



## AVIATION INVESTIGATION REPORT

A04A0057



### WING SCRAPE DURING A REJECTED LANDING

**CARGOJET AIRWAYS LIMITED**

**BOEING 727-225 C-GCJB**

**GREATER MONCTON INTERNATIONAL AIRPORT**

**MONCTON, NEW BRUNSWICK**

**28 MAY 2004**

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.

## Aviation Investigation Report

### Wing Scrape During a Rejected Landing

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Boeing 727-225 C-GCJB  
Greater Moncton International Airport  
Moncton, New Brunswick  
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Report Number A04A0057

#### *Summary*

Cargojet Airways Flight 620, a Boeing 727-225 freighter (registration C-GCJB, serial number 21855) was a night cargo flight from Hamilton, Ontario, to Moncton, New Brunswick. The first officer was performing the pilot flying (PF) duties, and the captain was conducting a line check on the first officer. The en route portion of the flight to Moncton was uneventful. On arrival at Moncton, the flight crew conducted two unsuccessful approaches in darkness and poor weather conditions before landing on the third approach.

A post-flight inspection of the aircraft in Moncton found visible damage on the left wing. The tip of the left outboard leading edge flap and the outboard trailing edge flap "canoe" were abraded. The damage was consistent with a slight contact with the runway. Available information indicates that the wing scrape occurred at 0241 Atlantic daylight time during the rejected landing after the second approach. The aircraft was at a pitch angle of five degrees nose up, 14 degrees of left bank, and a derived aircraft height above ground of approximately 26 feet. There were no injuries.

## *Other Factual Information*

### *Weather Observation Procedures at Moncton*

Weather observations at Moncton are made by a private company, ADGA Group Consultants Incorporated, under contract with NAV CANADA. ADGA personnel, in accordance with the *Manual of Surface Weather Observations* (MANOBS), conduct hourly weather observations and, in the case of deteriorating weather, release special weather observations. The observations are used to provide hourly reports, special observation reports, and ATIS (automated terminal information service) broadcast information. MANOBS amendment No. 9, dated September 1987, page xiv, paragraph entitled "Duties," states that while on duty, weather observers are required to keep a close and continuous watch on the weather. Check observations are to be taken between regular hourly observations to ensure that significant changes in weather do not remain unreported. A check observation is also required when a pilot report (PIREP) is received from an aircraft within 1½ statute miles (sm) of the airfield and the PIREP indicates that weather conditions, as observed by the pilot, differ significantly from those reported from the current observations.

The weather observer was not advised that the weather was significantly lower than what was being reported, and broadcast on the ATIS until after Flight 620 had missed landing on two approaches. When air traffic control (ATC) advised the observer of this, the observer immediately carried out an observation that was released at 0249. By this time, however, the flight was under vectors for the third approach, and the crew did not receive the 0249 report. The weather observers do not have access to area forecasts, satellite information, radar data, or observations from other airports.

To determine the height of the ceiling at night, the observers have a ceiling projector and alidade (a sighting device for measuring angles). Using this equipment is time consuming and, because it is a manual task, there is no continuous readout available for the observer. This alidade at Moncton is not ideally located. High intensity ramp lighting mounted on the building interfered with its use, and buildings immediately adjacent give the observer only 20° of arc (out of 180°) for estimating the amount of cloud cover.

### *Weather Forecast and Actual Conditions*

The Moncton aerodrome forecast for the period covering the incident was as follows: visibility 6 sm in mist; overcast ceiling 800 feet; temporarily 3 sm in mist. Between 0300 and 0600 Atlantic daylight time,<sup>1</sup> the forecast was as follows: ¾ sm in mist; overcast ceiling 300 feet.

The Moncton ATIS provided the following broadcast information:

ATIS Alpha for 0100 (received by the flight crew prior to descent) was as follows: ceiling (measured) 1100 feet overcast; visibility 15 sm; wind 100° Magnetic (M) at 3 knots; temperature 9°C; dew point 8°C.

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<sup>1</sup> All times are Atlantic daylight time (Coordinated Universal Time minus three hours).

ATIS Bravo for 0200 (received by the flight crew during descent) was as follows: ceiling (estimated) 1100 feet overcast; visibility 10 sm; wind 080° M at 3 knots; temperature 9°C; dew point 8°C.

ATIS Charlie, a 0246 weather special issued at 0249 (not received by the flight crew) was as follows: ceiling (estimated) 1100 feet overcast; visibility 1½ sm; wind 090° M at 3 knots; temperature 9°C; dew point 8°C.

The 0300 METAR<sup>2</sup> reported a ceiling (estimated) at 1100 feet and visibility 1 sm in fog.

The hourly weather reports for 0100 to 0300 for Greenwood, the filed alternate, indicated the lowest ceiling and visibility to be 1400 feet overcast and 3 sm. Because the crew expected the weather at Moncton to be well above minimums for landing, they did not update the weather for Greenwood.

### *Approaches*

The flight data recorder (FDR) and cockpit voice recorder (CVR) were removed from the aircraft and sent to the TSB Engineering Branch for analysis. The CVR had recorded 30 minutes of good quality audio; however, all in-flight information was overwritten when the CVR continued to operate after the final landing. The CVR did record crew comments after this landing. The FDR recorded good data on all channels. The FDR data was used to create an animation, which was used to analyse the second approach.

The first approach flown by Flight 620 was a straight-in, localizer back-course approach to Runway 11. The aircraft was still in cloud when it descended below the reported ceiling of 1100 feet above ground level (agl) and remained in cloud at the minimum descent altitude (MDA), 270 feet agl. Without adequate visual reference to land, the crew carried out a missed approach at 0231. It was calculated that the fuel remaining after this approach was about 10 100 pounds.

Flight 620 was then radar vectored for an instrument landing system approach (ILS) to Runway 29. While the aircraft was being vectored to the final approach course, the altitude hold function of the autopilot was malfunctioning, causing the aircraft to deviate from the selected altitude, and the first officer disconnected the autopilot to manually fly the approach. The aircraft was configured for a flap-30 landing. On reaching decision height at 200 feet agl, the flight crew saw the approach lights. The aircraft was slightly right of the extended centerline and on a corrective heading for the on-course. At about 150 feet agl, the first officer banked the aircraft to the right to acquire the runway centerline. He continued the correction until the aircraft was positioned near the right edge of the runway at about 40 feet agl. The first officer corrected once again toward the centerline and, at about 20 feet above the runway, with 14 degrees left bank, reduced the power to land. (It is estimated that the aircraft reached minimum diversion fuel upon completion of this approach.) At this point, the captain took control, applied power, and increased pitch to five degrees nose up to reject the landing. Before the wings were leveled, the left-wing leading-edge slat and trailing-edge flap scraped the runway. At the time, the flight

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<sup>2</sup> METAR is the international meteorological code for an aviation routine weather report.

crew were unaware that the aircraft had contacted the runway. Flight 620 was vectored for another Runway 29 ILS approach. The captain flew the approach and landed on Runway 29 at 0253.

The approaches were flown in accordance with the company's Standard Operating Procedures (SOPs). According to the SOPs, the PF conducts the instrument approach and the pilot not flying (PNF) monitors the approach, communicates with ATC, and makes the standard crew calls. Once minimums are reached, a decision is made as to whether there are sufficient visual references to allow transition from flight instrument references to external visual references for the landing. The SOPs call for a missed approach to be initiated if the aircraft is not on profile laterally and vertically when below 1000 feet agl.

### *Flight Crew*

The captain had acquired a total flight time of 40 000 hours, including 9000 hours on this type of aircraft. The first officer had 5000 hours total flight time, with 600 hours on type. The flight crew were reported to have been well-rested prior to the flight. Fatigue was not considered a factor in the occurrence.

### *Fuel*

The fuel remaining on board the aircraft during the third approach was below the minimum required diversion fuel (min div fuel) of 8680 pounds. At shut down in Moncton, the fuel remaining on board the aircraft was 6400 pounds. The company *Flight Operations Manual* (FOM) states that "Upon reaching MIN DIV fuel, the flight MUST proceed immediately to the alternate airport, unless an imminent landing at destination is reasonably assured."

### *Analysis*

The Moncton weather forecast called for a marked decrease in ceiling and visibility starting at 0300; however, this transition was already underway when Flight 620 flew the first approach at about 0230. The crew were unable to see the runway environment at the MDA of 270 feet agl, while the 0200 ATIS information stated that the ceiling was 1100 feet with a visibility of 10 sm. On the second approach, the crew did not see the runway lights until they had descended to 200 feet agl, at about 0240. The reported weather remained unchanged until after the second approach. A weather special released at 0249 reported that ceiling and visibility were 1100 feet and 1½ sm. By this time the crew had already commenced their third approach, and they did not receive the 0249 report. Although the deterioration in the weather had been accurately forecast for this period, the frequency of the observations were not adequate to capture the weather deterioration.

The decrease in ceiling and visibility was not detected by either the controllers or the weather observers, and no special observation was requested until after the second missed approach. The provision of more data to the weather observer, such as forecasts or pilot reports, might have prompted additional check observations. Also, better guidance as to when additional check observations are required, including specific reference to the consideration of forecasts,

temperature/dew point spread, etc. might have ensured the completion of additional check observations so that the change in visibility would have been detected prior to Flight 620's first approach.

Valid weather information is a critical element in good pilot decision making. When the destination weather is reported to be at or near minimums, crews update weather information, choose the approach most likely to be successful, and make plans for a possible diversion prior to the approach at destination. However, when the destination weather is reported to be well above minimums, crews anticipate a successful approach and landing and may forgo alternate planning and choose the most expedient approach likely to be successful.

The Moncton 0200 weather report received during descent for the first approach was as follows: estimated 1100 feet overcast, visibility 10 sm. Based on this report, the crew planned for and executed a straight-in, localizer back-course approach to Runway 11, anticipating no difficulties. Consequently, they did not plan for a diversion, and the approach choice was based upon the most expedient approach for the reported weather conditions. Had the reported weather reflected the actual lowered ceiling and visibility, the crew would likely have planned for a diversion and conducted an ILS approach to Runway 29 as their first approach. This option would have increased the chances of landing successfully on the first approach and avoided the low fuel state.

From post-flight calculations, there was enough fuel on board to allow a second approach. Although the aircraft was not laterally positioned to land on the second approach, the captain did not intervene to reject the landing until the aircraft was in a substantial left-wing down attitude, very near the runway surface, with power reduced. During the rejected landing the aircraft's wings were not leveled until after the nose was raised, resulting in the left wing contacting the runway. After the rejected landing there was min div fuel on board. At this time, the captain was faced with the decision to attempt a third approach in known conditions or proceed to the alternate airport without up-to-date weather information. Potentially, they could arrive at the alternate with a worse fuel state and in adverse weather conditions. The decision to attempt the third approach was inconsistent with the intent of the FOM. However, the captain was well aware of the weather conditions and that an imminent landing at Moncton was reasonably assured.

### *Findings as to Causes and Contributing Factors*

1. The captain's decision to intervene and reject the landing on the second approach was too late to prevent the aircraft from contacting the runway surface.
2. The aircraft's wings were not leveled until after the nose was raised, resulting in the left wing contacting the runway.

### *Finding as to Risk*

1. The forecasted deteriorating weather was not detected or reported in a timely manner.

## *Other Findings*

1. The aircraft landed with less than the minimum diversion fuel required in the *Flight Operations Manual* (FOM); however, the decision to carry out the third approach could be considered reasonable in the circumstances faced by the captain.
2. The weather conditions reported to the crew were not representative of the actual weather conditions at the airport. This contributed to the planning errors made by the crew and the unnecessarily low fuel state.

## *Safety Action*

The section dealing with minimum required diversion fuel in the operator's FOM has been amended. The amended version reads as follows:

"Upon reaching MIN DIV fuel, the flight MUST proceed immediately to the alternate airport."

Transport Canada is proposing changes to the *Canadian Aviation Regulations* that will define the use of pilot-monitored approaches as part of the new approach ban regulations.

In response to this occurrence, Transport Canada regional staff conducted an inspection of the weather observation service at Moncton on 05 October 2005. As a result of the findings, the flood lights near the ceiling projector were adjusted to reduce interference with weather observations, and NAV CANADA has implemented new procedures to improve the communication of information related to changing weather conditions between the weather office and the tower personnel.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 01 September 2005.*

*Visit the Transportation Safety Board's Web site ([www.tsb.gc.ca](http://www.tsb.gc.ca)) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.*

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# Appendix A: ILS Approach to Runway 29 at Moncton

**CANADA AIR PILOT / GPH 200**  
Effective 0901Z 16 JUNE 2004 to 0901Z 6 AUGUST 2004



**NOT FOR NAVIGATION**

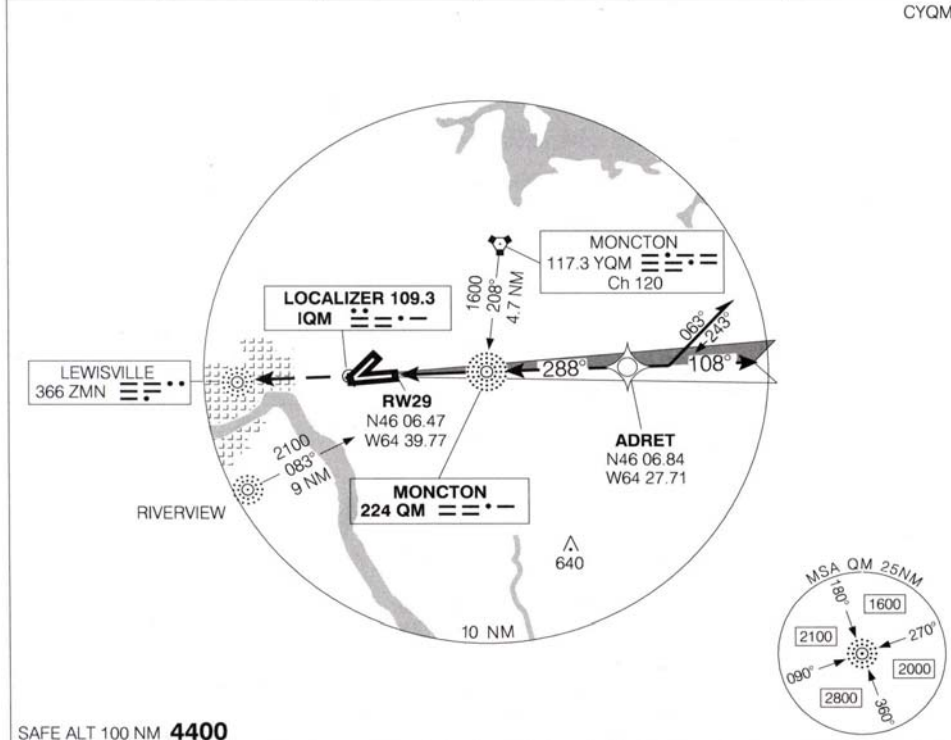
ILS or NDB RWY 29 (GPS)

Geomatics Canada

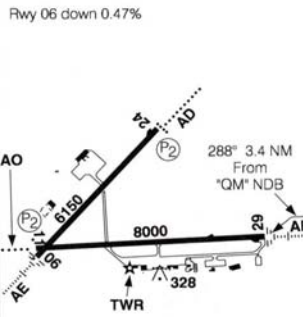
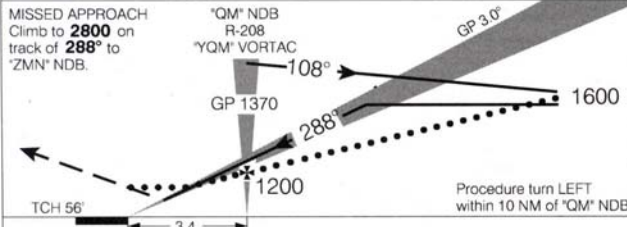
MONCTON/GREATER MONCTON INTL  
MONCTON NEW BRUNSWICK

<b>ATIS</b> 128.65	<b>ARR</b> 124.4 384.8	<b>TWR</b> 120.8 236.6	<b>GND</b> 121.8 275.8	<b>DEP</b> 124.4 384.8	<b>ELEV 232</b>
					<b>TDZE 29 232</b>

CYQM



SAFE ALT 100 NM **4400**



CATEGORY	A	B	C	D
ILS	<b>432</b>	(200)	1/2 RVR 26	
LOC LOC/VOR	<b>560</b>	(328)	1 RVR 50	
NDB	<b>600</b>	(368)	1 RVR 50	
CIRCLING	<b>740</b>	(508)	1 1/2	<b>740</b>
				(608)

*QM* NDB to MAP 3.4 NM					
Knots	70	90	110	130	150
Min:Sec	<b>2:55</b>	<b>2:16</b>	<b>1:51</b>	<b>1:34</b>	<b>1:22</b>

ILS or NDB RWY 29 (GPS)

N46 06 44 W64 40 43 VAR 20° W

MONCTON NEW BRUNSWICK

EFF 19 FEB 04 CHANGE: 2003 Mag Var

MONCTON/GREATER MONCTON INTL

**NOT FOR NAVIGATION**

NAD83

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