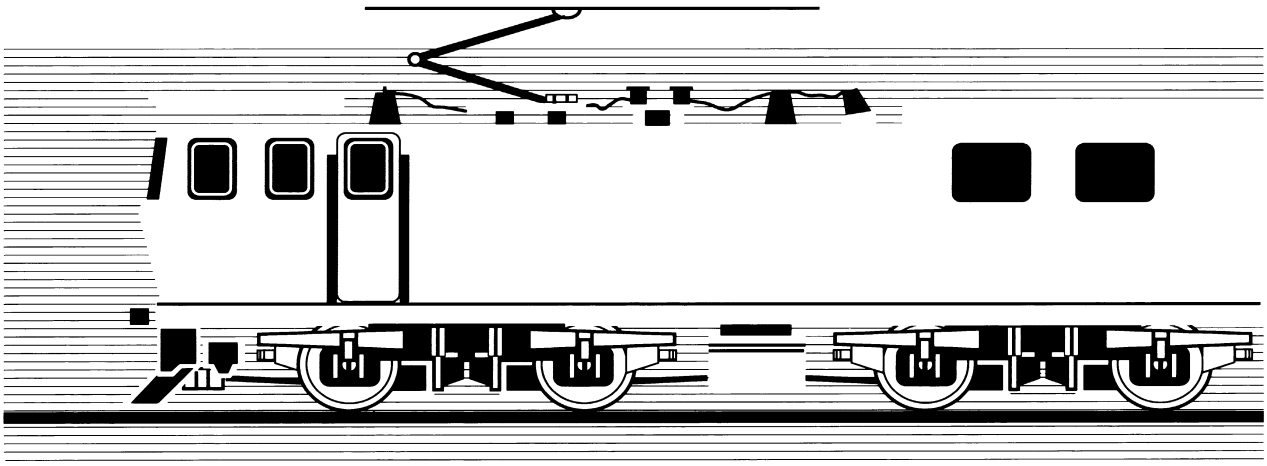
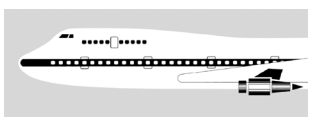
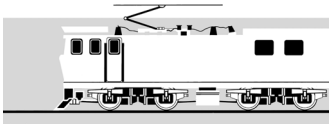


RAILWAY OCCURRENCE REPORT

03-107 diesel multiple unit Train 3247, passenger injury, Glen Innes 15 May 2003


TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

Report 03-107

diesel multiple unit Train 3247

passenger injury

Glen Innes

15 May 2003

Abstract

On Thursday 15 May 2003, at about 1240 hours, bi-parting doors on Train 3247, a Tranz Metro[1] Auckland to Papakura diesel multiple unit passenger service, closed on an alighting passenger at Glen Innes station and the train departed with the passenger trapped in the door. The driver heard the trapped passenger's screams and stopped the train within about 15 m from where the train departed.

The passenger suffered minor injuries.

The safety issues identified were:

- the door closure process
- the inspection of safety critical door components.

As a result of the actions taken by the operator, one safety recommendation has been made.

[1] Tranz Metro was the group within Tranz Rail with responsibility for the operation of suburban train services in Auckland.

Contents

Figures

Abbreviations

DMU	diesel multiple unit
hr	hour(s)
m	metre(s)
Toll NZ	Toll NZ Consolidated Ltd[2]
Tranz Rail	Tranz Rail Limited
UTC	coordinated universal time

[2] New owner of Tranz Rail, effective 5 May 2004

Data Summary

Train type and number:	diesel multiple unit Train 3247
Classification:	ADK 685
Year of manufacture:	1968
Date and time:	15 May 2003 at about 1240[3]
Location:	Glen Innes
Persons on board:	crew: 2 passengers: 20
Injuries:	crew: nil passengers: 1
Damage:	nil
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator-in-charge:	P G Miskell

[3] Times in this report are New Zealand Standard Time (UTC + 12 hours) and are expressed in the 24-hour mode.

1 Factual Information

1.1 Narrative

1.1.1 On Thursday 15 May 2003, Train 3247 was a Tranz Metro diesel multiple unit (DMU) commuter service from Auckland to Papakura. The service was crewed by a DMU driver and a train manager.

1.1.2 Train 3247 consisted of one ADK powered passenger car leading and one ADB non-powered passenger car trailing. The ADK car had 2 passenger doors and the ADB car had one door on each side of the car.

1.1.3 At about 1240, the train stopped at Glen Innes station and the DMU driver opened the doors to allow passengers to alight.

1.1.4 The train manager, who was travelling in the trailing car, stepped on to the platform from No. 6 bi-parting door and took up a position where he could see all 3 bi-parting passenger doors. He remained there until passengers had either alighted or boarded the train (see Figure 1).

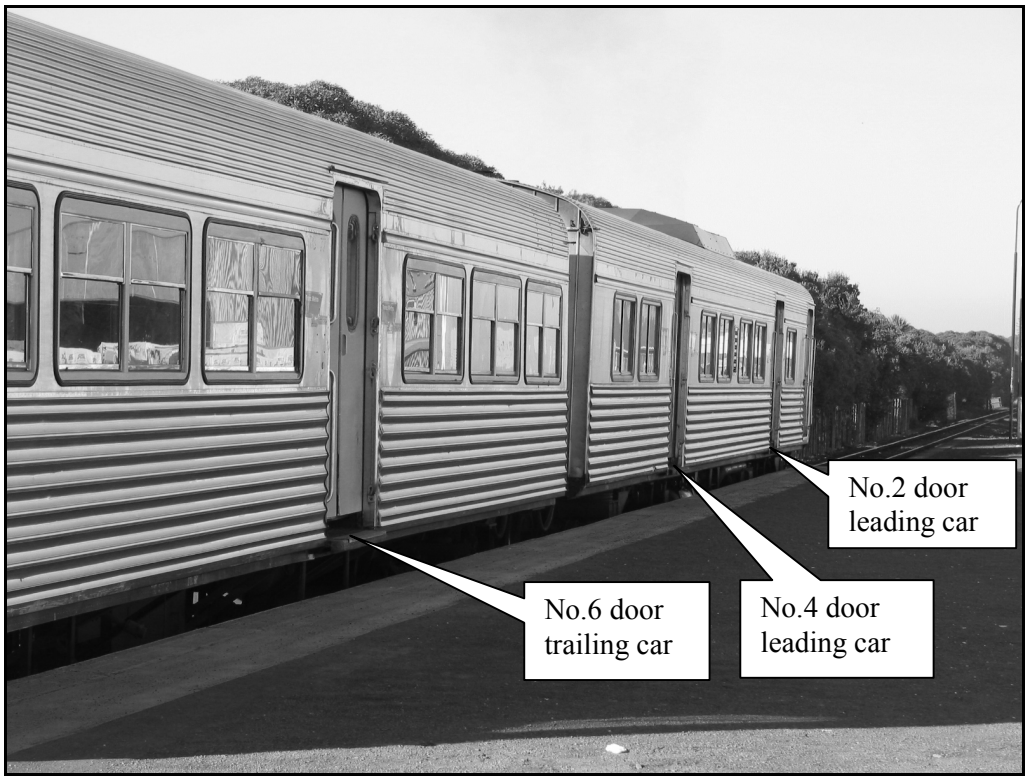


Figure 1
Train stopped at Glen Innes station on the down main

1.1.5 After the train manager satisfied himself that all passengers destined for Glenn Innes had alighted the service and new passengers had boarded the service, he re-boarded the train. He looked through the windows in the internal connecting doors into the ADK car and glanced outside the train before he closed the remote doors and gave a "door closed" signal to the DMU driver.

1.1.6 A passenger who was sitting on the left-hand bench seat at the front of the ADK car had fallen asleep during his trip from Auckland to Glen Innes. He suddenly awoke then attempted to alight from the train through No. 2 bi-parting doors as they were closing. The doors closed on his left ankle and upper arm, trapping him in the door but outside the train.

1.1.7 While the passenger struggled to extricate himself from the doors, the train started to move, so he screamed to attract the DMU driver's attention. The driver heard the screams and stopped the train within about 15 m from where he had departed. Meanwhile, the passenger had pulled himself free of the doors and fallen to the platform.

1.1.8 The driver got out of his seat and went across the cab to the platform side window and looked out and saw a person lying on the platform. He went back to his controls and secured the train then went to assist the injured person. The train manager arrived soon after.

1.1.9 The train crew remained with the injured passenger until ambulance staff attended to the passenger.

1.2 Site information

1.2.1 Glen Innes station was an island platform with up and down main lines on either side of the platform. Auckland bound services were berthed on the up main line and services from Auckland were berthed on the down main line.

Figure 2
Down main line and platform at Glen Innes (looking south, direction of Train 3247)

1.3 Door closing sequence

1.3.1 Tranz Rail Operating Code instructions to the train manager for the operation of bi-parting doors on ADK and ADB passenger cars are summarised below:

- once the doors were opened by the driver, the train manager should insert his key in one of the control boxes located next to each bi-parting door and must turn the key to position "2". All control boxes show a red light when any door is open (see Figure 3)
- having visually checked that all passengers were off/on and clear, the train manager should press the red "door close" button to close all the doors on the DMU except the local door beside the control box with the key inserted

- once all the remote doors were properly closed, a green light illuminated on the local control box
- the train manager should again visually check that passengers were clear of the doors before pressing the green button to send the 2-bells "right away" signal to the DMU driver
- as the train moves off the train manager must look along the train for any emergency signals or unusual situations
- if nothing is untoward, the train manager should turn the key to position 1 to close the local door and remove the key from the control box after these doors had closed.

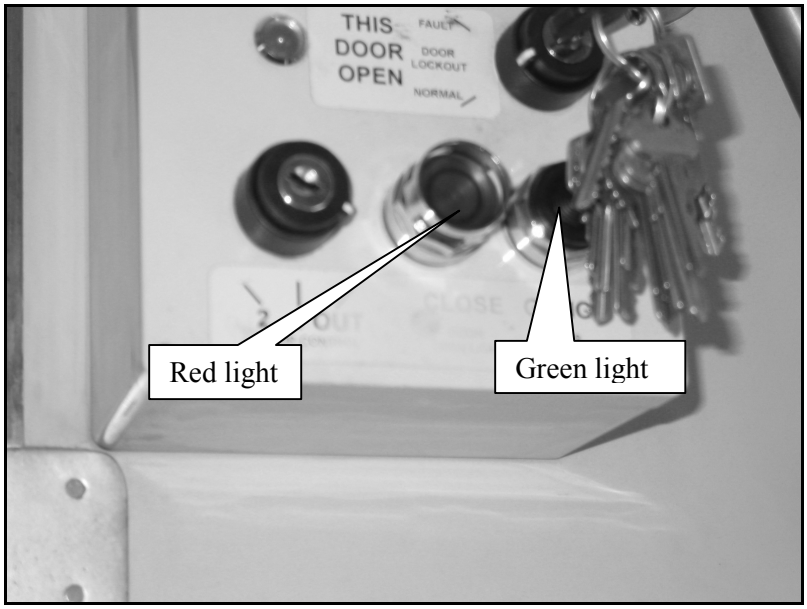


Figure 3
Train manager's door control box

1.3.2 Tranz Rail Operating Code Instructions to a DMU driver for the operation of bi-parting doors on ADK and ADB passenger cars are similarly summarised below:

- the DMU driver was the best person to ascertain when the DMU had stopped in the correct position at a station and so was responsible for opening the bi-parting doors on the appropriate side. A red light on the DMU driver's console was illuminated if any one of the bi-parting doors were open (see Figure 4)
- a full brake application must be made after the DMU has stopped at a station. If the controller was not in the brake position when the doors were opened, an alarm sounded
- a DMU driver must not depart from a passenger station until the blue "door closed" light was illuminated and the train manager has given the "right away" signal
- a DMU driver must stop the train if the warning buzzer sounded and/or the red "door open" light was illuminated.

1.3.3 A copy of Tranz Rail Operating Code Supplement CSR 4.10 Section 6 Issue 5, dated 19 November 2001 dealing with the operation of DMU doors is attached as Appendix 1. While the supplement was for ADL – ADC cars, all instructions for the operation of doors and bell codes were the same except that on the ADK and ADB cars, passengers were additionally given a 2-second audible warning before the doors began to close.

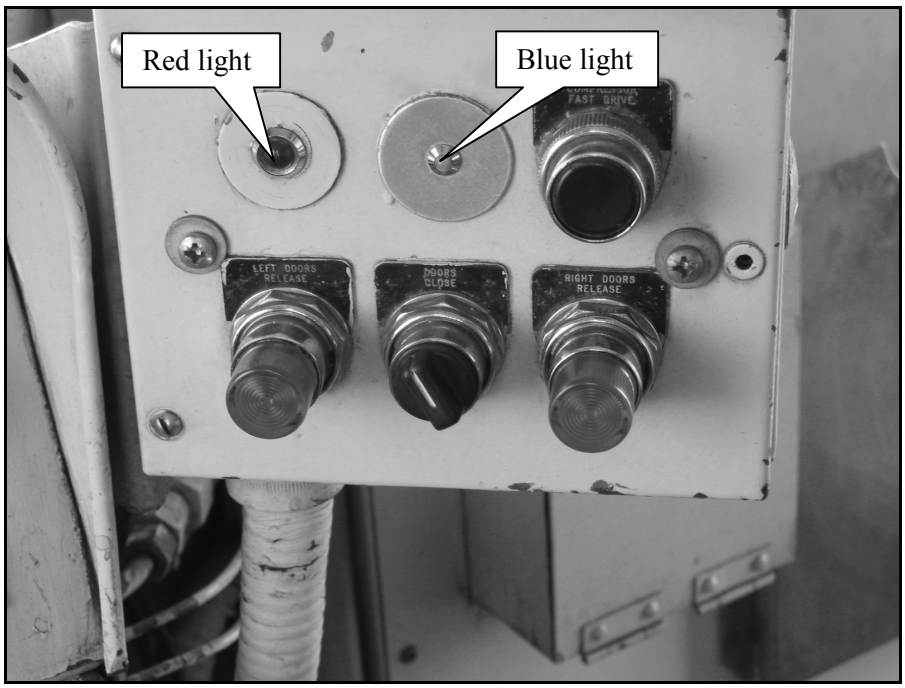


Figure 4
DMU driver's door status control console

1.4 Post-accident check of the door close mechanism on ADK 685

1.4.1 Both ADK 685 and ADB 775 were withdrawn from service after the incident and taken to Alstom[4] DMU depot for examination of the doors and door control mechanism.

1.4.2 The top door hanger bracket connections to the doors on the No.2 bi-parting doors of ADK 685 were found to be loose.

1.4.3 To simulate operating conditions that existed when the accident occurred, a 40 mm wide wooden block was placed at floor level between No.2 bi-parting doors. The simulation showed that:

- it was possible to close the bi-parting doors against the block while the tops of the doors made contact sufficient to activate the micro switch that sent a door closed indication to the train manager's control box
- with the train manager's key in position 2 on the control box by No.6 door, a green light was illuminated on the control box.
- when the green button on the control box was pressed and the remote doors closed, a blue "door closed" indication was illuminated on the driver's console
- a 2-bells "right away" signal was sent to the driver even though No.2 bi-parting doors remained wedged apart at the bottom.

1.5 Maintenance checks on doors of ADK 685

1.5.1 The ADK and ADB passenger cars used on the Auckland suburban passenger network were formerly owned by Westrail and operated in Perth. The ADK class cars were built at Commonwealth Engineering (NSW) in 1968 and the ADB cars were built at Westrail's own shops in 1968 and 1969. The ADK and ADB passenger cars were commissioned on the Auckland suburban passenger network during 1993.

[4] The service provider contracted to Tranz Rail responsible for the inspection and maintenance of the DMU fleet.

1.5.2 Tranz Rail Mechanical Code M2000 determined that ADK passenger rolling stock would be inspected at regular intervals:

- A-Check (servicing) as required
- B-Check 3 months
- C-Check 6 months
- D-Check 12 months.

1.5.3 Tranz Rail Code Supplement M 9331 Issue 4, dated 1 November 2000, described the door status system test procedures to be carried out on ADK passenger cars at the 3-monthly and higher intervals as:

> This part of the test should be carried out with no air to the doors. Place the selector out of 'OFF" and the controller in "B" in one cab.
>
> Ensure that all doors are closed and that no keys are in the guard's door boxes. "Doors closed" lights should be on at all doors and in both cabs.
>
> Starting from doors farthest from the cab with the key in, the "live" cab:
>
> Open each door in turn by hand
>
> Observe that the "This Door Open" light and the "Door Open" light comes on as the door is open.
>
> Open and close each door a sufficient distance to operate the microswitch. Repeat this 20 times
>
> This part of the test must be carried out with the air to the doors. Open all doors using the Left Release and Right Release buttons. The "go-no go" gauge is to be placed in the door at mid height.
>
> At each door in turn:
>
> Close and open the door as required by turning the door cut out switch between "fault" and "normal"
>
> "This door open" light must be OFF with "go" gauge in the door as it closes.
>
> "This door open" light must be ON with 'no go" gauge in the door as it closes.
>
> Close all doors using the "Close Doors" button/switch.
>
> Ensure that all door boxes have their cut out switches back to "normal".
>
> At each cab, in turn:
>
> Move the controller to 'O"
>
> Open any door
>
> Observe that the "door Open" light comes on and the "Door Open" alarm sounds when the door is opened.

1.5.4 The most recent B-Check inspection on ADK 685 was carried out on 24 April 2003. The check on all doors was carried out in accordance with Mechanical Code Supplement M9331 and no out of code items were recorded.

1.6 Personnel

Train manager

1.6.1 The train manager had worked for Tranz Rail for about 10 years. He had experience working on both long distance and commuter passenger services.

1.6.2 The train manager said that after arriving at Glen Innes station, he alighted from the trailing car and stepped about 8 or 9 paces from the platform edge and had a full view of all passengers alighting from and boarding the train. He waited on the platform a further 10 seconds after the last passenger had boarded the train before he re-boarded the train.

1.6.3 The train manager looked through the windows of the internal interconnecting doors to check that there was no further passenger movement in either car. He then glanced outside his door and confirmed there were no more passengers waiting to alight the service before he pressed the red "close door" button and waited for the green light on the control box to come up. When the light was up, he gave the 2-bells signal to the driver and closed the local door. He did not look along the train as it moved off.

1.6.4 The train manager said that when he started to move away from the door, a passenger came running through from the front car saying there had been a person trapped in the door but he disappeared. The train manager was surprised because he had had a green light on the control box. He made his way to the front of the train from where he was called by the driver who was already on the platform with the injured passenger.

1.6.5 The train manager's most recent safety observation in "On board passenger service duties" was carried out on 1 November 2002, at which time there were no identified shortcomings relating to closing doors and authorising the DMU driver to depart from stations.

Diesel multiple unit driver

1.6.6 The DMU driver had been a locomotive engineer for about 30 of the 39 years he had been employed by Tranz Rail or its predecessors, and included 10 years driving DMUs.

1.6.7 The driver said that on arrival at Glen Innes he stopped the train in the normal manner. His driving seat was on the left-hand side of the ADK car and the island station platform on his right-hand side. He said he waited about 2 to 3 minutes before he received the 2-bell "right away" signal from the train manager. He acted on the signal, but he could not remember if there was a blue light illuminated on his console.

1.6.8 As the train started to move away from the platform, the DMU driver heard screams that appeared to be coming from the platform side of the train. He stopped the train immediately and looked out the platform-side cab window and saw a person lying on the station platform. The driver said he had not received an alarm, indicating that a door was open, when the train moved away from the platform.

1.6.9 He secured the train and opened the doors before going to assist and comfort the person lying on the platform. After making a preliminary assessment of the nature of the injuries, the driver contacted train control and requested medical assistance.

The injured passenger

1.6.10 The injured passenger was a regular suburban rail passenger.

1.6.11 The passenger had fallen asleep during the scheduled 14-minute journey between Auckland and Glen Innes and was still asleep when the train arrived at his destination. He did not recall hearing the audible warning given 2 seconds before the bi-parting doors began to close. Waking to see the doors closing, he reacted instinctively and tried to alight.

1.6.12 He said he went into a state of shock when he was trapped between the doors as the train started to accelerate from the platform. He managed to free himself from the doors before the train stopped, but fell onto the platform. He suffered minor injuries and was treated at the station by ambulance staff. No further medical treatment was required.

1.7 Other relevant occurrences investigated by the Commission

Occurrence report 98-119, train movement while passenger alighting, Swanson, 20 October 1998

1.7.1 On 20 October 1998, the sliding doors on an Auckland to Waitakere DMU commuter train closed on a child in a pushchair as the mother was endeavouring to lift the pushchair from the train to the platform. While attempts were made to free the pushchair, the train moved slowly forward before the doors were opened sufficiently to allow the pushchair to be freed.

1.7.2 As a result of the incident the Commission recommended to the Managing Director of Tranz Rail that he:

> Emphasise to all Tranz Rail staff involved in passenger operations the importance of existing procedures that provide for the safety of passengers when boarding or alighting from trains, and implements compliance monitoring to ensure the procedures are adhered to. (116/98)

1.7.3 On 16 March 1999, the Managing Director of Tranz Rail accepted the safety recommendation and confirmed that action had been taken to implement it.

2 Analysis

2.1 The train manager's position on the platform at Glen Innes enabled him to observe all passengers alighting and boarding the train through any of the 3 open doors. By waiting a further 10 seconds or so on the platform after the last passenger boarded the service, he extended the buffer time and ensured that those passengers boarding the train had a reasonable time in which to find an available seat.

2.2 Once the train manager re-boarded the trailing car he satisfied himself by looking through the windows of the interconnecting doors that there was no passenger movement within the leading car. By making a further glance outside the train to check for late arrivals at the station before he pressed the "door close" button for the remote doors, the train manager had complied with the door-close code instructions up to that time.

2.3 It could not be determined what had woken the sleeping passenger at Glen Innes, but it was likely to have been the audible warning that sounded 2 seconds before the bi-parting doors started to close. Having suddenly woken, the passenger probably left his seat and moved towards the doors as they began to close. However by the time he reached the doors they had already started to close and he was unable to safely alight the train.

2.4 Attempting to alight the train through closing doors was dangerous and could not be justified under any circumstances. While the passenger's injury was minor in this instance, had the DMU continued with the passenger still trapped between the bi-parting doors the injuries would probably have been more severe. However, when the doors closed on the passenger, they should not have been able to close sufficiently to illuminate a green light on the train manager's control box.

2.5 The train manager gave the 2-bell "right away" signal to the DMU driver before he closed his local door after he correctly interpreted the green indication on the control box beside his local door to denote that all remote doors were closed. As the train moved off the train manager should have made a further visual check for any unusual situations. Had this final check been made, he may have seen the passenger trapped in the leading door.

2.6 In the 6 months between the train manager's last safety observation and this occurrence, it was possible his compliance with Rail Operating Code instructions had reached a point where a visual check outside the train, prior to giving "right away" was no longer carried out.

2.7 Although the DMU driver could not recall seeing a blue light on his console indicating that all doors were closed, the train remained stationary until the driver heard the 2-bell "right away" signal given by the train manager. Had the "door open" red light on his console been illuminated, a warning buzzer would have sounded had the DMU driver attempted to move the train.

2.8 The DMU driver's alertness meant that he responded immediately to the trapped passenger's screams and stopped the train within a short distance. His responsiveness probably reduced the risk of the trapped passenger suffering more serious injuries.

2.9 The most recent B-Check mechanical inspection that included an examination of the doors of ADK 685 was conducted less than 3 weeks prior to the incident. While the B-Check did not require the top hanger door connection to be specifically checked, a post-accident inspection identified significantly loose connections on the bi-parting doors that trapped the passenger. These connections had sufficient slack that it was possible to wedge a 40 mm block between the bi-parting doors at floor level and have the top of the doors close as normal, thereby activating the "door closed" micro switch as designed. This in turn activated the train manager's green "door closed" light on his local control box giving him an incorrect door status. However, in view of the actions taken by the operator no safety recommendation relating to the door close mechanism has been made.

2.10 Ideally power-operated doors should close with sufficient force to ensure that they could not be held open manually or opened between stations, but not so firmly that they could injure anyone trapped or prevent their escape. The compromise between these requirements would be to ensure that the doors close with sufficient force to be secure against unauthorised opening but provide a "soft" door edge seal that allows hands to escape with little discomfort. A safety recommendation relating to the replacement of the door edge seal has been included in this report.

2.11 Although the door control system with micro-switch detection may be considered the primary defence against a train moving while a passenger was trapped outside the passenger car between the bi-parting doors, the train manager's final visual check was the principal backup should the mechanical-electrical control system fail to detect a trapped object or person outside the train.

3 Findings

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

3.1 The accident occurred when a passenger attempted to alight from Train 3247 at Glen Innes station while the bi-parting doors were closing.

3.2 The train departed with a passenger trapped between the doors because the No.2 door on ADK 685 had loose door hanger brackets that allowed the top of the doors to make sufficient contact to activate the doors closed micro switch and display a "doors closed" indication on the train manager's control box.

3.3 The train manager did not make a final visual check to confirm that all passengers were clear of the doors as the train departed.

3.4 Train 3247 departed Glen Innes station after the driver received the audio and visual signals from the train manager to do so.

3.5 The DMU driver and train manager operating Train 3247 were appropriately certified.

3.6 The driver's actions in stopping the train within 15 m from departing the station reduced the risk of further injuries to the trapped passenger.

4 Safety Actions

4.1 During the week following the incident, a number of safety briefings conducted by the Tranz Metro Manager were held so that all train managers operating within the Auckland suburban network could be instructed in the door closure process as described in the Rail Operating Code.

4.2 Random audits were conducted which confirmed compliance with the Rail Operating Code instruction relating to door closure on suburban trains.

4.3 On 30 April 2004, Tranz Rail added an additional item to the B-Check (Issue 14) mechanical inspection of ADK/ADB cars:

> Check each door hanger bracket is tightly secured to its door.

4.4 On 30 April 2004, Tranz Rail amended M9331 to include an additional test:

> At each door in turn:
> Close the doors with a 30 mm block placed between the door side faces at the bottom.
>
> When the doors are closed, a gap must still be visible between the door side faces at the top of the doors.

4.5 On 30 April 2004, Tranz Rail advised the Commission that the entire ADK fleet was scheduled for overhaul within the next 18 months. As part of the overhaul, the existing door system will be replaced by a mechanism system similar to that used on the upgraded SA passenger cars.

5 Safety Recommendation

Safety recommendations are listed in order of development and not in order of priority.

5.1 On 19 July 2004 the Commission recommended to the Chief Executive of Toll NZ Consolidated Limited that he:

> ensure that the rubber door seals used on the bi-parting doors of passenger cars are of a material type and profile that allows trapped limbs to be freed with minimal discomfort to the person caught between the doors. (032/04)

5.2 On 13 July 2004, Toll NZ Consolidated Limited advised that the planned refurbishment of the ADK and ADB fleet would incorporate:

- soft door nosings that are currently fitted to the EM and ET fleet,
- obstacle detection facility whereby if the door encounters an obstruction it stops the door from closing and re-opens it.

5.3 On 28 July 2004, Toll NZ Consolidated Ltd advised that the refurbishment of the ADK fleet had begun and was scheduled to be completed by the end of 2005.

Approved on 30 July 2004 for publication

Hon W P Jeffries
Chief Commissioner

Appendix 1

6.0 DOOR OPERATION

6.1 Guards Door Control

Sliding cab door and saloon doors leading into the driving compartment of DMU's **must** be kept closed and locked at all times. Guards may leave equipment in the driving compartment which is in use.

Normal Door Operation (Guards Duties)

Once the doors have been opened, the Guard should insert his key in one of the control boxes located next to each bi-parting door. All control boxes will show an illuminated red light when any door is open, and an illuminated green light when all doors (except the door with the guards key inserted) are properly closed.

The key must be turned to position 2 on the control box. The Guard is to visually check all passengers are on/off and clear and when ready, press the red button. This will close all doors on the DMU except the one the key is inserted in.

Once the doors are properly closed, the green light will illuminate. The Guard *before closing his door, to again visually check that passengers are clear of the doors* then sound two bells by pressing the green button. This is the signal to the Locomotive Engineer to proceed with Guard aboard.

The Guard must now turn his key to position 1. This will close the doors the Guard is standing by. The key may be removed from the control box **AFTER** these doors have closed.

Danger: Do not travel with the doors open. Do not turn the key to "off" until the bi-parting doors are completely closed.

6.1.2 Normal Door Operation (Locomotive Engineers Duties)

The opening of the bi-parting doors is controlled from the cab by the Locomotive Engineer. All doors on the selected side of the DMU will open simultaneously. The bi-parting doors are opened by pushing the "Left Door Release" button or "Right Door Release" button. The Guard will control the closing of the doors.

CAUTION: The doors MUST NOT be opened before the DMU has come to a complete stop, *all saloon doors are on the platform, and the master controller is in the* "Application" *position.*

The control console is fitted with two "Door Status Indicator" lights. A BLUE light will indicate that all bi-parting doors are correctly closed. A RED light will indicate that any one of the bi-parting doors is open. A warning buzzer will also sound when the red light is illuminated if the master controller is in any position other than "Application" or "Emergency".

After starting, it will be noticed that all door status indications are red. If all doors are correctly closed, the door status indication will change to blue in the cab (green in the saloon) when the reverser is placed in either Forward or Reverse. The bi-parting doors will only operate when the reverser in the driving end is in the Forward or Reverse position. If a blue "Doors Closed" indication is not displayed when the reverser is placed in either Forward or Reverse, each door should be individually checked.

The door status indication will also be red when the penalty brake operates. The lights will revert to blue in the cab (green in the saloon) when the vigilance is reset.

A Locomotive Engineer must not depart from a passenger station until a blue "Door Closed" light is exhibited and the Guard has given the "Right Away" signal.

If the warning buzzer sounds and/or the red "Door Open" light illuminates, the train MUST be stopped immediately and the Guard informed. The Guard is then to investigate the cause. If the Guard observes that the door status information is red and the vehicle has not started to stop, he is to give the bell "stop" signal.

A "door close" rotary switch is fitted on the control console. This MUST NOT be operated unless in the Depot or during a door control failure situation when the Locomotive Engineer receives the "Close Door" bell signal from the Guard.

6.2 Door Operation with Door Status System Failure

(To be read in conjunction with instruction 6.3.3)

Once the doors have been opened, the Guard should insert his key in the switch by the side of the bi-parting door he is standing in and turn the switch to position 2. This will prevent this set of bi-parting doors closing when the Locomotive Engineer presses the "door closing" button. The key in position 2 also connects the circuit to make the bell operation at that door.

The Guard is to visually check all passengers are on/off and clear of doors and when ready sound one bell - this is the signal for the Locomotive Engineer to close the doors.

The Guard is to visually check that all other doors except his (which has the key in) are closed correctly and nothing is caught between the bi-parting doors.

When all is safe and clear, the Guard should sound two bells which is the Locomotive Engineers signal to proceed with Guard aboard.

The Guard should then turn his key "off" and remove it so that this set of bi-parting doors will now close.

Danger: If the key is put into the switch and turned to position 2 whilst the train is moving that set of doors is free and can be opened manually.

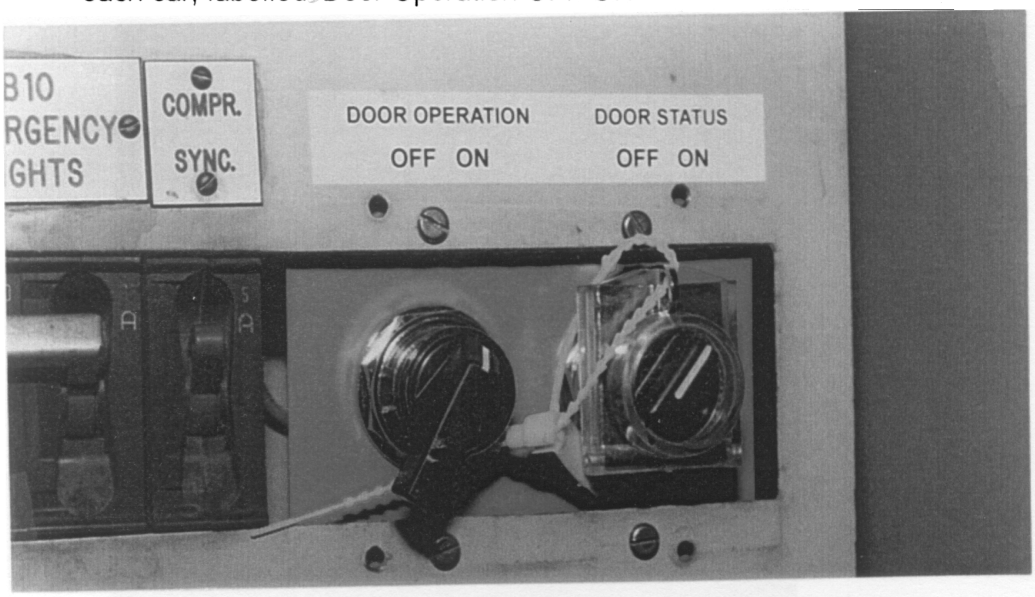
6.3 General Door Operating Instructions

6.3.1 Terminating Services

When passenger services terminate at a station and the DMU is to be stabled or relocated by the Locomotive Engineer, the Guard must ensure that all passengers have alighted the DMU. The Guard is then to close the doors from the saloon. When all doors are correctly closed, the Guard will alight from the DMU and verbally authorise or hand signal the Locomotive Engineer to proceed.

6.3.2 Door Isolation

A door isolation switch has been fitted in the DC electrical cabinet of each car, labelled 'Door Operation OFF ON



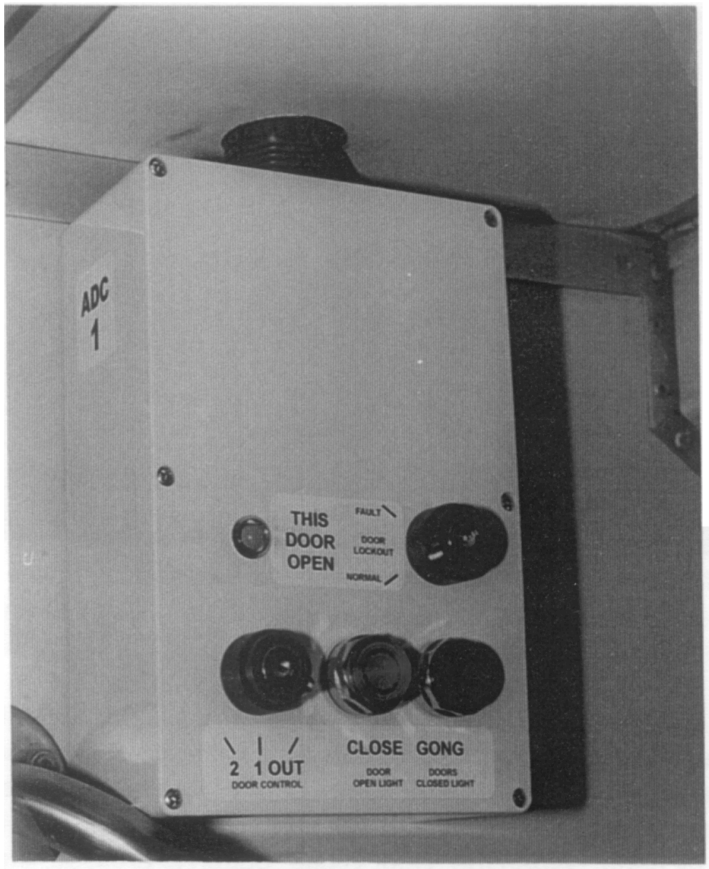
This switch, when operated, will isolate closed, all doors in that car. To isolate the whole DMU, the switch in both the ADL and ADC will need to be operated.

Each bi-parting door is fitted with a two position fault switch. If a fault developed that caused the door not to open, this switch should be turned to "Fault". When the Locomotive Engineer presses the door open button, that door will not open and the Guard must open it by hand. When the "Door Close" button is pressed, the door in fault mode will close in the normal manner.

6.3.3 Door Status System Failure

If it is not possible to get the system working properly, the system can be isolated by operating the "Door Status" switch in the DC electrical cabinet of the driving cab the Locomotive Engineer is operating from. This is fitted with a security seal. When this seal is broken it must be recorded in the Loco 54 book. The operation of a DMU with the door status system isolated is to be as Instruction 6.2. The Locomotive Engineer will close the doors with the "Door Close" rotary switch on the control console.

6.4 Bell Codes.



One Bell - Close doors (Instruction 6.2 only).
Two Bells - Proceed (Guard aboard).
Three Bells - Stop.
(given quickly)
Five Bells - Bell test (see air brake continuity test).
Continuous Bells Open Doors
(Only to be used when stationary at platform)

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