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NATIONAL TRANSPORTATION SAFETY BOARD

REVISED OCTOBER 9, 1974

AIRCRAFT ACCIDENT REPORT

OVERSEAS NATIONAL AIRWAYS, INC.
McDONNELL DOUGLAS DC-8-63, N863F
BANGOR, MAINE

JUNE 20, 1973

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JUNE 20, 1973

ADOPTED: FEBRUARY 7, 1974

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591

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16. Abstract Overseas National Airways Flight 4655, a DC-8-63 en route from Tampa, Florida, to Geneva, Switzerland, via Bangor, Maine, and Amsterdam, the Netherlands, was involved in a takeoff accident at the Bangor International Airport, Bangor, Maine, on June 20, 1973. In the emergency evacuation that followed, 34 of the 251 passengers on board were injured - 3 of them seriously. During the takeoff roll, the captain heard a loud, muffled sound, like that of a blown tire, and discontinued the takeoff. A fire broke out in the right main landing gear assembly and right wing root area. The passengers and crew emerged via the airplane emergency escape chute system. The National Transportation Safety Board determines that the probable cause of the accident was the undetected deflation of a right main landing gear tire as the aircraft was taxiing for takeoff. The additional loads imposed upon two other tires caused them to fail during the takeoff roll. Subsequently, the wheel assemblies were damaged. The fire was ignited by the friction between the metal wheels and the runway pavement. * This report is a revision of the Board's report of February 7, 1974.					
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TABLE OF CONTENTS

	<u>Page</u>
Synopsis	1
Investigation	1
Analysis	4
Probable Cause	6
Appendices	
Appendix A - Wheel and Tire Assembly History .	7
Appendix B - Aircraft Information	8
Appendix C - Crew Information	9

NATIONAL TRANSPORTATION SAFETY BOARD
 WASHINGTON, D. C. 20591

AIRCRAFT ACCIDENT REPORT

Adopted: February 7, 1974 (Revised October 9, 1974)*

OVERSEAS NATIONAL AIRWAYS, INC.
 McDONNELL DOUGLAS DC-8-63, N863F
 BANGOR, MAINE
 JUNE 20, 1973

SYNOPSIS

Overseas National Airways, Inc., Flight 4655, a McDonnell Douglas DC-8-63, was a nonscheduled charter flight from Tampa, Florida, to Geneva, Switzerland, via Bangor, Maine, and Amsterdam, the Netherlands. There were 251 passengers aboard the flight. The flight from Tampa, Florida, to Bangor, Maine, was routine. Flight 4655 departed the Overseas National Terminal at the Bangor International Airport about 0015 e.d.t., on June 20, 1973, and proceeded to runway 15. At 0024, the local controller cleared the aircraft for takeoff.

The captain stated that he heard a "loud, muffled sound" during the takeoff roll. In addition, there was a "slight jarring of the aircraft to the right." The captain then rejected the takeoff and brought the aircraft to a stop on a taxiway adjacent to runway 15. Fire broke out in the area of the right main landing gear and severely damaged the right main landing gear system, the right wing, and the right side of the fuselage. Thirty-four passengers were injured, three of them seriously, as they evacuated the aircraft through the emergency escape system.

The National Transportation Safety Board determines that the probable cause of the accident was the undetected deflation of a right main landing gear tire as the aircraft was taxiing for takeoff. The additional loads imposed upon two other tires caused them to fail during the takeoff roll. Subsequently, the wheel assemblies were damaged. The fire was ignited by the friction between the metal wheels and the runway pavement.

INVESTIGATION

Overseas National Airways, Inc., Flight 4655, a McDonnell Douglas DC-8-63, N863F, was a nonscheduled charter flight from Tampa, Florida, to Geneva, Switzerland, via Bangor, Maine, and Amsterdam, the Netherlands. Two hundred and fifty-one passengers and a crew of ten were aboard the aircraft when it departed Tampa, Florida, at 1945 e.d.t., ^{1/} with instrument flight rules (IFR) clearance, nonstop, to Bangor, Maine. The flight from Tampa to Bangor was routine.

^{1/} All times used herein are eastern daylight, based on the 24-hour clock.
 * Revised material is indicated by a vertical line on the left margin.

About 0015, Flight 4655 departed the terminal area at the Bangor International Airport and taxied, via the parallel taxiway, to runway 15. The captain stated that the aircraft had performed normally during the taxi operations and that all necessary checklist items had been accomplished without any discrepancies. At 0024, Flight 4655 was cleared for takeoff on runway 15. The captain stated that he had heard "a loud, muffled sound" during the takeoff roll. In addition, he stated that there was a "slight jarring of the aircraft to the right." The captain, who assumed that a tire had blown, rejected the takeoff. According to the flightcrew, the aircraft's speed was between 105 and 110 knots when the takeoff was rejected. The aircraft stopped 8,000 feet from the approach end of runway 15, on Taxiway Kilo. A fire, which started during the takeoff roll in the area of the right main landing gear, burned for approximately 5 minutes before it was extinguished by the airport fire department.

The cockpit voice recorder (CVR) tape revealed that the emergency evacuation did not begin until about 3 minutes after the aircraft stopped. The evacuation was initiated by the senior cabin attendant, who was stationed in the rear of the passenger cabin. Passengers were evacuated through 9 of the 12 available emergency exits. The cabin attendant's announcement over the public address system to "unfasten seatbelts," signaled the other cabin attendants to start the evacuation. However, the attendants, who were stationed in the rear cabin, were not standing by at their assigned evacuation stations when the order was given, because they were attempting to calm excited passengers. Eventually, four of these attendants reached the three exits in the rear cabin. The three other attendants were stationed at the emergency exits, from row 1 to approximately row 23. Despite shouted warnings not to use the overwing exits, at least eight used the two exits over the left wing; an overwing exit on the right side was opened, but was not used. Two passengers, who carried tote bags as they exited through a left overwing window, were among those injured. The evacuees had to stumble through smoke at various places inside the cabin, on the left wing, and at the bottom of the two left rear cabin escape slides.

When the Nos. 1 and 2 engines were shut down, all electrical power was cut off, and the public address system became inoperative. The senior cabin attendant then used hand signals and shouted directions. The two available portable megaphones were not used. Although the emergency lighting system operated normally after the aircraft's electrical system was cut off, one cabin attendant used a flashlight. According to some passengers, the meaning of the three-word instruction, "sit and slide," was not clear. In fact, they could not understand what was expected of them.

During the emergency evacuation, 34 passengers were injured, 3 of them seriously. Some passengers were injured when they fell from the escape slides. Slower moving passengers were struck from behind by

others who were jumping down the door slides. Still other passengers were injured as they jumped or fell from the edge of the left wing, or as they ran and stumbled away from the aircraft. The escape slides that were inflated manually operated normally. Three jetescape slides inflated normally; the fourth had to be inflated manually. A flight attendant, who had difficulty with the left forward boarding door, eventually succeeded in opening it with assistance from the captain. Later, examination of the door assembly disclosed no malfunction of the latching mechanism.

wavy tire imprints were found on the taxiway near the departure end of runway 15, but they could not be directly connected with this aircraft. About 1,200 feet down the runway, black rubber marks were more pronounced and were visible to the point where the aircraft stopped. These marks changed into shredded rubber deposits which were identified with the No. 7 tire. The corresponding print made by the No. 8 tire contained rubber smears and was considerably wider than normal. Metallic deposits were discernible in spots 3,700 feet and 5,700 feet down the runway.

An examination of the aircraft's right main landing gear revealed that:

1. The two rear tires and wheel assemblies (Nos. 7 and 8) had disintegrated and had sustained extensive fire damage. Maintenance and inspection data did not disclose any previous malfunction of these tires. The No. 7 tire had been recapped nine times, and the No. 8 tire had been recapped eight times. (See Appendix A.)
2. The forward inbound tire (No. 3) was deflated. It contained 6- and 8-inch wide holes in the tire casing. There was evidence of extensive fire damage.
3. The outboard forward tire (No. 4) was inflated, but sustained extensive fire damage. Fire also damaged the wheel assembly.

The flight engineer stated, "During my preflight inspection, all tires appeared satisfactory and brakes were not excessively warm." This inspection was conducted in the dark with the aid of a flashlight.

Segments of the No. 7 brake assembly had deteriorated from friction. A fuse plug in the No. 7 wheel was open (blown). The other brake assemblies in the right main landing gear showed no evidence of abnormal wear. The fuse plugs in the other three wheels had not blown.

The right inboard wing panel and flap assembly was heavily damaged by fire and flying debris. Fire also damaged a small area on the right side of the fuselage near the right wing root.

Comprehensive electronic tests were performed on the antiskid control shield. The equipment operated in accordance with specifications.

The eight antiskid wheel transducers were removed from the aircraft and tested. Five of the transducers operated normally; the remaining three could not be tested fully because of damage. Also, heat and fire damage prevented tests of the inboard and outboard dual servo antiskid valves.

The hydraulic filters in the hydraulic brake system did not contain excessive contaminants, and flow test results were within specified tolerances.

A review of the aircraft's maintenance records disclosed that the aircraft had been maintained according to Federal Aviation Administration (FAA) regulations and the company's procedures, (See Appendix B.)

ANALYSIS

The flightcrew and cabin attendants were qualified for the flight. (See Appendix C.)

The rubber and metal marks on the runway clearly indicate that the No. 7 tire on the right main landing gear deflated as the flight taxied for takeoff. The deflated tire precipitated the failure of, first, the No. 8 tire and, then, the No. 3 tire.

The subsequent disintegration of the Nos. 7 and 8 tires caused the metal wheels to contact the runway surface. Friction ignited the fire. Flying fragments of tire rubber and metallic debris caused structural damage to the underside of the wing.

The black wavy lines found on the runway were caused by the deflated No. 7 tire. The resulting overload on the No. 8 tire caused the imprint of its tread on the runway to be wider than normal.

The loud, muffled sound heard by the captain during the takeoff roll was evidently caused when the overloaded No. 8 tire failed. The aircraft jarred to the right side because it became unbalanced laterally when both rear tires to the right main landing gear failed.

The heavy friction damage to the No. 7 brake assembly and the blown fuse plug in that wheel indicate that the brake assembly had become overloaded, either from an excessive braking condition or from a malfunctioning brake component. The heat generated by this condition caused the fuse plug to blow which allowed air to escape from the No. 7 tire. The lack of any evidence of the distress in the immediate ramp area, and the flight engineer's observation during his preflight inspection that all tires and brakes appeared normal, indicate that the No. 7 tire deflated at some point during the taxi-out to runway 15.

Because of damage to the brake assembly and the anti-skid system, the reason for the brake overload could not be determined.

After the aircraft was stopped in the rejected takeoff, approximately 1 minute and 23 seconds elapsed before the first cabin door was opened. Although numerous remarks were passed among the flightcrew, the cabin attendants, and the tower about the location, intensity, and progress of the fire, the flightcrew did not attempt to assess the extent of it. The left engines idled for more than 3 minutes after the aircraft stopped and for nearly 2 minutes after the door light came on.

The CVR tape indicated that the flightcrew was not concerned about the intensity of the fire nor the immediate danger to the passengers. The captain did not go into the passenger cabin until the evacuation had begun. A flight officer should have gone to the cabin immediately after the aircraft stopped to assess the fire and to inform the captain of his findings. The captain did not use all available means of information regarding the location, intensity, and progress of the fire.

Wind forced smoke into the cabin through the open exits on the right side of the aircraft. Although some passengers and flight attendants reported that visibility was somewhat hampered by smoke and dim cabin lighting, the evacuation evidently was not delayed, nor were any of the injuries caused by restricted visibility in the cabin. If the smoke had been thicker or the aisles littered with debris, then it would be questionable whether emergency lights alone would have been enough to guide passengers and attendants to the exits. As past accidents have shown, personal flashlights carried by the cabin attendants are often the only source of illumination during emergency evacuation. A recent NTSB recommendation to the FAA has urged that portable, high-intensity lights be installed at each attendant's station. It is optional that air carriers instruct their cabin attendants to have flashlights readily accessible during landing and takeoff.

According to the carrier's operating procedures, an attendant should have been stationed at the overwing exits when the evacuation was ordered. However, because of the lack of effective communications between the flightcrew and the flight attendants regarding the extent of the fire and the possible necessity to evacuate the aircraft, the decision to evacuate was delayed and, in fact, was made by the senior flight attendant. As a result, most of the flight attendants were not at their assigned stations when the evacuation began. Moreover, the senior flight attendant was at the rear of the aircraft directing the evacuation via the public address system rather than at her assigned station at the overwing area where she would have had an excellent view of all exits. If she had used a portable megaphone to direct the evacuation, her shouted instructions would have been more audible and, therefore, more effective.

Despite instructions to the contrary from the flight attendants, some passengers used overwing exits, which caused major difficulties in the evacuation. Some passengers who went out on the left wing did not know how to get to the ground. Two of these passengers, who were carrying hand luggage during their egress, fell from the wing and were injured.

The evacuation of Flight 4655 took in excess of 3 minutes. The evacuation, conducted at night, involved a number of visibly excited, apprehensive, elderly persons, along with the other difficulties already described. These factors lead the Board to conclude that, although the evacuation was orderly and therefore successful, there were certain deficiencies present in the evacuation procedures as hereinbefore pointed out.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the undetected deflation of a right main landing gear tire as the aircraft was taxiing for takeoff. The additional loads imposed upon two other tires caused them to fail during the takeoff roll. Subsequently, the wheel assemblies were damaged. The fire was ignited by the friction produced between the metal wheels and the runway pavement.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

John H. Reed, Chairman, and William R. Haley, Member, were absent and did not participate in the adoption of this report.

February 7, 1974

APPENDIX A

WHEEL AND TIRE ASSEMBLY HISTORY

1. Position Number	3
2. Wheel Serial Number	B0925
3. Tire Serial Number (Goodyear)	2862161
4. Number of Recaps	3
5. Wheel Overhaul Date	March 14, 1973
6. Wheel Installed on Aircraft - N863F	April 24, 1973
7. Number of Takeoffs and Landings as of Accident Date	162

1. Position Number	7
2. Wheel Serial Number	H19/H118
3. Tire Serial Number (Goodyear)	OP11613
4. Number of Recaps	9
5. Wheel Overhaul Date	May 18, 1973
6. Wheel Installed on Aircraft - N863F	May 22, 1973
7. Number of Takeoffs and Landings as of Accident Date	79

1. Position Number	8
2. Wheel Serial Number	B1195
3. Tire Serial Number (Goodyear)	DX11506
4. Number of Recaps	8
5. Wheel Overhaul Date	N/A
6. Wheel Installed on Aircraft - N863F	May 31, 1973
7. Number of Takeoffs and Landings as of Accident Date	54

APPENDIX B

AIRCRAFT INFORMATION

Aircraft N863F is a McDonnell Douglas DC-8-63, serial No. 46001, which was leased to Overseas National Airways, Inc., by the Flying Tiger Line, Inc., of Los Angeles, California.

N863F was manufactured in October 1967 by the McDonnell Douglas Aircraft Company in Long Beach, California.

At the time of the accident, the aircraft had flown 18,453 hours, of which 5 hours were flown after the last maintenance was performed. The aircraft is equipped with four Pratt and Whitney JT3D-7 jet engines. The No. 1 engine, P67017, had a total of 15,136 flight hours; the No. 2 engine, P6713, had 12,757 flight hours; the No. 3 engine, P671201, had 14,994 flight hours; and the No. 4 engine had 12,531 flight hours.

APPENDIX C

CREW INFORMATION

Captain Robert W. Templeton, age 53, was employed by Overseas National Airways, Inc., on April 26, 1967. He possesses Airline Transport Pilot Certificate (ATE) No. 1741478, with ratings in airplane multiengine land and Douglas DC-8, and commercial privileges in Boeing 707/720. He has 16,864 flight hours, of which 4,800 hours were flown in the DC-8 aircraft. His first-class medical certificate, dated May 4, 1973, requires: "Holder shall possess correcting lenses for near vision while exercising the privileges of his airman's certificate."

First Officer Rasmus Nielsen, age 32, was employed by Overseas National Airways, Inc., on November 18, 1968. He possesses Airline Transport Pilot Certificate (ATE) No. 1618046, with multiengine land, single-engine land, and commercial privileges. He has 6,139 flight hours, of which 1,050 hours were flown in the DC-8 aircraft. His first-class medical certificate, dated June 4, 1973, has no limitations.

Flight Engineer Alvin F. Quack, Jr., age 44, was employed by Overseas National Airways, Inc., on July 22, 1966. He possesses Flight Engineer Certificate No. 1384677. He has 8,410 flight hours, of which 3,100 hours were flown in the DC-8 aircraft. His second-class medical certificate, dated October 19, 1972, has no limitations.

Overseas National Airways' records show the following information regarding cabin attendant emergency training. All recurrent training was accomplished on DC-8 type aircraft.

<u>Name</u>	<u>Date Hired</u>	<u>Initial Training</u>	<u>Recurrent Training</u>
Barney, S.	May 8, 1972	May 1972	Scheduled for June 1973
Gretz, C.	March 10, 1969	March 1969	January 1973
Harrington, G.	June 24, 1972	June 1972	June 1972
Hildebrand, P.	March 5, 1973	March 1973	
Martin, L.	March 5, 1973	March 1973	
Meyer, A.	April 3, 1972	April 1972	March 1973
Schaefer, J.	March 5, 1973	March 1973	