

Transportation Safety Board  
of Canada



Bureau de la sécurité des transports  
du Canada

## AVIATION INVESTIGATION REPORT

A02P0004



### OPERATING IRREGULARITY

NAV CANADA

COMMUNICATIONS EQUIPMENT FAILURE

VANCOUVER AREA CONTROL CENTRE

04 JANUARY 2002

Canada

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

### Operating Irregularity

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Communication Equipment Failure  
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### *Summary*

At approximately 0835 local time, a communication failure occurred while Westjet Flight 25 (WJA25), a Boeing 737-200, was on radar vectors for an instrument landing system (ILS) approach to Runway 09 at Victoria International Airport. The Victoria terminal controller instructed the flight to turn to intercept the localizer; however, WJA25 did not respond. The controller made five transmissions to the aircraft over a one-minute period. The controller also checked with the Victoria tower controller to determine if the aircraft had changed frequency, requested that a controller from an adjacent control position confirm the serviceability of the Area Control Centre (ACC) communication system, and selected frequency 121.5 MHz in preparation to call the aircraft on an alternate (emergency) frequency. After his fifth transmission on the operational frequency, the controller heard the crew of the aircraft respond and he instructed them to turn to intercept the localizer. Even though the crew made an immediate turn, the aircraft entered a higher minimum vectoring altitude (MVA) area.

The communication failure resulted when the frequency being used by the controller (133.85 MHz) was prematurely taken off the air for maintenance. The communication outage lasted 61 seconds and took place during the time that the controller was trying to issue the vectors to WJA25.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

Routine maintenance is required on all communication and navigation equipment. Within Nav Canada, this type of maintenance is scheduled well in advance and is carried out dependant on a number of factors including weather, traffic flow, and availability of alternate equipment. When equipment is scheduled to be shut down or removed for planned maintenance, a Notice to Airmen (NOTAM) is issued to inform appropriate personnel of the planned outage and the expected time that the equipment will be returned to service. This NOTAM is advisory in nature and not a pre-requisite to equipment shut down or removal. When a NOTAM is issued, information relevant to controller operations is entered into the controllers' operational information display system (OIDS) for immediate reference at control positions.

The NOTAM process follows a rigorous protocol, which ensures, in part, that a NOTAM can only be originated by an appropriate approval authority. During the time leading up to this occurrence, the Vancouver ACC attempted to originate a NOTAM to inform users that the peripheral station (PAL)<sup>1</sup> at Victoria was to be removed for maintenance. This action was delayed when an incorrect protocol was used to initiate the NOTAM. The process used to release equipment for maintenance is governed by Nav Canada's Manual of Technical Operations and by the associated work instructions. In part, the procedure requires that coordination be accomplished between the technical staff, who service the equipment, and the controllers, who use the equipment.

In this occurrence, a voice communication between the technical operations coordinator in the Vancouver ACC and the electronic systems technologist at the PAL site was misinterpreted; the technologist understood that the frequency had been released for maintenance. Based on his interpretation, he removed an active radio frequency (133.85 MHz) from service before the required coordination had been accomplished.

When the frequency was removed from service, the Victoria terminal controller was in the process of vectoring WJA25 to what Vancouver ACC controllers refer to as a "short gate" for an ILS approach to Runway 09 at Victoria.

The term "short gate" is not defined in either Transport Canada or Nav Canada aviation lexicons. In general terms, it means that the controller vectors the aircraft to intercept the localizer at a point closer than normal to the runway. Nav Canada's *Air Traffic Control Manual of Operations* (MANOPS) suggests the use of published arrival routes for efficiency, but allows controllers to vector an aircraft to the final approach path, providing the aircraft is established on the localizer at a point that is at least two miles prior to glide path interception. This procedure normally allows pilots sufficient time to set up a stabilized<sup>2</sup> final approach and to intercept a glide path using automated systems. The safety benefit of a stabilized approach during the final

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<sup>1</sup> PALs are remote transmitters/receivers used by air traffic control throughout Canada. They are usually located in remote areas on mountains to provide adequate line-of-sight coverage for aircraft operating in the area. The PALs stations are connected to a central air traffic service (ATS) centre by a combination of technologies as determined by the telephone company.

<sup>2</sup> The term "stabilized" means that the aircraft is in the final approach configuration, is at the appropriate approach speed, and is established on both the localizer and glide-path.

stage of a descent for landing has long been recognized, and most company operating procedures require that a go-around be conducted if an approach is not stabilized by a pre-determined height above ground. Controllers are also permitted to vector an aircraft closer than the normal two-mile glide path intercept point under certain specific conditions. In this occurrence, the aircraft was being vectored to intercept the localizer slightly high on the glide path, rather than to the MANOPS minimum prior to interception of the glide path. The procedure had been initiated by the controller rather than requested by the pilot and, as such, was not in accordance with direction provided in Nav Canada's MANOPS.

Use of a "short gate" procedure reduces the flight time for the aircraft and is considered, by some controllers, to be more efficient than the published arrival procedure to the airport (Duncan Arrival), or the normal vectoring procedure outlined in the MANOPS. Although this procedure is purported to save arriving aircraft about 15 miles of flight distance, it normally requires pilots to intercept the localizer from a position above the glide path. This can increase aircrew workload and, in some cases, impedes the use of the aircraft's automated systems. Additionally, when a controller vectors an aircraft to the "short gate" at Victoria, the aircraft may have to be cleared to descend and placed on a heading that directs it toward higher ground to the south of the localizer. Because of terrain features in the Victoria area, this vectoring procedure demands vigilance on the part of the controller, as well as unimpeded communication until an aircraft has intercepted the localizer and is established on the final approach course.

Nav Canada supervisors previously recognized an increased risk in this procedure and issued an Operations Bulletin (01-151) which stated, in part, that controllers were not to descend aircraft to the lower MVAs until a turn to intercept the final approach course or clearance for the ILS had been issued and/or the aircraft had been instructed not to go through the final approach course. Nav Canada's Operations Bulletins are valid for a specific period, pending incorporation of the procedures into other directives. Operations Bulletin 01-151 had lapsed four days before this occurrence, and the procedures outlined by the bulletin were not followed.

Communication failure procedures are well established and understood by aircrew and controllers alike. In the event of a loss of communication, while on vectors for an ILS approach to Runway 09 at Victoria, the crew is expected to select a specific transponder code, climb to a published safe altitude, and follow the last assigned route to the airport which, in this case, would be the localizer track. However, a loss of communication may not be immediately apparent to a crew, and it is possible that there will be a delay before the crew initiates the lost communication procedures. While on vectors to a short gate at Victoria, because of terrain considerations, it is imperative that an approaching aircraft not be allowed to proceed south of the localizer track.

The Boeing 737-200 involved in this occurrence was equipped with an operational ground proximity warning system (GPWS), installed to alert the flight crew when the aircraft is too close to the terrain.

When the frequency was removed from service, alarm signals<sup>3</sup> activated and the problem was immediately apparent to the technical operations coordinator within the ACC; technical personnel were able to correct the error within 61 seconds. When the radio frequency was re-established, WJA25 was crossing through the localizer at about 90 degrees to the final approach path. Once radio communications were re-established, WJA25 responded immediately and turned to re-intercept the localizer and complete the approach.

## *Analysis*

A NOTAM is normally issued prior to removing equipment from service. This NOTAM was delayed because of an error in format and was not issued until after the loss of communication occurred. Because of the delay in issuing the NOTAM, relevant information about the scheduled removal of the frequency was not entered into the controllers' OIDS.

When the frequency was removed from service, the warning systems worked correctly. The technical operations coordinator was immediately aware that the frequency had failed and acted directly to have it returned to service; this was accomplished in about 61 seconds.

In this occurrence, when communications were lost, the controller was at a critical point in the vectoring procedure. Because the controller had not provided alternate instructions, he had to rely on the aircrew to recognize that a communication failure had occurred. There was no stated requirement that the controller provide alternate instructions, as the Operations Bulletin requiring this procedure had expired.

WJA25 was not immediately aware that a communication failure had occurred. However, based on their previous experience flying into Victoria, the crew anticipated a quick turn to final. When the clearance to turn was not received, and as their aircraft approached the localizer, they were preparing to contact the controller and, if necessary, turn to establish their aircraft on the localizer. The crew's prior experience flying into the airport, and their knowledge of the local terrain provided a level of safety not present under other circumstances. Without such prior knowledge, warning about high terrain to the south of the localizer would have been dependent on the GPWS.

## *Findings as to Causes and Contributing Factors*

1. The controller descended the aircraft to the lower MVA before providing clearance for the ILS approach, and did not provide any alternate instructions regarding high ground south of the localizer.
2. An active communication frequency was prematurely removed from service following a misunderstanding of a voice communication between technical staff, resulting in a loss of communications between the controller and WJA25.
3. A previous Operations Bulletin (01-151), requiring controllers to instruct aircraft not to proceed south of the final approach course when on vectors for an ILS to Victoria's Runway 09, had lapsed four days prior to the occurrence.

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<sup>3</sup> PALs are monitored within the ACC.

## *Other Findings*

1. Use of the "short gate" procedure into Victoria, as observed in this occurrence, was not in accordance with direction provided in Nav Canada's MANOPS.

## *Safety Action*

Following this occurrence, the Vancouver ACC reviewed the NOTAM process and identified a number of changes that were required in the activation protocol. These changes were initiated within the ACC.

The Vancouver ACC reviewed existing procedures and phraseology used when coordinating the removal of operational equipment for maintenance purposes. This review resulted in amendments to the procedures and a formalization of the terminology used to confirm the release of the equipment.

Nav Canada has initiated a program to establish a back-up, tuneable PAL for use in the event of communications failure. The plan is to provide additional radio equipment which can be instantly accessed from control positions in the Vancouver ACC.

As an interim measure, Vancouver ACC issued an Operations Bulletin (02-036), requiring that alternate instructions be issued to aircraft when a controller vectors an aircraft toward higher terrain. Nav Canada subsequently revised the Victoria Terminal Operations Letter (00-1) to integrate new procedures that are to be used when vectoring an aircraft toward high ground, or when using a "short gate" rather than the published arrival into Victoria.

On 18 April 2002, additional spot heights were added to the Victoria approach charts to aid in pilot terrain awareness.

Effective 03 October 2002, the ILS approach chart for RW09 will depict a warning for mountainous terrain in the NW and SW quadrants.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 23 October 2002.*

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