Australian Government
Australian Transport Safety Bureau

Ground handling occurrence involving Airbus A330, 9M-MTB

Melbourne Airport, Victoria | 31 March 2016

Investigation

ATSB Transport Safety Report
Aviation Occurrence Investigation
AO-2016-028
Final – 13 September 2016

Source: Front cover Melbourne Airport, modified by the ATSB

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Addendum

Page	Change	Date
9	Corrected the safety advisory notice number.	27 July 2017

Safety summary

What happened

Damaged door of 9M-MTB

Source: Melbourne Airport, modified by the ATSB

On 31 March 2016, an Airbus A330-323, registered 9M-MTB and operated by Malaysia Airlines Berhad (Malaysia Airlines), was being prepared and boarded for a flight from Melbourne Airport, Victoria, to Kuala Lumpur, Malaysia. The captain engaged the aircraft's park brake before carrying out an external inspection of the aircraft. The resulting lit park brake indicator light on the nose landing gear led the aircraft maintenance engineer to assume that the park brake would remain on. Thinking that the aircraft would remain secure, the maintenance engineer removed the main landing gear chocks out of sequence with the relevant procedure and without informing the others in the ground crew. The ground crews did not check the main gear chocks before removing the nose gear chocks to attach the tow tractor to the nose gear. Unaware that no chocks were in place, and out of sequence with the relevant procedure, the captain released the park brake on return to the flight deck. The aircraft rolled back about 3 m and struck the aerobridge. The aircraft's forward-left door and hinges, and the aerobridge were damaged. There were no injuries.

What the ATSB found

The ATSB found that the ground and flight crew procedures were not well harmonised, leading to reduced cohesion between the crews, and that the tractor operator's procedures did not match the way tasks were carried out locally. These problems reduced the likelihood that the respective procedures would be followed correctly. In addition, the flight crew and engineers did not explicitly convey their actions and intentions to the others, resulting in a number of missed opportunities to discover the resulting procedural errors.

What's been done as a result

The engineering company, tractor operator and Malaysia Airlines each planned or initiated safety action in response to this occurrence. The engineering company introduced standard procedures and initiated periodic operational safety inspections at all ports. The tractor operator developed a written procedure to incorporate local differences in work practices and improve coordination. Malaysia Airlines reported that it was planning to amend its procedures so that flight crews advise ground crews whenever the park brake is about to be released. As an interim measure, Malaysia Airlines sent A330 flight crews a reminder to communicate with ground crews before releasing the park brake to verify that chocks are in place.

Safety message

The ATSB stresses the importance of organisations ensuring that ground and flight crew procedures are harmonised to increase the likelihood that potential problems or mistakes are detected before causing harm. It is also important that local variations to procedures are formalised to reduce the risk of the inconsistent completion of tasks, and to improve the organisation's ability to identify and address potential safety concerns. In addition, the ATSB encourages crews to highlight any procedural problems to their operator in order for them to be reviewed and enhanced as appropriate.

Importantly, when about to perform a key action like removing chocks or releasing the park brake, crews should consider checking with others to identify potential conflicts between tasks. This can reduce the risk of unintentional aircraft movement.

The occurrence

Sequence of events

On 31 March 2016, an Airbus A330-323, registered 9M-MTB and operated by Malaysia Airlines Berhad (Malaysia Airlines), was being prepared and boarded for a flight from Melbourne Airport, Victoria, to Kuala Lumpur, Malaysia. The aircraft had been parked in the bay for several hours following its previous flight, and was secured using wheel chocks under the left main and nose landing gears.

An engineering company provided an aircraft maintenance engineer (AME) and a licenced aircraft maintenance engineer (LAME) to prepare the aircraft for departure. A third company provided a towbarless tractor[1] and driver for pushback.[2] A technician was also refuelling the aircraft using a fuel truck parked under the aircraft's wing. Ground crews could communicate with the flight crew via a headset.

At 0037 Eastern Daylight-saving Time[3], the aircraft captain engaged the park brake before disembarking to perform a pre-flight external inspection of the aircraft. The park brake had to be set to check the brake wear indicators and could only be controlled from the flight deck. A closed-circuit television recording showed the captain performing the inspection from 0043 to 0048.

Shortly after the captain checked the main landing gear chocks, the AME removed them from the left main landing gear in preparation for pushback. The AME was aware that this step was not in accordance with the normal sequence for pushback with a towbarless tractor, but thought that the aircraft would be secure because the:

- nose landing gear chocks were installed
- park brake indicator light on the nose landing gear had been on when it was recently checked by the AME, consistent with the brake being engaged (Figure 1).

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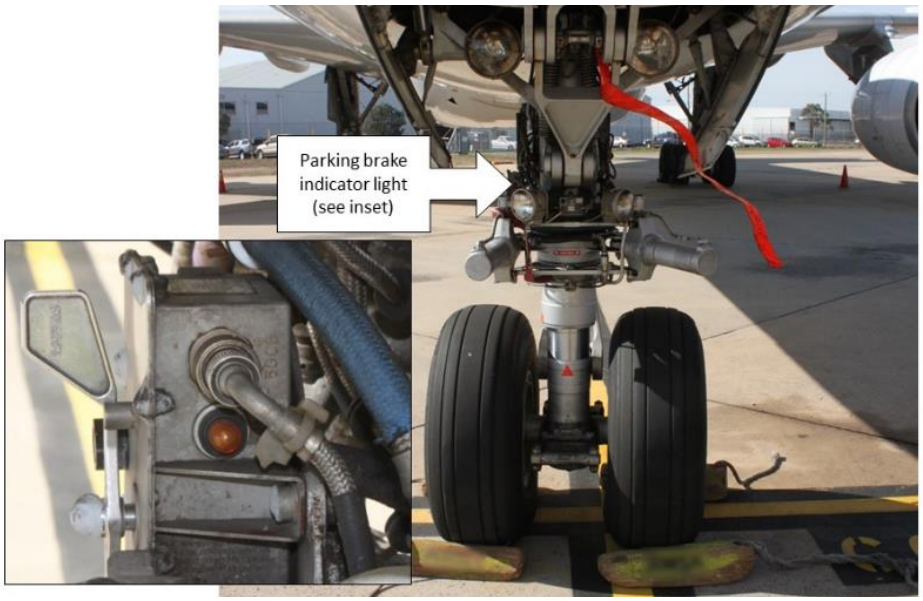
1 A towbarless tractor has a mechanism that grips and lifts the aircraft's nose wheels. It cannot be docked with nose landing gear chocks in place. A conventional tractor uses a towbar to attach to the nose landing gear and chocks can be in place at that time.

2 Moving an aircraft from its parking position to a taxi position using specialised ground support equipment.

3 Eastern Daylight-saving Time (EDT) was Coordinated Universal Time (UTC) + 11 hours.

Figure 1: Nose landing gear showing the aircraft's park brake indicator light (note the wheel chocks in place)



Source: ATSB

Shortly after, the tractor driver arrived at the bay and boarded the tractor. The driver prepared the vehicle for docking to the aircraft's nose landing gear. The tractor driver reported being unable to see whether the main landing gear chocks were in place due to the shadowing under the aircraft.

At 0051:03, the LAME started to remove the nose chocks so that the towbarless tractor could be docked. The AME assisted the LAME and together they finished removing the chocks at 0051:14. Both then moved off under the aerobridge, which was still in use by boarding crews and passengers. The closed-circuit television recording showed the refueller disconnecting the refuelling equipment from the aircraft's under-wing filler point at about the same time as the nose chocks were removed.

The driver began to move the towbarless tractor into position to engage the nose landing gear at 0051:18. The closed-circuit television recording showed that the park brake indicator light turned off at 0051:21. This aligned with the flight crew's recollection that the captain released the park brake on return to the flight deck. The captain later reported always doing this, expecting that the ground crews would inform him when it was necessary to apply the brake.

At 0051:27, as the towbarless tractor moved towards the nose landing gear, the aircraft began to move very slowly backwards. The refueller lowered the fuel truck's lift a few seconds after the aircraft started moving. The towbarless tractor driver did not notice the aircraft's movement at first. He continued forward and stopped when the tractor made contact with the aircraft's nose gear tyres, then drove forward for another 3 seconds. This second movement was probably because the driver noticed the increasing distance between the tractor and the aircraft and automatically tried to bring them closer. The driver did not initially recognise that the situation was abnormal.

The aircraft's slow movement was not immediately obvious to the flight or ground crews. The aircraft stopped after coming into contact with the aerobridge, having rolled backwards about 3 m in 22 seconds. Hearing the noise and realising that the aircraft had moved, the LAME radioed the flight crew to set the park brake. The captain completed this action at 0052:09.

The aircraft's forward-left door was dislocated by the contact with the aerobridge (Figure 2). The door, hinges, and aerobridge were damaged and there was slight indentation of the fuselage skin forward of the door. There was no major structural damage. There were no injuries.

Figure 2: The aircraft's forward fuselage showing the dislocated forward-left door. The slight indentation in the fuselage skin forward of the door is not visible. The aerobridge is shown retracted from its position when struck by the aircraft

Source: Melbourne Airport, modified by the ATSB

Pushback procedures

Engineer procedures

The engineering company used Malaysia Airlines procedures for ground handling. The procedure for the departure stage of a transit check included a step to remove all of the chocks after the aerobridge is detached from the aircraft. The procedure for pushback stated that 'Chocks should not be removed from the main-gear until the tractor is fully secured to the nose-gear'. It did not contain guidance for coordinating with a tractor driver.

Tractor operator procedures

The tractor operator used a set of written procedures as the basis for activities that varied across the organisation depending on local arrangements. Workers were trained according to these local requirements.

The written procedure for pushback with a towbarless tractor showed photographs of the pushback activity that included steps for a 'walk-around check'. It also included confirming that the:

- 'main gear [was] chocked' prior to docking the tractor with the aircraft's nose wheels
- 'Chocks should not be removed from the main-gear until the tractor is fully secured to the nose-gear and brakes on [the] tractor set.'

At Melbourne Airport, these steps were omitted in practice, because the tractor operator's work arrangements there did not include management of the wheel chocks. The procedure did not describe how a driver should coordinate with other ground crews when docking the tractor to the aircraft.

Flight crew procedures

The flight crew procedures included steps to:

- set the park brake before carrying out an external inspection of the aircraft
- check the park brake is set and release it only if the brakes are hot (that is, soon after landing) and chocks are in place
- release the park brake after all aircraft doors are closed, pushback clearance is received from air traffic control and ground crew readiness is confirmed.

The procedures did not provide guidance or instruction on how to coordinate park brake release with ground crews.

Safety analysis

Explanation of the occurrence

The aircraft's park brake was set for the captain's external inspection of the aircraft. The resulting illumination of the park brake indicator light on the nose landing gear led the aircraft maintenance engineer to assume that it would remain set, though this was not confirmed with the flight crew. Thinking that the aircraft would remain secure, the aircraft maintenance engineer removed the main landing gear chocks.

Subsequently, the ground crews did not check the main landing gear chocks before the engineers removed the nose landing gear chocks to dock the towbarless tractor. The tractor operator's written procedure included a step to check the main landing gear chocks, but in practice, the step was omitted at Melbourne Airport because of a local variation in the way the work was conducted. In addition, there was no corresponding step in the engineers' procedures. As a result, the absence of main gear chocks remained undetected.

Separately, the aircraft captain was unaware that the docking process was underway and that no chocks were in place. Although the flight crew procedures stated that the park brake should only be released when the wheel brakes were hot (generally only shortly after landing), or after the aircraft doors were closed and with ground crew clearance, the captain released the park brake on return to the flight deck. In the absence of any braking mechanism, the aircraft commenced moving until it struck the aerobridge.

Lessons for effective teamwork

This occurrence highlights the importance of organisations ensuring that ground and flight crew procedures are harmonised to increase the likelihood that potential problems or mistakes are detected before causing harm, and of affected crews applying those procedures consistently. In addition, it is important that local variations to procedures are formalised to reduce the risk of the inconsistent completion of tasks, and improve the organisation's ability to identify and address potential safety concerns.

Also highlighted is the importance of crews, when about to perform a key action, considering a check with others to identify potential conflicts between tasks. In this instance, such a check before removing chocks or releasing the park brake would likely have reduced the risk of unintentional aircraft movement.

Findings

From the evidence available, the following findings are made with respect to the ground handling occurrence involving Airbus A330, registered 9M-MTB and operated by Malaysia Airlines Berhad, which occurred at Melbourne Airport, Victoria on 31 March 2016. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- The aircraft maintenance engineer removed the main landing gear chocks before the towbarless tractor was secured to the aircraft and out of sequence with the normal operating procedures.
- Consistent with local practices, neither the engineers nor the tractor driver checked that the main landing gear chocks were in place before attempting to dock the towbarless tractor to the aircraft.
- The aircraft captain released the park brake out of sequence with the normal operating procedures.

Other factors that increased risk

- **The procedures provided to ground and flight crews by Malaysia Airlines Berhad and the towbarless tractor operator did not provide clear guidance or instruction on coordinating activities related to pushback and, in the case of the tractor operator, were informally replaced by local procedures. [Safety Issue]**

Safety issues and actions

The safety issue identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The ATSB expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions are repeated separately on the ATSB website to facilitate monitoring by interested parties. Where relevant the safety issues and actions will be updated on the ATSB website as information comes to hand.

Coordination of activities related to pushback

Number:	AO-2016-028-SI-01
Issue owners:	Malaysia Airlines Berhad and Menzies Aviation
Operation affected:	Aviation: Air transport
Who it affects:	Air transport ground handling

Safety issue description:

The procedures provided to ground and flight crews by Malaysia Airlines Berhad and the towbarless tractor operator did not provide clear guidance or instruction on coordinating activities related to pushback and, in the case of the tractor operator, were informally replaced by local procedures.

Proactive safety action taken by Malaysia Airlines Berhad

Action number: AO-2016-028-NSA-002

On 27 May 2016, Malaysia Airlines Berhad reported that it was planning to amend its procedures so that flight crews advise ground crews whenever the park brake is about to be released. As an interim measure before the amendment could be approved, the operator sent A330 flight crews a reminder to communicate with ground crews before releasing the park brake to verify that chocks are in place.

Proactive safety action taken by Menzies Aviation

Action number: AO-2016-028-NSA-003

On 5 August 2016, Menzies Aviation (the tractor operator) developed a written local operating procedure to incorporate local differences in work practices and improve coordination between work crews.

Current status of the safety issue

Issue status: Adequately addressed

Justification: The proactive safety actions taken and planned by Malaysia Airlines Berhad and Menzies Aviation, in conjunction with the additional safety action taken by Aircraft Maintenance Services Australia (the engineering organisation), will improve crew coordination during ground operations and adequately address the safety issue.

In an effort to inform industry more widely of this safety issue, and the safety benefits possible from ensuring that ground and flight crew procedures are harmonised, the ATSB has issued the following safety advisory notice.

ATSB safety advisory notice to organisations that work airside

Action number: AO-2016-028-SAN-006

Effective coordination and communication between airside crews can prevent or detect mistakes that could otherwise lead to damage or injury. The ATSB advises organisations that work airside and aircraft operators to ensure that ground and flight crew activities are harmonised, and to foster active communication and coordination between working crews.

Additional safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk.

Action number: AO-2016-028-NSA-001

On 10 June 2016, the ATSB was advised by Aircraft Maintenance Services Australia (AMSA), the engineering organisation, of the following proactive safety action in response to this occurrence:

- The engineering team that day received retraining in pre-departure and pushback operations. This included refamiliarisation with documented procedures, practical assessment and a requirement to perform a team safety brief on lessons learned.
- AMSA began introducing standard aircraft arrival, turnaround and departure procedures to all ports. This will ensure that practices are standardised and that they are over and above client's requirements.
- AMSA commenced periodic operational safety inspections at all ports. These inspections include assessments of the standard procedures to identify opportunities for improvement.

General details

Occurrence details

Date and time:	31 March 2016 – 0051 EDT	
Occurrence category:	Incident	
Primary occurrence type:	Operational - Ground handling	
Location:	Melbourne Airport, Victoria	
	Latitude: 37° 40.4' S	Longitude: 144° 50.6' E

Aircraft details

Manufacturer and model:	Airbus A330-323	
Registration:	9M-MTB	
Operator:	Malaysia Airlines Berhad	
Serial number:	1219	
Type of operation:	Air Transport High Capacity	
Persons on board:[4]	Crew – 14	Passengers – 259
Injuries:	Crew – 0	Passengers – 0
Damage:	Minor	

[4] Total manifested. It is likely that a small number of passengers and crew were not yet aboard at the time of the incident.

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

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