground impact in the runway approach light area.

Contributing factors in the accident were Valujet's failure to incorporate cold weather nose gear servicing procedures in its operations and maintenance manuals, the incomplete procedural guidance contained in the ValuJet quick reference handbook, and the flightcrew's inadequate knowledge and understanding of the aircraft systems.

4. RECOMMENDATIONS

As a result of the investigation of this accident, the National Transportation Safety Board makes the following recommendations:

—to the Federal Aviation Administration:

Require all airlines to review their operations and maintenance manuals and, if necessary, adjust or expand these manuals to reflect the manufacturer's recommended cold weather nosegear servicing procedures. (A-96-166)

Stress the importance of adherence to the rules, structure, and guidelines within the revised ValuJet company operating manual to ValuJet management and its employees, to Flight Safety International (or other contracted training organizations used by ValuJet), and to the individuals responsible for the oversight of ValuJet. (A-96-167)

Reevaluate ValuJet's flight operations training manual and the ValuJet training syllabus used by Flight Safety International, and require ValuJet to revise or expand these documents to include more detailed descriptions and explanation of the Douglas DC-9 systems and procedures. (A-96-168)

Require ValuJet to revise its crew resource management (CRM) training curriculum to more clearly reflect modern integrated (flightcrew, cabin crew, company, etc.) CRM practices (including line operational simulation training) and to combine academic/classroom training with integrated practical crew simulations. (A-96-169)

Require all airlines to revise their procedures to stipulate that flightcrews turn off power to the cockpit voice recorder as part of the engine shutdown procedure in the event of a reportable incident/accident. (A-96-170)

Require that all newly manufactured cockpit voice recorders intended for use on airplanes have a minimum recording duration of 2 hours. (A-96-171)

—to ValuJet Airlines:

Develop, immediately, a more extensive and accurate winter operations manual, with corresponding adjustments to maintenance procedures, to reflect the manufacturer's cold weather nosegear servicing procedures. (A-96-172)

Clarify for all flightcrews the importance of referencing all available crew reference documents and consulting with company maintenance personnel (time permitting) to resolve in-flight abnormalities before committing a flight to landing. (A-96-173)

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December 11, 1996