

Inquiry RO-2013-108: Near collision between 2 metro passenger trains
Wellington, 9 September 2013

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Final Report

Rail inquiry RO-2013-108

Near collision between 2 metro passenger trains
Wellington

9 September 2013

Approved for publication: October 2013

Transport Accident Investigation Commission

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The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of occurrences with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector and the public, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of the final report

This final report has not been prepared for the purpose of supporting any criminal, civil or regulatory action against any person or agency. The Transport Accident Investigation Commission Act 1990 makes this final report inadmissible as evidence in any proceedings with the exception of a Coroner's inquest.

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Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not cited in this final report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1980 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

Unless otherwise specified, photographs, diagrams and pictures included in this final report are provided by, and owned by, the Commission.



Location of accident

Contents

- Abbreviations ii
- Data summary iii
- 1. Conduct of the inquiry 1
- 2. Factual information 2
- 3. Analysis 5
 - 3.1. General 5
 - 3.2. Automatic protection 5
 - 3.3. Driver distraction 6
- 4. Recommendations 7
 - 4.1. General 7
 - 4.2. KiwiRail 7
 - 4.3. NZ Transport Agency 8

Figures

Figure 1 Signal 145 at yellow (left) and Signal 38 at red (right) 2
Figure 2 Track and signalling layout at Wellington showing the movement of the 2 trains 3
Figure 3 A signal trip installed at Signal 39 (left) and the trip lever on a Matangi train (right)..... 6

Abbreviations

Commission	Transport Accident Investigation Commission
km/h	kilometre(s) per hour
m	metre(s)

Data summary

Incident particulars

Incident:	passenger Train 9243 passing Signal 38 at red (stop), leading to a near collision in Wellington
Date and time:	9 September 2013 at 1322 ¹
Location:	0.73-kilometre mark ² within Wellington station limits
Tranz Metro persons involved:	train driver and train manager of Train 9243 and a driver of an empty train travelling in an opposing direction
Persons on board:	3 crew and 24 passengers
Injuries:	nil
Damage:	nil

Vehicle particulars

Train details:	2-car Matangi set, with FT4132 leading and FP4132 trailing. The length of the set was 43 metres and it weighed 77.8 tonnes
Train origin/destination:	Johnsonville/Wellington, a distance of 10.49 kilometres
Scheduled departure/arrival:	Johnsonville depart 1300, Wellington platform 1 arrive 1321
Train operator:	Tranz Metro, a business unit of KiwiRail Limited
Train owner:	Greater Wellington Rail Limited, a business unit of the Greater Wellington Regional Council

¹ Times in this report are New Zealand standard times (universal co-ordinated time + 13 hours) and are expressed in the 24-hour mode.

² The distance from a datum marker at the end of the Wellington station platforms.

1. Conduct of the inquiry

- 1.1. On Monday 9 September 2013 at 1336, the NZ Transport Agency notified the Transport Accident Investigation Commission (Commission) of the incident under section 13(4) of the Railways Act 2005. The Commission opened an inquiry under section 13(1) of the Transport Accident Investigation Commission Act 1990, to determine the circumstances and causes of the incident, and appointed an investigator-in-charge.
- 1.2. The investigator in charge interviewed the train driver and the train manager from Train 9243 and the train driver from the empty passenger train on Monday 9 September 2013. He also interviewed the KiwiRail Limited signaller who was on duty in the Wellington signal box at the time of the incident.
- 1.3. The Commission reviewed data from the Tranzlog event recorders and forward-facing closed-circuit video recording systems on both trains, and data from the signalling system logs for the Johnsonville Line and Wellington station.
- 1.4. On 13 September 2013 the investigator rode in the cab on the same service to observe the aspects that would have been seen by a train approaching Signal 38 at stop.
- 1.5. The Commission received information relating to the history of the apparatus associated with Signal 38. The Commission also reviewed KiwiRail's general policy and Tranz Metro's procedures covering the issue of train driver distraction.
- 1.6. On 25 September 2013 the Commission approved the draft final report for circulation to interested persons for comment.
- 1.7. On 23 October 2013 the Commission reviewed the submissions and changes to the draft report were made where appropriate. The Commission approved the final report for publication on the same date.

2. Factual information

- 2.1. On 9 September 2013 Train 9243 (the passenger train) was the scheduled 1300 Tranz Metro service travelling from Johnsonville to Wellington. The passenger train was scheduled to berth at Wellington's platform 1, the usual arrival platform for services from Johnsonville.
- 2.1.1. The passenger train left Johnsonville on time with a crew of 3: a train driver, a train manager working in the lead car, and an assistant train manager working in the rear car.
- 2.1.2. The passenger train was delayed 4 minutes at Ngaio station. The train left Crofton Downs (its last passenger stop) at about 1318 for the journey to Wellington. There were 24 passengers on board.
- 2.1.3. The train manager completed his ticketing duties after leaving Crofton Downs and made his way to the driver's cab. He sat down on a forward-facing seat opposite the driver. After completing some documentation, the train manager and train driver engaged in a non-work-related conversation.
- 2.1.4. The train driver and train manager both said that their conversation continued until the time of the incident.
- 2.1.5. The passenger train was travelling at 53 kilometres per hour (km/h)³ when it passed Signal 145 at 1324:03. Signal 145 was showing a yellow aspect at that time (see Figure 1). The yellow aspect was a warning to the driver that the next signal was displaying red (stop). The next signal was Signal 38, which was 714 metres (m) ahead and out of clear view at the time of passing Signal 145.



Figure 1
Signal 145 at yellow (left) and Signal 38 at red (right)

- 2.1.6. The driver remembered noticing that Signal 145 was showing yellow, but he did not use the signal alert device installed in his cab. The signal alert device was designed to remind the driver that the previous signal was showing yellow. The system sounds an audible alarm and a flashing light appears in the driving cab after the train has travelled 400 m from where the driver has activated it. The train manager said that he could not recall seeing Signal 145 because he was turned towards the driver while they talked.
- 2.1.7. Meanwhile a signaller in the Wellington signal box had set the route for an empty passenger train to go from platform 9 and through the 73/74 crossover points to the maintenance depot in the Wellington yard, a distance of 620 m. The 73/74 crossover points were the same ones over which the passenger train needed to travel in order to reach platform 1. Signal 38 was set at red so that the empty train could cross ahead of the passenger train (see Figure 2).

³ The speed limit for the section was 60 km/h.

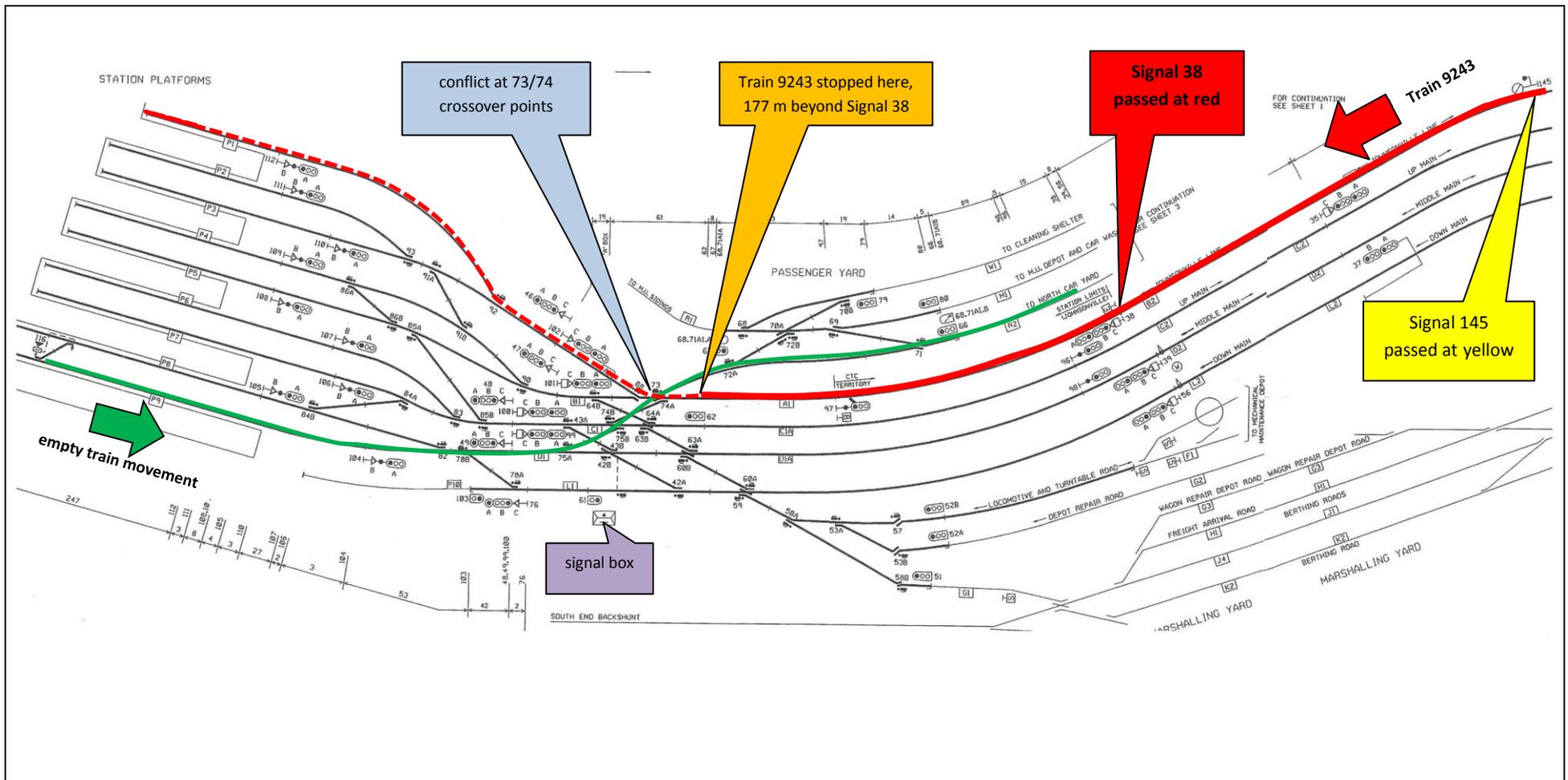


Figure 2
Track and signalling layout at Wellington showing the movement of the 2 trains
(not to scale)

- 2.1.8. The empty train approached the 73/74 crossover points at 1324:32, travelling at about 17 km/h. Twenty seconds later the passenger train passed Signal 38 at red while travelling at 42 km/h with 15% braking applied. The passenger train driver was slowing his train to transit through the 73/74 crossover points. He had completely missed seeing that Signal 38 was displaying red. The 2 trains were travelling towards each other on an intersecting path at a then closing speed of 59 km/h.
- 2.1.9. Meanwhile the signaller saw on his mimic screen that the passenger train had failed to stop at Signal 38. He immediately broadcast an urgent message over the local radio channel for the passenger train driver to stop his train. The driver heard the signaller's radio call and applied full service braking from a speed of 27 km/h. The train stopped in 35 m, with the front of the train 42 m back from the crossover points (an overrun of 177 m past Signal 38). It was calculated that the rear of the empty train had cleared the crossover points 7 seconds earlier.
- 2.1.10. The incident was reported to train control. The driver and train manager on the passenger train were relieved of their duties. Both underwent post-incident drug and alcohol testing in accordance with KiwiRail's procedures, and both returned negative results.

3. Analysis

3.1. General

- 3.1.1. The near collision occurred in a relatively low-speed area, where train speed was limited to 20 km/h while moving through the crossover points. However, there was the potential for a near 40 km/h head-on or glancing collision. There would have been a high risk of injury to passengers and crew if the trains had collided.
- 3.1.2. The driver of the passenger train acknowledged that he had not seen Signal 38 displaying red. Trains from the Johnsonville Line almost always berthed at platform 1, and for arriving movements Signal 38 was almost always showing green – at least that was the driver’s expectation in this instance. He also acknowledged that the reason for his not noticing the red signal was his becoming engrossed in his conversation with the train manager.
- 3.1.3. In this case a potential collision was prevented by the signaller’s noticing that the passenger train had failed to stop at Signal 38. Had he not done so it is possible that the trains would have collided, but at what speed it is difficult to say. Whether they collided, and at what speed would depend if the driver of either train recognised the potential collision, and if and when either fully braked their train.
- 3.1.4. If a collision had not occurred, the passenger train would probably have “run through” and damaged the 73 end of the crossover points, because they were set for the passage of the empty (outbound) train instead.
- 3.1.5. Two safety issues were identified:
1. The near collision occurred at the convergence of several busy metro passenger lines and there was no automatic protection applied to preventing such a collision in the event of a driver failing to stop at Signal 38.
 2. There was a potential for drivers of metro passenger trains to be distracted by non-operational interactions with other train staff.

3.2. Automatic protection

- 3.2.1. The area where the tracks from 9 platforms converge and cross on to 4 main lines is a natural area of conflict that requires careful management. The area is controlled by a dedicated signaller operating the signal box. There are a number of signalling interlocks for managing conflicts, but they essentially rely on train drivers seeing and complying with the various signals.
- 3.2.2. Of the 4 lines into and out of Wellington station, 2 are bi-directional, a third is for departing trains only and the fourth is for arriving trains only. The passenger train was arriving on one of the bi-directional lines that was dedicated to Johnsonville Line services. There are 2 other lines on which trains can potentially arrive. Each of those lines is protected by an equivalent signal to Signal 38⁴.
- 3.2.3. The equivalent signals on the other 2 lines are Signal 39 and Signal 56. These 2 signals are equipped with signal trip devices at ground level (see Figure 3). The signal trip catches on a brake trip lever mounted low down on an electric train which automatically applies the train’s air brakes if the signal is passed at red.

⁴ Referred to as “Home” signals.

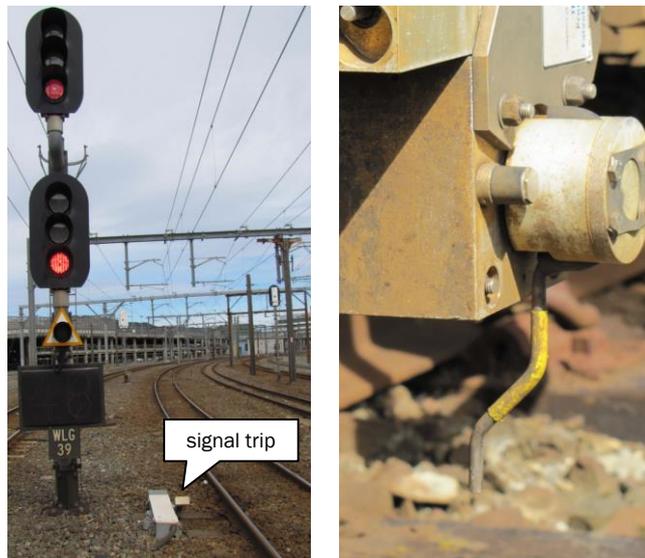


Figure 3
 A signal trip installed at Signal 39 (left) and the trip lever on a Matangi train (right)

3.2.4. Signal 38 was not equipped with a signal trip device, so in the event of an overrun there was no automatic means of stopping a train before it reached the crossover points. The Commission has recommended that such a device be installed.

3.3. Driver distraction

3.3.1. KiwiRail's operating rules stated in part that:

117. Prevention of Locomotive Engineer Distraction

Locomotive Engineers must not participate in an attempted conversation where it is unsafe to do so. Conversations must be brief and confined to essential or urgent operating matters only.

(1) On Railcars and Multiple Units with direct access to the Locomotive Engineer, Train Managers/Guards and Assistants must:

Not ride in the driver's compartment or converse with the Locomotive Engineer except on matters relating to the running of the train.

3.3.2. KiwiRail had moved the content of Rule 117 from its general rules section to its operating rules section on 23 July 2012. The Rule had been previously contained within a rule that mostly detailed KiwiRail's response to adverse weather events. KiwiRail felt that the Rule deserved its own number and it was more appropriate to be located as an operating rule.

3.3.3. Both the passenger train driver and the train manager were aware that they should not have been engaging in idle conversation. KiwiRail's records of signals being passed at red in the Wellington electrified network between July 1999 and September 2013 showed that there had been 123 incidents during that period, of which 42% were partly or wholly attributable to driver distraction. The records also showed that there had been one previous similar incident at Signal 38 and 7 similar incidents at adjacent Signals 39 and 56 during the same period.

3.3.4. Driving metro trains on a busy metro passenger train network involves constant monitoring of signals. The current metro train network has a high reliance on train drivers seeing and responding to signals to prevent train collisions.

3.3.5. This incident is an example of what can happen if a driver is distracted and fails to see an important signal.

3.3.6. The Commission has recommended that KiwiRail take measures to address this safety issue.

4. Recommendations

4.1. General

- 4.1.1. The Commission may issue, or give notice of, recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues, depending on whether these safety issues are applicable to a single operator only or to the wider transport sector. In this case, recommendations have been issued to KiwiRail and the NZ Transport Agency.
- 4.1.2. In the interests of transport safety it is important that these recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

4.2. KiwiRail

Recommendation 1

- 4.2.1. The near collision occurred at a convergence of several busy metro passenger lines and there was no automatic protection applied to preventing such a collision in the event of a driver failing to stop at Signal 38.

Equivalent signals protecting other lines into Wellington station have been fitted with signal trips that automatically apply a train's brakes in the event of it overrunning the signal. A signal trip fitted to Signal 38 would have automatically applied the passenger train brakes in this case.

On 23 October 2013, the Commission recommended that the Chief Executive of KiwiRail install some form of protection that will automatically stop a train that has overrun Signal 38 in the Wellington Station area, and that he reviews other signalling arrangements in busy, high risk metro passenger areas to ensure the same arrangements are in place to minimise the risk of train collisions for the same or similar reasons (O22/13).

- 4.2.2. On 6 November 2013, the Chief Executive of Kiwi Rail replied:

Recommendation O22/13 made to the Chief Executive of KiwiRail is accepted.

A program to install a Signal trip at 38 Signal has been agreed. Design is programmed for completion by end of January 2014, and final commissioning by end of March 2014. Concurrently the Signals Engineering team will be undertaking a qualitative risk review of signalling arrangements in the Wellington Metro area. This will also be expected to be completed by end of March 2014.

Recommendation 2

- 4.2.3. Driver distraction has the potential to contribute to or cause serious accidents and incidents.

In this case the driver of the passenger train was distracted by engaging in a non-operational conversation with the train manager, and failed to stop his train at a red signal.

- 4.2.4. *On 23 October 2013, the Commission recommended that the Chief Executive of KiwiRail takes the necessary action to reinforce to all staff the existing rule forbidding non-operational conversation with train drivers, and use some means of monitoring compliance with the rule (O23/13).*

4.2.5. On 6 November 2013, the Chief Executive of Kiwi Rail replied:

Recommendation 023/13 made to the Chief Executive of KiwiRail is accepted.

Implementation of recommendation 023/13 has commenced with a program of briefings to Locomotive Engineers and on board customer service staff. Compliance is being monitored through the casual and formal observation process.

KiwiRail will provide a further update on progress in the New Year.

4.3. NZ Transport Agency

Recommendation 3

4.3.1. The Commission has made 2 recommendations to the Chief Executive of KiwiRail, that he:

1. Install some form of protection that will automatically stop a train that has overrun Signal 38 in the Wellington station area, and that he review other signalling arrangements in busy, high-risk metro passenger areas to ensure that the same arrangements are in place to minimise the risk of train collisions for the same or similar reasons.
2. Take the necessary action to reinforce to all staff the existing rule forbidding non-operational conversations with train drivers, and use some means of monitoring compliance with the rule.

On 23 October the Commission recommended that the Chief Executive of the NZ Transport Agency takes all appropriate steps to ensure that KiwiRail addresses the above recommendations (024/13).

On 7 November 2013, the acting Manager Rail Safety for the NZ Transport Agency replied:

Recommendations 022/13 and 023/13 that the Commission have directed to the Chief Executive of KiwiRail are noted. Recommendation 024/13 made to the Chief Executive of the NZ Transport Agency is accepted. Discussions on these recommendations will be initiated on publication of the final report. These discussions will include a projected timeframe for implementation. This will be advised to TAIC in due course.



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ISSN 1178-4164 (Print)
ISSN 1179-9102 (Online)