

AVIATION OCCURRENCE REPORT

RUNWAY OVERRUN

RELIANT AIRLINES INC.  
DASSAULT/SUD FAN JET FALCON N212R  
PETERBOROUGH AIRPORT, ONTARIO  
18 FEBRUARY 1998

REPORT NUMBER A98O0034

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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### *Summary*

The Dassault/Sud Fan Jet Falcon aircraft, serial number N212R, operated as Kitty Hawk Flight 2182 (KHA 2182), departed from Kansas International airport, Kansas, on a night instrument flight rules flight to Peterborough airport, Ontario. The flight had a crew of two and was transporting 2 922 pounds of automobile parts for a major automobile manufacturer.

The crew carried out a non-directional beacon (NDB) straight-in approach to runway 09 at Peterborough. The aircraft touched down within the runway touchdown zone but overran the 5 000 foot runway by 236 feet. The aircraft nose landing gear collapsed and the aircraft came to rest on the main landing gear and nose. The accident occurred at 0555 eastern standard time (EST)<sup>1</sup> during night hours at an elevation of 628 feet above sea level (asl) in instrument meteorological flight conditions. The crew were not injured and exited the aircraft unassisted through the main cargo door.

*Ce rapport est également disponible en français.*

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<sup>1</sup> All times are EST (coordinated universal time minus five hours) unless otherwise noted.

## *Other Factual Information*

The Peterborough airport is served by a single, east/west (09/27) oriented, 5 000-foot asphalt-surface runway that is 100 feet wide. The instrument approach to the airport is a non-precision NDB approach to runway 09. The runway final approach fix is the Peterborough low frequency non-directional radio beacon located 3.8 nautical miles from the threshold of runway 09. The inbound final approach fix crossing altitude is 1 800 feet asl with a minimum descent altitude of 1 200 feet asl (575 feet above ground level (agl)).<sup>2</sup> Landing from the approach is straight in. The flight crew did not report any difficulty receiving the radio signal from the Peterborough beacon or tracking to, or from, the non-directional radio beacon.

Runway 09 lighting consisted of high intensity runway threshold, runway end, and runway edge lighting. A precision approach path indicator system for aircraft with eye-to-wheel height of up to 10 feet is installed for runway 09. All available runway lighting was reported "ON" and set at strength 5 for the approach. The lighting was reported selected "ON" manually by airport personnel. The flight crew did not report any difficulty with the airport lighting system.

Runway conditions prior to KHA 2182's approach were reported as bare and wet with braking action reported as good by a Learjet aircraft flight crew that had landed on runway 09 a short time before KHA 2182. The airport runway maintenance crew reported sanding the runway, and they considered braking action to be good just prior to KHA 2182's landing. All of the above runway information was passed to and acknowledged by KHA 2182 flight crew on radio contact with company dispatch at Detroit, Michigan, while they were en route, and just prior to their approach when they were in radio communication on unicom frequency with a fixed-base operator at the Peterborough airport.

The aircraft landed within the touchdown zone with full trailing edge flap extended, and the speed brakes were extended immediately after touch down. The crew reported that the anti-skid braking action was fair for the initial portion of the landing roll but decreased to near nil as the aircraft decelerated from a touchdown speed of 125 knots. The captain, the pilot-flying, selected the anti-skid brake system off and deployed the aircraft drag chute when it became apparent that he might not be able to stop the aircraft before it ran off the end of the runway. He continued to apply maximum brakes but was not successful in stopping the aircraft on the runway. The aircraft drag chute was recovered 3 200 feet from the runway threshold at about the point the crew recollected deploying it. The crew reported that they had not released the drag chute from the aircraft after deploying it. The drag chute mechanism was examined after the occurrence and no mechanical defects were found. It was not determined why the chute released from the aircraft after it was deployed by the crew. The aircraft was not equipped with reverse thrust.

Weather observations at Peterborough airport are taken by a weather person between 0600 and 1600, Monday to Friday, and by an automated weather observation system (AWOS) during other hours, Monday to Friday. The AWOS weather observation, recorded at 0559, showed overcast cloud at 500 feet agl and a visibility of 2.5

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<sup>2</sup> A specified altitude referenced to sea level for a non-precision approach below which descent must not be made until the required visual reference to continue the approach to land has been established.

statute miles in light rain, while the observation taken by a weather person at 0600 reported overcast cloud at 700 feet agl and a visibility of 1.5 statute miles in light rain and snow. The wind was from 070 degrees true at 9 knots. Light rain was reported falling throughout the night and early morning hours with the temperature at 1 to 2 degrees above freezing. The visibility deteriorated to 3/8 of a mile in moderate snow, and wet snow accumulated on the runway surface immediately after the occurrence. The flight crew did not observe snow on the approach until after they had descended below the cloud base just inside the final approach fix, and it did not appear to them that there was any build-up of snow on the runway during the approach.

All four tires on the dual-wheeled aircraft main landing gear had an area of reverted rubber present (see Figure 1), indicative of hydroplaning. When hydroplaning occurs, the tires of the aircraft are completely separated from the actual runway surface and will continue to hydroplane until a reduction in speed permits the tire to regain contact with the runway surface. During total dynamic hydroplaning, the tire lifts off the runway and rides on the wedge of the water, causing such a complete loss of tire friction that wheel spin-up will not occur. On wet runways, where there is not enough water to cause dynamic hydroplaning, viscous hydroplaning can occur. This term describes the normal slipperiness or lubricating action of water. Viscous hydroplaning does not reduce the friction to such a low level that wheel spin-up will not occur. On the other hand, reverted rubber hydroplaning can occur when a locked tire is skidded along a very slippery water- or slush-contaminated runway, at any speed above about 20 knots, where the heat generated by friction produces steam and begins to revert the rubber, on a portion of the tire, back to its uncured state. The increase in stopping distance as a result of hydroplaning is impossible to predict accurately, but it has been estimated to increase by as much as 700 per cent. Performance graphs for the aircraft indicate that a landing distance of 4 400 feet was required for the aircraft at the calculated landing weight of 22 198 pounds. Landing distance was calculated for a bare, dry runway condition.



The captain was certified and qualified for the flight in accordance with existing regulations. He had a total flying time of 10 540 hours, of which 6 852 were on type, and had been employed by the company since 1989. He was familiar with the Peterborough airport, having operated the Falcon-type aircraft in there on many previous occasions. The first officer was certified and qualified for the flight in accordance with existing regulations. He had a total flying time of 3 575 hours, of which 585 were on type, and had been employed by the company for six months.

## *Analysis*

Based on the runway and weather reports received en route and just prior to their approach at Peterborough, the flight crew anticipated and planned for a landing on a bare, wet runway. This runway condition would not likely have significantly increased the aircraft landing distance from that of a landing on a bare, dry runway, and the crew would have had sufficient runway to land the aircraft and successfully stop on the runway. The precipitation changed to light snow and rain at about the time the flight crew commenced the approach into Peterborough. A film of slush and water that accumulated on the runway was sufficient to cause hydroplaning

but not of sufficient depth to be visible to the crew on approach.

The reduced braking action on the wet runway prevented the aircraft from decelerating normally with the anti-skid brake system activated. Despite the fact that an anti-skid brake system would provide a better braking action than a conventional braking system, the captain decided to switch off the anti-skid braking system. When the anti-skid system was deactivated, the wheels locked in a skid, the hydroplaning reduced the braking action to near nil, and the aircraft travelled off the end of the runway.

The crew deployed the aircraft drag chute but, for undetermined reasons, the aircraft drag chute did not remain attached to the aircraft to help achieve a shorter landing distance.

### *Findings*

1. Precipitation changed from light rain to snow and rain at or near the time at which the flight crew commenced their approach to the airport.
2. The runway surface was contaminated with a thin layer of slush at the time the aircraft landed.
3. The aircraft main landing gear tires hydroplaned on landing roll, reducing the aircraft braking action.
4. The aircraft main landing gear wheels locked in a skid when braking was applied with the brake anti-skid system deactivated.
5. The drag chute, when deployed , did not remain attached to the aircraft.
6. The aircraft overran the end of the runway.

### *Causes and Contributing Factors*

The aircraft hydroplaned and overran the runway, probably as a result of the anti-skid brake system being selected off and maximum brakes being applied. It was not determined whether having the anti-skid system selected would have prevented the overrun, but the distance to a full stop would have been reduced.

Contributing to this occurrence was the lack of aerodynamic braking, a result of the drag chute becoming detached.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles H. Simpson and W.A. Tadros, authorized the release of this report on 29 October 1998.*