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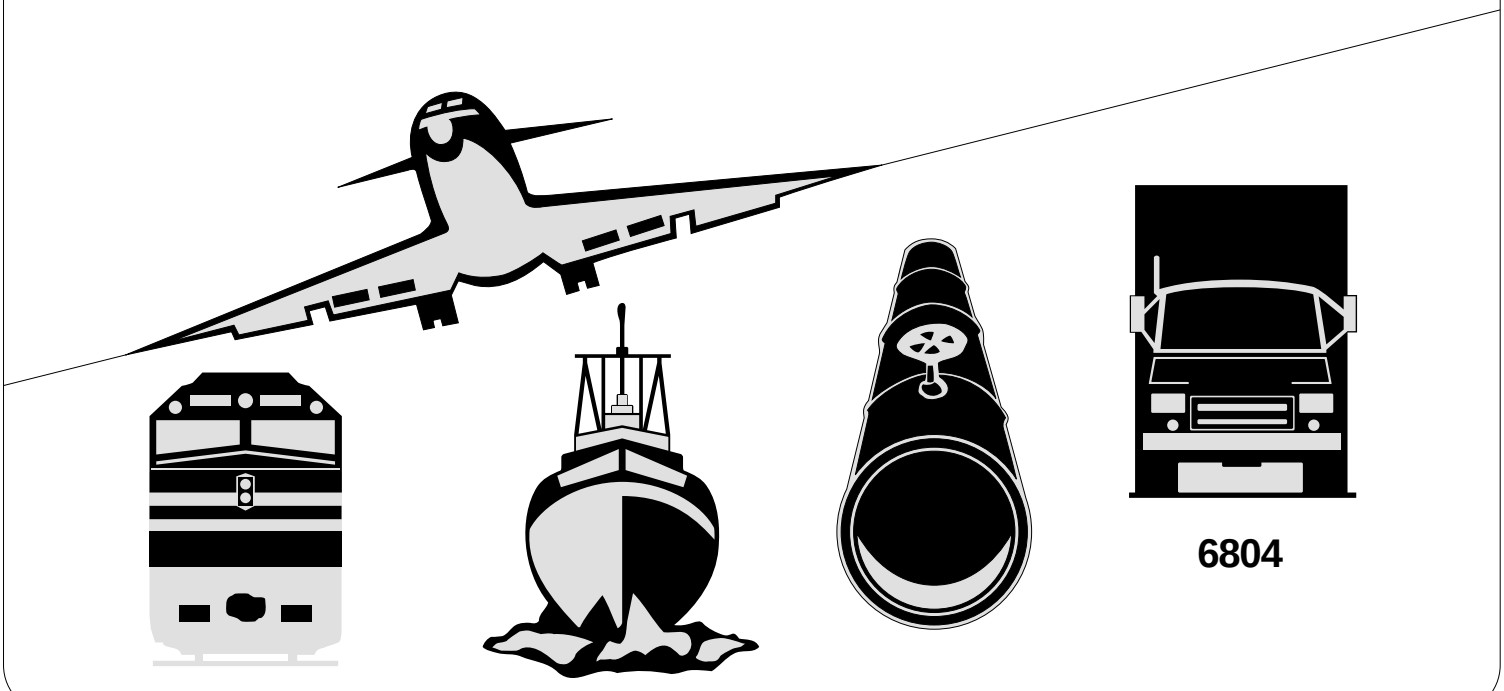
NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

WHEELS-UP LANDING
CONTINENTAL AIRLINES FLIGHT 1943
DOUGLAS DC-9 N10556
HOUSTON, TEXAS
FEBRUARY 19, 1996



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EXECUTIVE SUMMARY

On February 19, 1996, at 0902 Central Standard Time, Continental Airlines (COA) flight 1943, a Douglas DC-9-32, N10556, landed wheels up on runway 27 at the Houston Intercontinental Airport, Houston, Texas. The airplane slid 6,850 feet before coming to rest in the grass about 140 feet left of the runway centerline. The cabin began to fill with smoke, and the captain ordered the evacuation of the airplane. There were 82 passengers, 2 flightcrew members, and 3 flight attendants aboard the airplane. No fatalities or serious injuries occurred; 12 minor injuries to passengers were reported. The airplane sustained substantial damage to its lower fuselage. The regularly scheduled passenger flight was operating under Title 14 Code of Federal Regulations Part 121 and had originated from Washington National Airport about 3 hours before the accident. An instrument flight rules flight plan had been filed; however, visual meteorological conditions prevailed for the landing in Houston.

The National Transportation Safety Board determines that the probable cause of this accident was the captain's decision to continue the approach contrary to COA standard operating procedures that mandate a go-around when an approach is unstabilized below 500 feet or a ground proximity warning system alert continues below 200 feet above field elevation. The following factors contributed to the accident: (1) the flightcrew's failure to properly complete the in-range checklist, which resulted in a lack of hydraulic pressure to lower the landing gear and deploy the flaps; (2) the flightcrew's failure to perform the landing checklist and confirm that the landing gear was extended; (3) the inadequate remedial actions by COA to ensure adherence to standard operating procedures; and (4) the Federal Aviation Administration's (FAA) inadequate oversight of COA to ensure adherence to standard operating procedures.

Safety issues discussed in this report include checklist design, flightcrew training, adherence to standard operating procedures, adequacy of FAA surveillance, and flight attendant tailcone training. Safety recommendations concerning these issues were made to the FAA.

3. CONCLUSIONS

3.1 Findings

1. The two-member flightcrew and three flight attendants were trained and qualified to conduct the flight in accordance with Federal regulations. There was no evidence of any medical condition that might have affected the flightcrew's performance.

2. The air traffic control request to maintain 190 knots to the outer marker did not contribute to the accident because it did not affect crew actions, decisionmaking, or situational awareness.

3. The airplane was certificated and equipped and maintained in accordance with Federal regulations and approved procedures. There is no evidence that mechanical malfunctions or failures of the airplane structures, flight control systems, or powerplants contributed to the accident.

4. Because the captain omitted the "Hydraulics" item on the in-range checklist and the first officer failed to detect the error, hydraulic pressure was not available to lower the landing gear and deploy the flaps.

5. The "Hydraulics" item is placed too low on the in-range checklist, rendering it vulnerable to omission.

6. The captain's distraction from his duties as pilot-in-command and his disregard for the sterile cockpit rule contributed to the pilots' failure to detect their hydraulic system configuration error when they selected 5˚ of flaps.

7. Both the captain and the first officer recognized that the flaps had not extended after the flaps were selected to 15˚.

8. The pilots' lack of previous exposure, either through training or during line operations, to the consequences of improper hydraulic system configuration contributed to their failure to detect their hydraulic system configuration error.

9. The pilots failed to perform the landing checklist and to detect the numerous cues alerting them to the status of the landing gear because of their focus on coping with the flap extension problem and the high level of workload as a result of the rapid sequence of events in the final minute of the flight.

10. Had the landing checklist been properly performed, the flightcrew would have detected the failure of the landing gear to extend.

11. Although the first officer was unwilling to overtly challenge the captain's decision to continue the approach, he did attempt to communicate his concern about the excessive speed of the approach to the captain.

12. There was no compelling reason for the captain's decision to land the airplane; multiple signals and guidance indicated that the approach should be discontinued, as did Continental Airlines' standard operating procedures.

13. The flightcrew's degraded performance is consistent with the effects of fatigue, but there is insufficient information to determine the extent to which it contributed to the accident.

14. There were deficiencies in Continental Airlines' (COA) oversight of its pilots and the principal operations inspector's oversight of COA. COA was aware of inconsistencies in flightcrew adherence to standard operating procedures within the airline; however, corrective actions taken before the accident had not resolved this problem.

15. This accident demonstrates the need for all air carriers to bring their checklists that apply to all phases of ground and flight operations into compliance with the contemporary human factors principles of checklist design outlined in the FAA's report, "Human Performance Considerations in the Use and Design of Aircraft Checklists."

16. The "C" flight attendant was unable to completely remove the tailcone access plug door, because one of the aft jumpseat shoulder harness straps was buckled to the lap belt, which tied the plug door to the aft cabin bulkhead. Fortunately, the lack of availability of the tailcone exit did not preclude a timely and successful evacuation.

17. Continental Airlines flight attendants received inadequate information and training on the operation of the DC-9 tailcone access plug door.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the captain's decision to continue the approach contrary to Continental Airlines (COA) standard operating procedures that mandate a go-around when an approach is unstabilized below 500 feet or a ground proximity warning system alert continues below 200 feet above field elevation. The following factors contributed to the accident: (1) the flightcrew's failure to properly complete the in-range checklist, which resulted in a lack of hydraulic pressure to lower the landing gear and deploy the flaps; (2) the flightcrew's failure to perform the landing checklist and confirm that the landing gear was extended; (3) the inadequate remedial actions by COA to ensure adherence to standard operating procedures; and (4) the Federal Aviation Administration's inadequate oversight of COA to ensure adherence to standard operating procedures.

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 DC-9 and MD-80 operators with the "HI, LOW, OFF" hydraulic switch configuration to revise their checklists to emphasize the importance of the "Hydraulics" item by placing it as the first item on the in-

range checklist (or equivalent), and requiring that both pilots verbally verify hydraulic pump switch settings and system pressures. (A-97-3)

Require all principal operations inspectors of 14 CFR Part 121 operators using DC-9 and MD-80 airplanes with the "HI, LOW, OFF" hydraulic switch configuration to ensure that operating manuals and training programs include information about the consequences of improper hydraulic system configuration, specifically that the flaps and landing gear will not function normally if the engine-driven hydraulic pumps are not set to "HI." (A-97-4)

Require all principal operations inspectors of 14 CFR Part 121 carriers to ensure that the carriers establish a policy and make it clear to their pilots that there will be no negative repercussions for appropriate questioning in accordance with crew resource management techniques of another pilot's decision or action. (A-97-5)

Require all principal operations inspectors of 14 CFR Part 121 carriers to ensure that crew resource management programs provide pilots with training in recognizing the need for, and practice in presenting, clear and unambiguous communications of flight-related concerns. (A-97-6)

Require Continental Airlines to audit its internal oversight process and correct deficiencies in that oversight process that allow deviations from standard operating procedures and violations of Federal regulations to go uncorrected, and to develop a specific plan to reinforce the importance of adherence to standard operating procedures among pilots. (A-97-7)

Audit its surveillance of Continental Airlines (COA) en route operations to determine if the surveillance is adequate to identify procedural deficiencies in COA's operations. (A-97-8)

Require that principal operations inspectors review the checklists of air carriers operating under 14 CFR Parts 121 and 135 to ensure that they comply with the guidance presented in the Federal Aviation Administration report entitled "Human Performance Considerations in the Use and Design of Aircraft Checklists," and require that any checklists that do not comply with the guidance be revised accordingly. (A-97-9)

Amend Flight Standards Handbook Bulletin 96-02, "Guidelines for Crewmember Training on Aircraft Tailcones and Approval of Tailcone Training Devices," to include a requirement that if any portion of a restraint system is attached to the tailcone access plug door in the aircraft that might interfere with the opening of the door, the plug door training device must be equipped with the entire restraint system. (A-97-10)

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February 11, 1997