

**Report 09-006, Cessna 207, ZK-DEW aircraft starting incident resulting in runway incursion,
Queenstown Aerodrome. 5 September 2009**

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Report 09-006

**Cessna 207
ZK-DEW**

aircraft starting incident resulting in runway incursion

Queenstown Aerodrome

5 September 2009



Cessna 207, ZK-DEW

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Abbreviations

CAA	Civil Aviation Authority (of New Zealand)
CAR	Civil Aviation Rule(s)
CCTV	closed circuit television
ICAO	International Civil Aviation Organization
IIC	investigator-in-charge
m	metre(s)
mm	millimetre(s)
MSSF	Milford Sound Scenic Flights Limited
rpm	revolution(s) per minute
TAIC	Transport Accident Investigation Commission
UTC	coordinated universal time

Data Summary

Aircraft registration:	ZK-DEW
Type and serial number:	Cessna 207, 20700161
Number and type of engines:	one Teledyne Continental IO-520
Year of manufacture:	1970
Operator:	Milford Sound Scenic Flights Limited (MSSF)
Date and time:	5 September 2009, 0916 ¹
Location:	Queenstown Aerodrome latitude: 45° 01.3' south longitude: 168° 44.3' east
Type of flight:	regular commercial transport
Persons on board:	crew: one passengers: 5
Injuries:	nil
Nature of damage:	nil to aircraft minor to marker board and equipment
Pilot's licence:	commercial pilot licence (aeroplane)
Pilot's age:	38
Pilot's total flying experience:	2770 hours (855 hours on type)
Investigator-in-charge:	IR M ^c Clelland

¹ All times in this report are in New Zealand Standard Time (UTC +12 hours) and expressed in the 24-hour mode.

Executive Summary

Investigation conduct

The Transport Accident Investigation Commission was alerted to the incident at about 0900 on Tuesday 22 September 2009. The Commission elected to investigate and at 0955 an investigator-in-charge (IIC) was appointed. During the investigation the IIC visited Queenstown Aerodrome and interviewed the pilot of ZK-DEW, the office coordinator and witnesses to the incident. A copy of the closed circuit television recording was obtained and the IIC met with representatives of the operator, Milford Sounds Scenic Flights Limited. Relevant Civil Aviation Authority and operator records were also reviewed.

A draft copy of the report on this incident was sent to 'interested persons' for comment on 8 April 2010. The final report on this incident includes any changes accepted as a result of submissions received.

The incident

On Saturday 5 September 2009 the Cessna 207 aircraft had been loaded with 5 passengers for a trip from Queenstown to Milford Sound. Owing to a faulty battery the aircraft would not start using the conventional key-start system.

The pilot placed another company employee, who was not a pilot or an engineer, in the left-hand seat, set the handbrake and set the ignition and engine controls for a hand-start procedure. The pilot succeeded in starting the engine by swinging the propeller, but as the employee sitting in the left-hand seat did not understand how to operate the foot brakes, and had inadvertently disengaged the handbrake, the aircraft started moving forward at a speed that the pilot could just match.

The aircraft left the apron area and entered the grassed Zone 2 protection area adjacent to the main runway before stopping. It was therefore classed as a runway incursion because permission from air traffic control was required before entering the Zone.

The operator had established a procedure for hand-starting aircraft in exceptional circumstances; however the procedure did not meet the standards recommended by the Civil Aviation Authority in a published article in its monthly magazine, and the pilot did not follow the procedure anyway.

Nobody was injured and the aircraft was not damaged. A safety recommendation was made to the Director of Civil Aviation to promote further awareness of the risks involved in hand-starting aircraft.

Factual Information

1.1 History of the incident

- 1.1.1 On Saturday 5 September 2009, ZK-DEW, a Cessna 207 aeroplane, was programmed to be used for a routine scenic flight from Queenstown to Milford Sound and return. The flight was part of a package tour for 5 passengers that also included a boat trip in Milford Sound. The approximately 20-minute flight to Milford Sound was planned to depart Queenstown at about 0900 to allow sufficient time for the passengers to meet a cruise boat departing at 0955.
- 1.1.2 The pilot arrived at the aerodrome at about 0800 and completed a pre-flight inspection of ZK-DEW. The pilot started the aircraft normally, did a ground run check, then taxied it to the general aviation apron where it was shutdown in preparation for loading (see Figure 1). The pilot then returned to MSSF's (the operator's) office in the terminal to collect the passengers for the flight.
- 1.1.3 At about 0900, after loading the passengers and giving a safety briefing, the pilot attempted to start the aircraft using the normal key-operated electric starter. According to the pilot, "the propeller turned to the first compression but [the engine] didn't fire". Further attempts to start the engine by the same means were unsuccessful. The pilot turned off the ignition switch² and asked a pilot at a nearby aircraft to turn the propeller over several times. The second pilot, who was from the same company, was also preparing to depart to Milford Sound but agreed to assist initially. After the propeller was rotated several times the pilot tried to start the engine again using the electric starter, but without success.
- 1.1.4 The pilot turned off all the switches and using his cellular phone called the operator's office and requested the flight coordinator to bring a back-up starter pack to the aircraft. The pack included an aircraft battery and connection. The flight coordinator, who had no piloting experience, located the starter pack and delivered it to ZK-DEW. After connecting the starter pack to the power receptacle on the aircraft, the pilot attempted to start the engine, and again the engine would not rotate and fire.
- 1.1.5 The pilot left the aircraft and asked the flight coordinator to sit in the pilot's seat and hold his feet on the brakes while the pilot attempted a "hand start".³ The flight coordinator sat in the pilot's seat and pointing to the pedals confirmed with the pilot that they were the brakes. The pilot leaned in the door, located next to the pilot's seat on the forward left side of the aircraft, confirmed the location of the brakes and set the park brake fully on. The mixture lever was still set to full rich and the throttle control was set forward about 5 mm. The pilot then turned the ignition switch to BOTH.
- 1.1.6 The pilot moved to the front of the aircraft and began to rotate the propeller. After about 10 to 15 rotations the engine fired and rapidly increased its speed to what the pilot estimated to be about 1500-1700 revolutions per minute (rpm). The pilot later said that when he walked around to the left side of the aircraft to the pilot's door, the aircraft started to move forward, dragging the still-attached starter pack.
- 1.1.7 As the aircraft accelerated, the pilot tried unsuccessfully to lean in the door and reach past the flight coordinator to close the throttle, at the same time instructing the flight coordinator to apply braking. The flight coordinator tried to apply the foot brakes to bring the aircraft to a halt, but with no success. The aircraft veered left, crossed the apron and moved onto the grass towards the runway. The starter pack pulled itself free of the aircraft as it approached the grass area. As the aircraft crossed the apron the flight coordinator turned off the ignition switch and stopped the engine. As the aircraft slowed, it ran onto the grass area adjacent to the runway and

² The ignition was a multi-position, key-operated switch with positions, OFF, Left, Right, BOTH and START, and controlled electrical power to the magnetos and starter.

³ A procedure where the ignition is turned on and the propeller is swung or rotated by hand to initiate engine starting. Sometimes call swing starting or hand swinging.

struck and damaged a marker board. The aircraft came to a halt a few metres past the marker board and about 40 m from the runway. There were no injuries.

- 1.1.8 The operator and airport staff escorted the passengers across the apron and back to the operator's office. The aircraft was then pulled clear of the runway protection area. Using a second starter pack the aircraft was started and the pilot taxied it back to the apron and ran the engine for about 15 minutes before shutting down. The aircraft was then restarted by normal means and run for a further 10 minutes. At about 1100 the passengers were reboarded and the flight continued as planned.

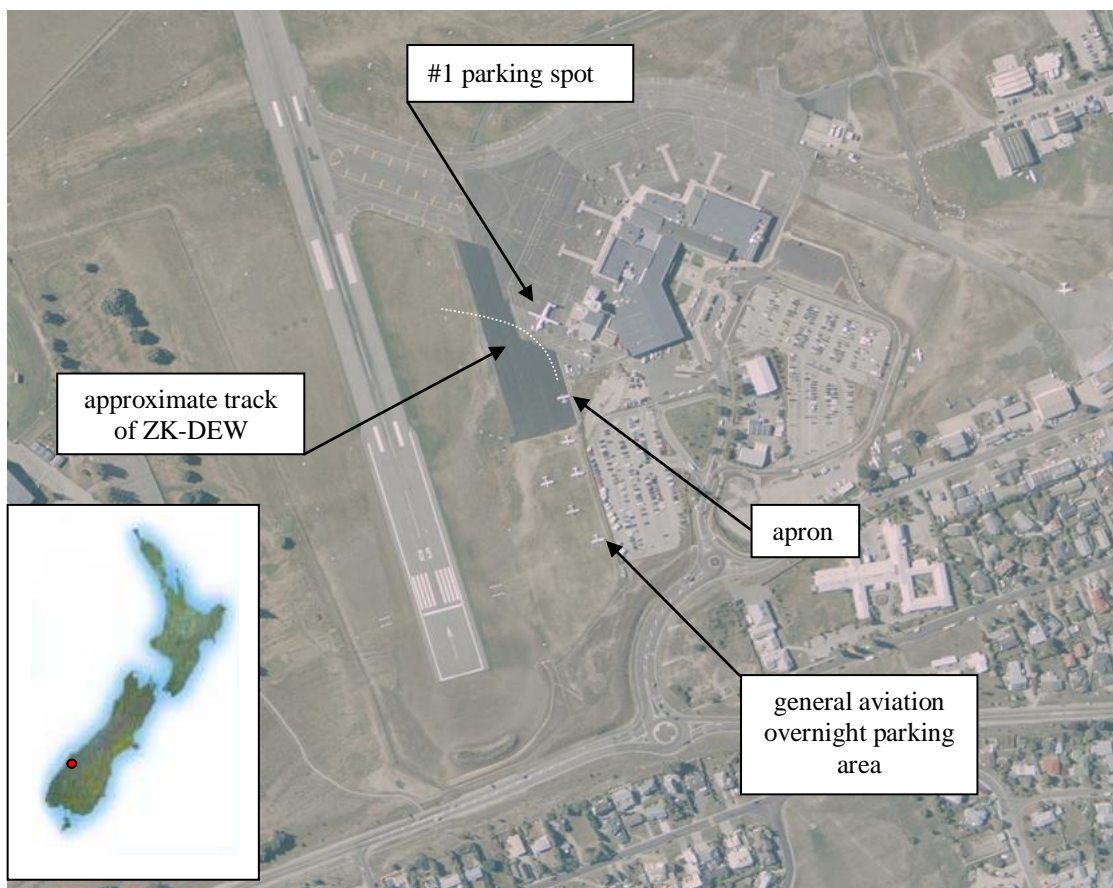


Figure 1
Queenstown Aerodrome
(courtesy of Queenstown Airport Corporation)

1.2 Personnel information

- 1.2.1 The pilot was aged 38. Civil Aviation Authority (CAA) records showed the pilot held a commercial pilot licence (aeroplane) and a current class 1 medical certificate valid until 3 December 2009. The pilot's logbook recorded that his most recent annual competency check and biennial flight review had been conducted on 8 October 2008.
- 1.2.2 After completion of his initial flight training in Canterbury, the pilot moved to Queenstown in August 2001 and started flying with the Wakatipu Aero Club, when he obtained his commercial pilot licence in January 2002. He became an instructor with the Aero Club and also undertook some commercial charter operations. He joined the operator in October 2006. At the time of the incident he was the operator's Operations Manager (senior pilot) and had accrued a total of 2770 flying hours, including 855 hours on the Cessna 207-type aircraft.
- 1.2.3 The pilot's 24-hour and 7-day history was unremarkable. He had accrued 3.2 flying hours in the previous 2-day period and had had a rostered day off 4 days prior to the subject incident. The pilot reported that he was in good health, but did acknowledge there had been some anxiety

among the operator's pilots because of an impending merger with another local operator, although job retention was assured.

1.3 Aircraft information

1.3.1 ZK-DEW was a Cessna 207 high-wing aeroplane, serial number 20700161, manufactured in the United States in 1970. It had fixed tricycle landing gear and seating for a pilot plus 6 passengers. It was powered by a normally aspirated Teledyne Continental IO-520 piston engine that drove a 3-bladed constant speed propeller.

1.3.2 The 3 main engine controls, the throttle, propeller and mixture, were of the push-pull type. The engine would normally be started by an electric starter and usually shut down by pulling the mixer control to idle cut-off (see Figure 2). The engine could also be shut down by turning the ignition switch off and thus the engine magnetos, leaving residual fuel in the fuel line to the engine.

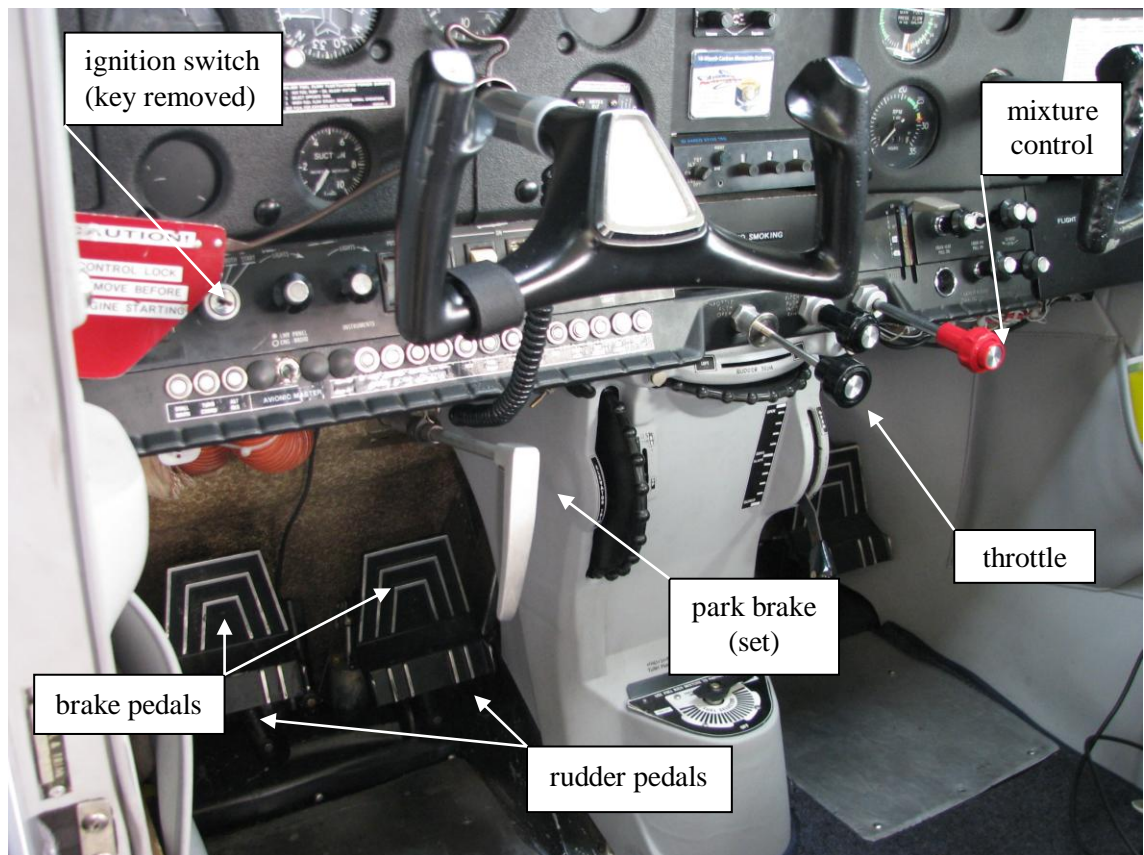


Figure 2
Aircraft controls – ZK-DEW

1.3.3 ZK-DEW was fitted with individual disc type brakes on both main wheels, operated by pressing down on the corresponding foot pedal located above the rudder pedals. The brakes could also be set by pulling and rotating a park brake lever handle mounted at the bottom of the instrument panel in front of the pilot. To release the park brake the lever handle was rotated and the lever would retract and thereby release the brakes. Tests determined that the handle needed to be rotated some 30-45 degrees before the lever would retract.

1.3.4 Aircraft maintenance records showed ZK-DEW had accrued a total of 12 068 hours. The most recent scheduled check had been a 50-hour inspection completed on 7 August 2009 and the aircraft had 41 hours to run to the next check. There were no recorded or reported faults at the time of the incident, and no history of any starter or brake problems.

- 1.3.5 Following the incident, the aircraft battery was checked and determined to be faulty, with one collapsed cell, so the battery was replaced.

1.4 Aerodrome information

- 1.4.1 Queenstown Aerodrome was the base for numerous scenic flight aeroplane and helicopter operators, and also handled scheduled domestic and international flights using aircraft up to Airbus A320 and Boeing 737 size. The larger aircraft were restricted to the main bitumen runway 05/23, while the smaller aircraft could also use a parallel grass runway or a grass cross runway 14/32 (Aeronautical Information Publication New Zealand, 2008a and b).
- 1.4.2 The sealed apron area where the passengers boarded ZK-DEW for the flight was near the first of the larger aircraft parking spots adjacent to the terminal, where typically large turbo-prop aircraft would be parked for unloading and loading. At the time of the incident this parking spot was not in use.
- 1.4.3 The incident was witnessed by the air traffic control staff on duty and the areas described above were monitored by closed-circuit television (CCTV) cameras operated by the Queenstown Airport Corporation. A recording of the movements of ZK-DEW was obtained during the investigation and examined (Queenstown Airport Corporation, 2009). The recording showed that ZK-DEW moved forward a few metres then veered left, crossed the apron and went onto the grass area adjacent to the main runway. The aircraft crossed a section of the first large aircraft parking spot and came to a halt about 40 m from the main runway. In doing so, it infringed the Zone 2 protection area around the runway. Entry into Zone 2 was permitted subject to obtaining clearance from air traffic control. However, runway operations involving medium and large aircraft were not to be permitted at the same time (CAA, 2007a and b).
- 1.4.4 The recording showed that ZK-DEW moved about 95 m before coming to a stop. It was estimated that ZK-DEW accelerated to a speed equivalent to a fast jogging pace and was slowing as it crossed from the apron onto the grass. During the movement the right side of the aircraft only was visible and it was not possible to see the pilot moving alongside.
- 1.4.5 The recording also showed that as ZK-DEW started to move, an Airbus A320 aircraft was completing its landing on runway 23 and passing abeam ZK-DEW. By the time the A320 had turned around at the end of the runway, ZK-DEW had come to a halt near the marker board.

1.5 Organisational information

- 1.5.1 The operator (MSSF), was established in 1982 and was one of a group of companies owned by Totally Tourism New Zealand. At the time of the incident it operated a fleet of 4 Cessna 207 aircraft and had 3 full-time pilots and one part-time pilot available for flying duties.
- 1.5.2 On 3 January 2007, another of the operator's pilots in another aircraft had an uncommanded aircraft movement while hand-starting at Milford Sound. The aircraft reportedly moved a few metres before a pilot sitting in the aircraft brought it to a halt. The primary concern at the time was the proximity to other aircraft parked nearby, but there was no collision.
- 1.5.3 Following that incident, the pilot of ZK-DEW drafted a "manual aircraft start" procedure for use by the operator, which was reported by the pilot to have been discussed with the operator's quality assurance representative. It was then included in the operator's Standard Operating Procedures (MSSF, 2008). Pilots were required to sign it regularly as having read the procedures. The pilot advised that to his knowledge the incident on 5 September was the first time the manual starting procedure had been used since the procedure was written. None of the other pilots was known to have received any practical training in hand-starting.

1.5.4 The manual engine starting procedure was as follows

Reason: When a key start is not possible, for whatever unforeseen [sic] circumstance, no external power source is available and purpose of the flight is to return plane and passengers to home base.

This procedure can be done with passengers on board. Minimum of two MSSF pilots to carry out start.

Procedure:

- One person in pilot's seat
- Outside pilot calls out the following procedure
 - Hand brake on and foot brakes applied
 - Fuel on
 - Mixture rich
 - Throttle closed
 - Masters on
 - Prime as for hot or cold start
 - Advance throttle ¼ inch
 - Start to turn prop through

Stand with your hand on the blade back and finger tips around the trailing edge, walk backwards pulling the propeller through in a clockwise direction.

If the engine fails to start. STOP... Unload passengers, ring base and we will relocate a new plane. April 2008

1.5.5 Using ZK-DEW, the operator performed a partial reconstruction of the incident to determine the engine power required before the aircraft would move (MSSF, 2009). A throttle setting of “¼ inch” (about 6 mm) was found to produce an engine speed of 1300-1400 rpm. With the park brake set and a pilot only on board, the engine speed needed to be increased to 1900 rpm before the aircraft began to move.

1.5.6 Two rescue service personnel who witnessed the incident believed that the engine rpm of ZK-DEW as it moved forward was well above the usual after-start idling rpm. Estimates varied from “50-75% power” to “1800-2000 rpm”.

1.6 Additional information

Hand-starting

1.6.1 The pilot said that while flying with the Wakatipu Aero Club, he had been taught how to do hand-starting. The Aero Club's current Chief Flying Instructor commented that the Club had no written procedures for hand-starting. The procedure was restricted to senior pilots only, who first needed to undertake a practical course of instruction from a senior Club member, normally the Chief Flying Instructor. A pilot was always to be in the pilot's seat when hand-starting to control engine rpm, use aircraft brakes and shut down if required.

1.6.2 Although not commonly used, the pilot said that he had done a couple of hand starts about 2 years previously when cold weather had caused some starting issues with the operator's aircraft. At the time there was no alternative starting method, as the operator did not then have a battery pack for use at Queenstown.

1.6.3 The aircraft manufacturer advised that no manufacturer-endorsed hand-starting procedures were available (Cessna Aircraft Company, 2009). Its safety representative commented that while hand-starting could be performed safely, especially on those aircraft with smaller engines, the

range of aircraft and circumstances made it impractical to develop a procedure for each model or one generic procedure for all models.

- 1.6.4 In July 2000, the CAA published an article in its bi-monthly *Vector* magazine on hand-starting. The article discussed general rules for hand-starting, including the need for training and “a qualified person (preferably a pilot or maintenance engineer) should occupy the pilot’s seat”. The article also described typical verbal instructions and actions that should occur during hand-starting. It emphasised the need for the person in the cockpit and the person swinging the propeller to repeat each other’s instructions to help avoid any misunderstanding.

Civil Aviation Rules

- 1.6.5 A review of Civil Aviation Rules (CARs) identified no rule that precluded the flight coordinator from assisting in starting the engine of ZK-DEW. However, as he was not “duly authorised”, he was not permitted to taxi the aircraft (CAA, 2007d). CAR 135.69 also precluded him from the “manipulation of the controls”, but during an “air operation” only (CAA, 2007e).

Incident notification

- 1.6.6 CARs required an accident or incident to be reported by the operator to the CAA “as soon as practicable” (CAA, 2008). The related CAA Advisory Circular AC12-1 considered “as soon as practicable” to be by telephone (CAA, 2007c). The Civil Aviation Act 1990⁴ directed that the CAA notify the Transport Accident Investigation Commission of an accident involving an aircraft or a serious incident, as described by the International Civil Aviation Organization (ICAO), as soon as practicable. A Memorandum of Understanding between the Commission and the CAA⁵ expanded on the Act and stated that the notification of accidents and serious incidents would be by the most appropriate means available, including by email during office hours, or by telephone if outside office hours or urgent (the Commission, 2009). A weekly summary of accidents and serious incidents was also to be provided.
- 1.6.7 The incident occurred on Saturday 5 September 2009. On 8 September, the CAA received initial notification of the incident from Airways New Zealand, the air traffic services provider at Queenstown. Based on the initial notification information, stating that “ZK-DEW shot forward on the apron and hit a marker board and slightly infringed Zone Two”, the incident was classified as “minor” and entered into the CAA data base on 9 September. On Thursday 10 September, the pilot called the CAA to follow up on the incident form he had completed and sent by email on 7 September. It was then confirmed that an incorrect address had been used and the incident form was resubmitted.
- 1.6.8 On Tuesday 15 September, the CAA distributed its weekly summary of incident reports, which included reference to the subject incident. On 16 September, the acting manager of the CAA Safety Investigations Unit upgraded the incident from “minor” to “major” and assigned a staff member to investigate the incident.
- 1.6.9 The Commission became aware of the potential seriousness of the incident when contacted by the CAA-appointed investigator at about 0900 on Tuesday 22 September. Following initial enquiries, the Commission elected to investigate the incident and at 0955 an investigator was appointed.
- 1.6.10 When asked for comment on the notification of the incident to the Commission, the CAA advised that the CAA investigator had reviewed the CCTV recording on 22 September 2009 and determined the event was more significant than first reported. The CCTV information “allowed the event to be re-classified as a serious incident”. The investigator had then contacted

⁴ Civil Aviation Act 1990, section 27

⁵ Memorandum of Understanding between The Transport Accident Investigation Commission and The Civil Aviation Authority of New Zealand, dated %^\$^%\$.

the Commission and therefore the CAA had “fulfilled its obligation to inform the TAIC as soon as practicable”.

- 1.6.11 In 2009/2010, the Commission investigated a runway excursion incident at New Plymouth Aerodrome (TAIC, 2009). As a result of delays in the notification of the incident, the cockpit voice recorder was not quarantined and was eventually overwritten. The lack of this information affected the quality of the investigation and a safety recommendation was made to the Director of Civil Aviation regarding this issue.

2 Analysis

- 2.1 The pilot was hand starting ZK-DEW by swinging the propeller because the aircraft had a faulty battery and could not be started by normal means. A faulty or flat battery, while not common, can occur and therefore a hand start can sometimes be the only means by which a pilot can start an engine, especially in remote areas away from technical support. There are also some older aircraft where hand-starting is the normal and only means of starting. However, hand-starting does involve some risk and a pilot needs to be sure that this has been carefully considered before deciding to undertake the procedure.
- 2.2 Following several cases of flat batteries because of the cold weather, the operator had organised a supplementary ground starting pack for use at Queenstown. As a result of a starting incident at Milford Sound in January 2007, the operator had also developed a hand-starting procedure that was added to its operating procedures manual for pilots to use. However, as demonstrated in this incident, the procedure was not robust and should have been subjected to closer scrutiny before adoption. This is discussed further below.
- 2.3 Having first tried to start the engine using the ground starting pack without success, the pilot should have stopped any further attempts to start ZK-DEW. While he correctly identified a battery problem, the actual fault was unknown. Had he been able to hand start the engine and continue to Milford Sound, he could have been in a worse situation had the fault reoccurred away from home base. The pilot’s use of the hand-starting procedure in this context was also in contravention of the operator’s procedure and should have only been used as a last attempt to return to home base.
- 2.4 Post-incident testing showed that a “¼ inch” throttle setting produced about 1300-1400 rpm, while witness accounts suggested that engine rpm was significantly higher. Setting of the throttle requires experience and finesse and a few millimetres either way can make a significant difference to the engine rpm. Nevertheless, the pilot had the necessary experience to be able to set the throttle, but not while standing outside the aircraft. As a safety measure, a pilot’s hand should never be far away from the throttle to enable adjustments to be made or, if urgent, quickly close the throttle.
- 2.5 For the aircraft to have moved with the park brake properly set and 6 persons on board, testing showed it would have required an engine power setting higher than 1700-1900 rpm. Therefore it can be assumed that the rapid forward movement of the aircraft after starting was due to a combination of the higher rpm and the hand brake being released. The handle did not require much pressure or movement before it would release and any lateral movement of the flight coordinator’s knee making contact with the park brake handle could have knocked and released the brake.
- 2.6 There was no back-up to an inadvertent release of the park brake. The flight coordinator was not familiar with the aircraft, including using the throttle, and the aircraft wheels were not chocked nor was the aircraft tied down. While the pilot showed the flight coordinator the location of the foot brakes, he did not ensure the flight coordinator knew how to use them. As a result, after the aircraft started moving the flight coordinator pressed down firmly on the rudder pedals, but did not know to rotate his feet to apply pressure on the toe pedals. A pilot or trained engineer would have known to close the throttle quickly and simultaneously apply foot braking.

- 2.7 The aircraft veered left either due to asymmetric pressure on the rudder pedals turning the aircraft to the left, or because slight pressure was applied to the left foot brake. The flight coordinator, despite not knowing how to use the throttle or pull the mixture through to idle cut-off, fortunately had the initiative to turn off the magnetos to stop the engine as the aircraft crossed the apron.
- 2.8 Civil Aviation Rules did not preclude the pilot from utilising the untrained flight coordinator to assist in the starting of ZK-DEW. However, the use of the flight coordinator was not in accordance with the operator's hand-starting procedure, a procedure written by the pilot. That the flight coordinator accidentally, and probably unknowingly, knocked the park brake lever as he prepared to vacate the seat for the pilot was another example of the need to use personnel familiar with operating around aircraft and trained in hand-starting. The flight coordinator should not have been placed in this position.
- 2.9 With no other pilots close at hand or available, the use of the flight coordinator was a last resort to start the aircraft before seeking engineering support. This, along with the failure to disconnect the starter pack before attempting a hand start, indicated that the pilot was in a rush to depart and get his passengers to Milford Sound in time to meet the boat. While the pilot's intentions were understandable, he allowed the pressure of time to blur his judgement and rush his actions.
- 2.10 The impending company re-organisation should not have placed undue stress on its pilots to the extent that it would have impeded their ability to operate aircraft safely. The pilot, in his role as a senior pilot within the company, was likely trying to be conscientious and demonstrate to management his competency in delivering his passengers on time. Were the passengers to miss the boat's sailing, he felt it could have reflected badly on him.
- 2.11 The operator's hand-starting procedure had not been adequately reviewed before inclusion into its standard operating procedures and pilots were not given subsequent training. The procedure contained a possible inaccuracy in that it directed that the person swinging the propeller was to "stand with your hand on the blade back". The most correct term to use would have been the "camber side" of the blade as described by propeller manufacturers. The other side was sometimes referred to as the "face side" or the "rear side". The tips of the fingers only were to be against the trailing edge of the blade if extra purchase was required. Hands or fingers were not to be wrapped around the blade.
- 2.12 The operator's procedure made no reference to the use of wheel chocks or securing the aircraft. It did not contain step-by-step instructions, or the need to repeat back instructions, thus avoiding any confusion. Importantly there was no reference to any of the dangers associated with hand-starting and the requirement for a training programme before attempting to hand start an aircraft in possibly less-than-ideal conditions.
- 2.13 The circumstances of the occurrence meet the criteria for it being classified as a "serious incident" as defined by the ICAO, in that "an accident nearly occurred". While the flight coordinator was able to turn off the ignition switch, of concern was his inability to control the direction of the aircraft as it accelerated. Had the aircraft continued straight ahead or veered right it could have struck an obstacle, causing significant damage to the aircraft and possible injury to the passengers. Less likely, but still potentially dangerous, was the possibility of an aircraft being parked on spot 1 with passengers moving about the area that ZK-DEW traversed.
- 2.14 Although ZK-DEW stopped some 40 m short of the runway, it had entered the outer protection area around the runway and therefore technically it had infringed the runway. However, had ZK-DEW continued onto the runway a collision with another aircraft was considered unlikely as pilots using the runway would have had a clear view of ZK-DEW encroaching it and air traffic control staff had the ability to alert and divert other aircraft away from the path of ZK-DEW. For a collision to have occurred the encroachment would have to have occurred simultaneous with an aircraft achieving a point where the required action to avoid collision

would have resulted in loss of control. While this was possible, the likelihood was low with the level of aircraft activity at Queenstown.

Incident notification

- 2.15 The initial delay in the Commission being notified of the incident was due to a lack of accurate information being received by the CAA, including an addressee error by the pilot and inexperienced staff processing the initial report. However, once the occurrence had been identified as worthy of upgrading to “major”, the CAA should have promptly notified the Commission. At the very least, an informal phone call could have been made regarding the now major, but not then supposedly serious incident. That another 6 or 7 days elapsed before it was reportedly “reclassified as a serious incident” had the potential to impact on the investigation, particularly witness information.
- 2.16 The delay in the Commission being informed of serious incidents had been identified in a previous investigation, resulting in a safety recommendation being made to the Director of Civil Aviation to address this safety concern. That recommendation was for the Director to address the safety issue where:
- The late notification of this incident hampered the Commission’s investigation, because potentially valuable CVR [cockpit voice recorder] information was not preserved. The Commission has noted recently that other serious incidents have not been notified as soon as practicable to the CAA, and in some cases the delays have affected the Commission’s decision whether to investigate. The Commission and the CAA rely on being immediately notified of serious incidents in order to be able to conduct effective investigations and to learn the lessons to prevent accidents. Late notifications prevent the Commission from meeting its statutory obligations (008/10).
- 2.17 Because this recommendation remains in an open status, no further recommendation has been made.

3 Findings

Findings are listed in order of development and not in order of priority.

- 3.1 The aircraft moved forward across the apron and towards the runway uncontrolled after the pilot hand started it while an untrained person was at the controls.
- 3.2 The pilot did not adhere to the operator’s documented hand-starting procedure, which was lacking in content and not supported by a training programme.
- 3.3 The aircraft moved forward almost immediately after starting when the unqualified person in the pilot’s seat accidentally knocked and released the park brake.
- 3.4 The aircraft entered without authority a Zone 2 area designed to protect aircraft authorized to operate on the active runway.
- 3.5 The potential existed for serious damage or injury to have occurred because of the proximity of other aircraft, buildings, and potentially people and other aircraft operating on the apron area and active runway.

4 Safety Actions

- 4.1 Following the incident, the operator directed that the hand-starting procedure was not to be used on company aircraft.

5 Safety Recommendation

- 5.1 On 20 May 2010, the Commission recommended to the Director of Civil Aviation that he address the following safety issues:

- 5.1.1 In spite of the education material produced by the Civil Aviation Authority on hand-starting aircraft, the understanding of the risks associated with that activity were not well recognised by this operator and might not be with other operators in that sector of the industry (015/10).

- 5.2 A reply was not available at the time of printing

6 References

- Aeronautical Information Publication New Zealand. (2008a). p. AD2-51.1 and 51.2, effective 25 September 2008. Airways Corporation of New Zealand.
- Aeronautical Information Publication New Zealand. (2008b). p. AD2-52.1 and 52.2, effective 25 September 2008. Airways Corporation of New Zealand.
- Cessna Aircraft Company. (2009). Manager Customer Services. Email, 7 October 2009.
- Civil Aviation Act. (1990). s. 27(1), *Duty of Authority to notify accidents and incidents to the Transport Accident Investigation Commission*. Wellington
- Civil Aviation Authority of New Zealand. (2007a). *Advisory Circular AC139-5, Operational Safety During Works on Aerodromes*, Revision 1, effective 27 April 2007. http://www.caa.govt.nz/Advisory_Circulars. Lower Hutt (New Zealand): CAA
- Civil Aviation Authority of New Zealand. (2007b). *Advisory Circular AC139-6, Aerodrome Standards and Requirements*, Revision 2, effective 2 July 2007. http://www.caa.govt.nz/Advisory_Circulars. Lower Hutt (New Zealand): CAA
- Civil Aviation Authority of New Zealand. (2007c). *Advisory Circular AC12-1, Mandatory Occurrence Notification and Information*, Revision 3, effective 16 May 2007. http://www.caa.govt.nz/Advisory_Circulars. Lower Hutt (New Zealand): CAA
- Civil Aviation Authority of New Zealand. (2007d). *CAR 91.119, General Operating and Flight Rules*, effective 22 November 2007. http://www.caa.govt.nz/rules/Rule_Consolidations. Lower Hutt (New Zealand)
- Civil Aviation Authority of New Zealand. (2007e). *CAR 135.69, Air Transport Operations – Helicopters and Small Aeroplanes*, effective 1 March 2007. http://www.caa.nz.rules/Rule_Consolidations. Lower Hutt (New Zealand)
- Civil Aviation Authority of New Zealand. (2008). *CAR 12.55, Notification of Incidents*, effective 23 October 2008. http://www.caa.govt.nz/rules/Rule_Consolidations. Lower Hutt (New Zealand)
- Milford Sound Scenic Flights Limited. (2008). *Standard Operating Procedures: Manual Starts*, effective April 2008. Queenstown (New Zealand).
- Milford Sound Scenic Flights Limited. (2009). *QA Manager's Report – Incident re ZK-DEW, 5 September 2009, Queenstown Airport MSSF – OCC022*. Undated. Queenstown (New Zealand).
- Queenstown Airport Corporation. (2009). *Closed Circuit Television Recording*, taken 5 September 2009.
- Transport Accident Investigation Commission. (2009). *Report 09-003 Fairchild SA227-AC Metroliner III, ZK-NSS, runway excursion, New Plymouth Aerodrome, 31 March 2009*. <http://www.taic.org.nz/ReportsandSafetyRecs/AviationReports>. Wellington, New Zealand
- ZK-DEW. (2009). *Aircraft Maintenance Logbook*, effective as at 5 September 2009.



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