Report 98-119

train movement while passenger alighting

Swanson

20 October 1998

Abstract

On Tuesday 20 October 1998, at approximately 1258 hours, the sliding doors on an Auckland to Waitakere commuter train closed on a child in a pushchair as the mother was endeavouring to lift the pushchair from the train to the platform at Swanson. While attempts were being made to free the pushchair the train moved slowly forward before the doors were opened sufficiently to allow the pushchair to be freed. The safety issues identified were the possibility of diesel multiple units being able to move from rest without all doors being closed, and the lack of compliance with procedures laid down for passenger safety. Two safety recommendations were made to Tranz Rail Limited to address these issues.

Contents

Glossary of abbreviations

DMU	diesel multiple unit
LE	locomotive engineer
Tranz Rail	Tranz Rail Limited
TB	throttle/brake
EP	electro-pneumatic

Transport Accident Investigation Commission

Rail Incident Report 98-119

Train type and number:	Diesel multiple unit 2120
Date and time:	20 October 1998, 1258 hours
Location:	Swanson
Type of occurrence:	Train movement while passenger alighting
Persons on board:	Crew: 2 Passengers: 8
Injuries:	Nil
Nature of damage:	Nil
Investigator-in-Charge:	R E Howe

1. Factual Information

1.1 Narrative

1.1.1 On Tuesday 20 October 1998 Train 2120 was a diesel multiple unit (DMU) commuter service running between Auckland and Waitakere.

1.1.2 The DMU was made up of a pair of complementary cars, ADC856 leading and ADL806 trailing.

1.1.3 At 1258 hours, the DMU stopped at Swanson, the last stop before the Waitakere terminus, and the doors opened to allow passengers to disembark.

1.1.4 Witnesses observed four people alighting from the trailing door of the trailing car. The fourth person was a mother with a child in a pushchair who had to wait some time to alight as the previous person was physically impaired and had difficulty negotiating the step from the floor of the car to the platform.

1.1.5 The mother then alighted and was in the process of lifting the pushchair from the car to the platform when the sliding doors closed on the pushchair.

1.1.6 As the mother was attempting to free the pushchair from the doors, and uncertain whether it would be quicker to unstrap the child, the DMU was observed moving slowly forward. In response to screams from the mother, who was now attempting to unbuckle the child, a female passenger (witness A) further along in the car came to her assistance and together they tried to force the doors apart sufficiently to free the pushchair.

1.1.7 During the process of freeing the pushchair the mother stated that the DMU was moving slowly and while not sure of the exact distance it had moved she recollected it had gone "a few metres anyway".

1.1.8 The screams also attracted the attention of at least two other people on the platform. One was a women on the platform near the head of the DMU, who the mother saw gesticulating to the locomotive engineer (LE), and the other was a man (witness B) at the centre of the platform who observed the whole incident.

1.1.9 After the doors opened sufficiently to free the pushchair, the mother checked that her child was unharmed and ran in a state of shock to her parents home which was less than 100 m from the station. Before she departed she looked up to see the guard looking out of the front window of the DMU. She later stated that her impression was that the guard was unaware of what had just transpired.

1.1.10 On reaching her parent's home the mother telephoned the Auckland Railway Station to lay a complaint. She later stated that she was advised that with the safety measures built in to the DMUs they could not move until the doors were completely closed. She concluded that they were not very interested in her complaint and hung up before Tranz Rail Limited (Tranz Rail) were able to get full details.

1.2 Witness A

1.2.1 Witness A was in the front portion of the rear car of the DMU and was alerted to the incident by shouts of "stop, stop". She initially thought it was children misbehaving, but then realised that something was wrong when she saw the pushchair stuck in the door with the mother on the outside.

1.2.2 Witness A immediately went to the assistance of the mother and tried to force the doors open. She was not aware of any movement of the DMU while she was attempting to free the pushchair.

1.2.3 She stated that after the pushchair was freed the doors closed and the DMU moved off. Witness A did not notice any other passengers with pushchairs board or alight the DMU.

1.2.4 Witness A saw no sign of the guard at Swanson, but did speak to her at Waitakere and asked if she was aware of the pushchair being stuck in the door. She stated that the guard answered affirmatively.

1.3 Witness B

1.3.1 Witness B stated that he was situated on the platform at about midway along the DMU when it had stopped. He observed the physically impaired person taking considerable time to alight from the DMU followed by the mother with the pushchair. His attention was particularly focused when he heard some "blood curdling screams" from the mother and he noticed that the DMU sliding doors had closed on the pushchair.

1.3.2 He then observed the DMU starting to move forward slowly with the mother keeping pace and attempting to undo the straps that were holding the child in the pushchair. He immediately went over to the DMU and started banging on the side and yelling to stop the train, hoping to attract the attention of the driver.

1.3.3 Witness B then observed a woman on the platform near the front of the DMU put her arms in the air. He stated he thought this was a signal for the LE to stop the train. At this stage the DMU slowed down and stopped.

1.3.4 Witness B noted that the guard was in the front cab with the LE and assumed that the door closure had been activated immediately after seeing the mother alight from the DMU.

1.3.5 Witness B said that the trapped pushchair was the only one to come off the train at Swanson. He noted that as soon as the door opened sufficiently to release the pushchair it closed and the train immediately moved off without any staff dismounting from the front cab.

1.3.6 The woman who was reported as being at the head of the DMU at the time of the incident could not be found.

1.4 The guard's recollection

1.4.1 The guard stated that she was in the front cab of the DMU with the LE as it stopped at Swanson. From the side door window she noted when all the passengers had alighted and told the LE to close the doors. The LE used the "door close" rotary switch fitted to the control console to close the doors.

1.4.2 She was not aware of anything untoward at the rear of the DMU but her attention was attracted by a woman just in front of the cab who, by her actions, was indicating that something was wrong. At the time the guard stated that she was not aware of any movement of the train nor any change in the engine note.

1.4.3 The guard did not recall hearing the warning buzzer in the cab, provided to indicate that the DMU was moving while the doors were still open.

1.4.4 The guard said that she looked back and saw an obstruction at the leading door of the trailing car (the pushchair seen by witnesses was caught in the trailing door of the trailing car). She asked the driver to open all the doors and proceeded out of the cab and along the platform to investigate. The guard stated that on arriving at the leading door of the trailing car she found a woman whose pushchair had apparently been stuck in the doorway and asked her destination. The passenger said Henderson, and the guard assumed that the woman had boarded the train, realised that the train was going in the wrong direction, and alighted at the last moment.

1.4.5 The woman concerned was not found and the delay in being advised of the incident meant this conflicting version of events could not be confirmed.

1.4.6 The guard stated that she was unaware of any incident at the trailing door and after entering the train by the leading door of the trailing car she used her control box keys to close the doors and proceeded back to the cab.

1.5 The LE's recollection

1.5.1 The LE stated that he brought the DMU to a normal stop at Swanson and opened the doors. He stated that the guard was in the cab with him.

1.5.2 After receiving a request from the guard to close the doors, and receiving right of way, he actuated the "door close" switch from the cab console. He was unaware of the number of people who had got on or off the DMU because of the wall behind him obstructing any rear view.

1.5.3 The LE was awaiting the door indicator warning light to change from red to blue before releasing the brakes and applying power to move off. He stated that the light stayed on red and he did not move the controls from the LAP (hold) position knowing that if he did so while any of the doors were not closed an instantaneous warning buzzer would be activated. He stated that he did not notice the DMU move nor did he hear any warning buzzer.

1.5.4 The LE stated that the guard, on looking out of the cab door, said "There's a pram in the doors". The LE released the doors for the guard to investigate still unaware of any movement of the DMU.

1.6 Door operation

1.6.1 The attached appendix 1 is a copy of Tranz Rail's Rail Operating Code, Supplement 4.10, Section 6 (dated 2 March 1998) dealing with the operation of doors on DMU's.

1.6.2 In summary the code provided for the following normal actions and procedures for the correct operation of the doors on a DMU:

- because the LE was the best person to ascertain when the DMU was stopped in the correct position at a station he was responsible for opening the doors on the appropriate side.
- once the doors were opened the guard was required to insert a key into the control box at one of the door positions and turn it to the "2" position.
- having visually checked that all passengers were on/off and clear, the guard pressed the red "door close" button and all the doors on the DMU closed (except the one with the key inserted).
- once the doors were properly closed, a green light illuminated the control box and the guard then sounded two bells by pressing a green button indicating to the LE that he could proceed.

- the door that the guard was standing at was then closed by the guard turning the key to the "1" position and the key was removed after the doors were closed.

  "Door status indicator" lights were fitted to the control console in the DMU cabs; a blue light indicated that all bi-parting doors were correctly closed and a red light indicated that one of the doors was open. If the master controller was moved to any position other than LAP, APPLICATION or EMERGENCY BRAKE while a red light was displayed a warning buzzer was sounded. The LE was not permitted to depart from a passenger station until the blue "door closed" light was exhibited and the guard had given the two bell "right away" signal. The "door close" rotary switch fitted in the control console was not to be operated unless in the depot or during a door failure situation.

1.6.3 Activation of door closing, either by the guard's red button or the rotary switch on the LE's control console, also automatically primed the hydraulic transmission system in anticipation of the DMU moving off. The priming operation required approximately 7 seconds to energise the transmission fill circuit and at the end of 15 seconds, if the throttle/brake (TB) control was not moved, the transmission oil was dropped from the torque converter.

1.7 Driver's console

1.7.1 The attached appendix 2 is a copy of the relevant parts of Tranz Rail's Rail Operating Code, Supplement 4.10, Section 3 (dated 27 January 1997) dealing with the controls, switches and gauges on DMU's.

1.7.2 The master controller used by the LE was of the combined TB handle type and had the following sequential control positions:

EMERGENCY BRAKE	Applied a separate emergency braking system.
APPLICATION	Progressively applied brakes to the DMU through an electro- pneumatic (EP) brake system.
LAP	Held brakes in the position they were left in after either application or release.
RELEASE	Progressively released the EP brakes from the position they were in.
COAST	Applied a free wheel to the DMU. i.e. no brakes and no power.
DRIVE	Primed the hydraulic transmission system in anticipation of the throttle being applied.
THROTTLE	Had three throttle opening positions to power the DMU.

1.7.3 To brake a train at a passenger station the LE would vary the TB control between APPLICATION and RELEASE to adjust retardation to pull up at the right position. Having stopped he would move the TB to the LAP position in anticipation of moving off once the blue light had come up, indicating that the doors had closed.

1.7.4 The maximum pressure obtainable for braking was 280 kpa on ADL cars and 240 kpa on ADC cars but for holding purposes at a station 50 kpa was normally all that was required to resist any movement.

1.7.5 If an LE attempted to move the TB from LAP to any position other than APPLICATION or EMERGENCY BRAKE prior to the blue light coming up an emergency buzzer would immediately sound.[1]

1.8 DMU faults and servicing

1.8.1 On 19 and 20 October 1998 faults were recorded in the repair book that accompanied the DMU involved in this incident. The following are extracts of the comments made and the corrective actions taken :

Date	Adjustments required	Action taken
19 October 1998	Brakes on ADC releasing in LAP position if less than 100 kpa brake cylinder pressure.	Controller cam roller magnet adjusted. "SMC"[2] valve replaced
20 October 1998	As above, brakes on ADC car releasing at low applications. Same fault if driven from either end. ADL brakes working OK.	Return to Westfield 3 month check
20 October 1998	Re above :- This occurs when brake is released from higher pressure down to 100 kpa or less. ADC's brakes continue to release to zero. Appears magnet valve is not re-seating after a partial release has taken place.	Release "SMC" magnetic valve replaced.

The first and last faults were recorded by the LE involved in this incident, the last one being associated with the incident. The second fault was recorded by a different LE on an earlier run.

1.8.2 Following the replacement of an "SMC" valve on 19 October the unit had been released for service after a partial brake test. The fault continued intermittently which gave rise to the 20 October report. Following the incident it was found that the second "SMC" valve was at fault and required replacement. Subsequent tests were carried out on a 2 car DMU to establish what effect the filling of the transmission would have on the possible movement of a DMU from rest with various brake applications.

Test 1 (carried out on nominally level track at the DMU depot)

No brakes applied and TB moved to DRIVE (i.e. transmission filling):

- after 6 seconds the vehicle started to move
- after a further 6 seconds the vehicle travelled one metre
- after a further 8 seconds the vehicle moved a total of 5 m.

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[1]Note: To move the DMU the TB handle was required to be moved from the LAP position through RELEASE, COAST, DRIVE to THROTTLE before any power was transmitted to the unit.

[2] SMC was the propriety brand name of a magnetic valve. Two valves were used per unit; one to allow for the release of brake air pressure and the other for the application of brake air pressure.

Test 2 (carried out on a nominally level track at the DMU depot)

The vehicle was held in transmission filling mode with the EP brake isolated on one car and braking pressure reduced so that movement just occurred.

- in one direction the vehicle moved when the brake pressure was reduced to 75 kpa.
- in the other direction movement occurred when the brake pressure was reduced to 50 kpa.
- In both cases the vehicle was only crawling and an increase of 25 kpa brake pressure brought the vehicle to a prompt stop.

Test 3

A test similar to test 2 was carried out in the up direction at Swanson platform and showed:

- 50 kpa pressure in the brake cylinder of one car was sufficient to prevent vehicle movement in the transmissions filling mode.
- at about 30 kpa pressure 1.2 m movement occurred before the transmission oil dropped from the converter.
- with no brakes applied at all a total of 6.5 m movement occurred before the transmission oil dropped from the converter.

1.9 Site information

1.9.1 The track at Swanson platform was nominally level at the peak of a vertical curve, with down grades either side.

1.9.2 The height of the Swanson platform level was approximately 300 mm below the DMU floor level.

1.10 Personnel information

1.10.1 The LE started his railway career in 1967 at Westfield as a locomotive trainee. He progressed to locomotive assistant and after nine years qualified as a second grade driver. After another five year's service he qualified as a first grade driver and had experience on long distance passenger and express freight trains. With the introduction of DMUs to Auckland in 1993 he was almost exclusively rostered on these services. He held a current certification for the duties being carried out.

1.10.2 The guard had 16 years railways experience in the Auckland area with approximately eight years as a guard's assistant and the remainder as a guard. When the DMUs were introduced she received specific training on them and had been rostered on these services exclusively. She held a current certification for the duties being carried out.

1.11 Notification

1.11.1 The incident was not reported by the Tranz Rail train crew at the time.

1.11.2 The following incident was notified by Tranz Rail to Land Transport Safety Authority (LTSA) on 23 October 1998:

L File Ref	Date	Time	Location	Metrage Line
9/99-0004	20/10/98	1300	Swanson	North Auckland Line

Doors closed on pushchair - Swanson

While getting off the train at Swanson the doors closed on a passenger's pushchair. The train was reported to have moved slightly when this took place. It appears the passenger got on the train to go to Auckland, but when she realised the train was going to Waitakere she decided to get off again.

Investigating.

This incident report was based on initial follow up on a passenger complaint. On the information available LTSA did not feel the incident warranted formal notification to TAIC at that time

1.11.3 The Commission was formally notified of the incident by the LTSA on 30 October 1998, some ten days after the event. The catalyst to the notification was a newspaper report based on the mother's version of events which came to LTSA's attention on 30 October 1998.

2. Analysis

2.1 The late notification of this incident was due to the different perception of events by those involved and does not reflect adversely on the Tranz Rail or LTSA notification procedures.

2.2 Because of the late notification and relative time delay in locating and interviewing staff and witnesses there were conflicting accounts of what took place. One possible reason for the conflicting accounts is that there may have been more than one incident involving pushchairs caught in doors involving the same guard around 20 October 1998.

2.3 Notwithstanding these conflicts there is no doubt that a DMU moved while a child in a pushchair was trapped by a door closing on the pushchair, and that the Tranz Rail staff were unaware of the serious nature of the incident that had occurred.

2.4 There are two possible explanations for a DMU moving in such circumstances:

- power application by movement of the TB control handle
- creeping due to faulty brake release.

2.5 Any attempt to move the TB control handle away from the LAP position to power the DMU would immediately trigger an alarm. The LE stated he did not move from the LAP position and the train crew stated they did not hear the alarm. In order to apply power it was necessary for the LE to move the TB handle through four control positions from LAP to RELEASE to COAST, to DRIVE to THROTTLE. Under a red light status the alarm buzzer would be immediately activated on the first movement out of LAP giving the LE the opportunity to move back to LAP well before the THROTTLE position was reached. In such a situation it is unlikely that the LE would have persisted in moving the TB control handle to the THROTTLE position to cause the DMU to move.

2.6 The more likely explanation for the movement of the DMU is creeping due to brake release based on the following sequence of events:

- When pulling up at Swanson the LE stopped the DMU leaving only minimum brake pressure applied before placing the TB control handle in the LAP position. In normal conditions this would have been sufficient to hold the DMU. However, because of the faulty magnetic valve in the release circuit the brake pressure in the leading car continued to fall.
- After assuming that all alighting passengers were clear, the guard requested the LE to close the doors which he did with the rotary switch in the control console. In the process a passenger managed to alight but her pushchair got caught in the doors.
- The action of closing the doors automatically started the transmission filling cycle in anticipation of the DMU being put into motion.
- In the 7 seconds it took for the transmission to fill the DMU was stationary while the mother struggled to get the push chair free.
- At some time during the next 8 seconds, and with only half of the DMU effectively braked, the action of the drag from the filled transmission overcame the brakes and the DMU started to creep forward.
- At the end of the 15 second cycle the TB handle was still in the LAP position; the filling cycle was, therefore, automatically deactivated and the DMU stopped.

2.7 The LE, guard and witness A were all on board the DMU during the above sequence. With nothing to immediately relate movement to it is understandable that they did not notice any movement during this period.

2.8 The movement of the DMU, as observed by both the mother and witness B, was relative to the platform and therefore easily noticed. Both said the movement was only in the order of metres, although under the circumstances it may have seemed considerably more to the mother at the time.

2.9 With the engines of the DMU at idle and the drag effect of the transmission only just overcoming the brakes, any movement of the DMU would have been gradual and of a short duration.

2.10 The DMU braking test on the depot track (Test 1) showed that with only 50% of the unit braked, movement commenced when the braking pressure was reduced to between 50 and 75 kpa while in the transmission filling mode. This is slightly in conflict with Test 3 at Swanson where the pressure had to be reduced to "about 30 kpa" before movement was possible. Variations in track conditions, engine and transmission characteristics and handling techniques would account for the difference.

2.11 The test carried out at Swanson (Test 3) was likely to be more typical of the actual site condition and this showed that a movement of 1.2 m could occur with only one half of the DMU braked down to 30 kpa.

2.12 The initial action that led to the incident was the guard not being in a position where a clear view of passengers boarding or alighting the DMU could be obtained. This action brought about the premature closing of the sliding doors before all passengers were clear.

2.13 The use of the main control console rotary switch to close the sliding doors in a normal operating passenger service was contrary to Tranz Rail's Operating Code. Both the guard and the LE were aware of this. However, in a sparsely occupied train near the end of its run, the guard decided to control departure from the cab.

2.14 The 300 mm height difference between the Swanson platform and the floor of the DMU did not make for easy or rapid passenger movement from one to the other. However, a properly stationed guard would have been aware of the possible affect this height difference was having on disembarkation.

2.15 The partial testing of the brakes following repairs on 19 October did not reveal the still uncorrected fault present in the braking system. The fault was reported to have been intermittent and it was therefore not surprising that the tests did not reveal the continuing fault condition.

3. Findings

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

3.1 The guard was in the front cab of the DMU when she gave right of way to the LE, in contravention of Tranz Rail code requirements.

3.2 The guard did not have a clear view of passengers alighting from the DMU resulting in the sliding doors closing before passengers had alighted.

3.3 The use of the rotary switch by the LE to close the doors was in contravention of Tranz Rail's code.

3.4 The Tranz Rail staff on the DMU were appropriately certified.

3.5 The practice of leaving DMUs minimally braked in the LAP position while standing did not allow for a reasonable safety factor against the possibility of movement due to operating abnormalities.

3.6 The movement of the DMU while it was berthed at Swanson was probably caused by a combination of normal hydraulic filling of the transmission (actuated by door closure) and a faulty EP release valve in the braking circuit of the leading car (ADC 856).

4. Safety Actions

4.1 The train crew were removed from DMU duties until they had completed retraining and recertification.

4.2 On 23 October Tranz Metro Staff Bulletin No. 133 highlighted two incidents in a week involving passengers being caught between the doors of DMUs. The correct door closing procedure detailed in Tranz Rail Code Supplement R4.10 was repeated and emphasised.

5. Safety Recommendations

5.1 On 18 February 1999 it was recommended to the managing director of Tranz Rail that he :

5.1.1 Emphasise to all Tranz Rail staff involved in passenger operations the importance of the 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); and

5.1.2 Modify the control system and the procedures on DMU's to ensure that they are held under sufficient braking to prevent movement due to transmission priming when stopped at stations. (117/98)

5.2 On 16 March 1999 the managing director of Tranz Rail responded as follows:

5.2.1 **116/98**
Tranz Rail accepts this safety recommendation.

Action has been taken and this recommendation has been completed.

5.2.2 **117/98**
Tranz Rail is currently in the process of identifying the best option to improve the door control which has been highlighted as a result of this incident. After assessing alternative options Tranz Rail intends to promulgate the changes as quickly as possible.

Approved for publication, 26 May 1999

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.

6.1.1 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 is then to 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 and all doors are on the platform.

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 "Lap", "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 System Isolated

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.

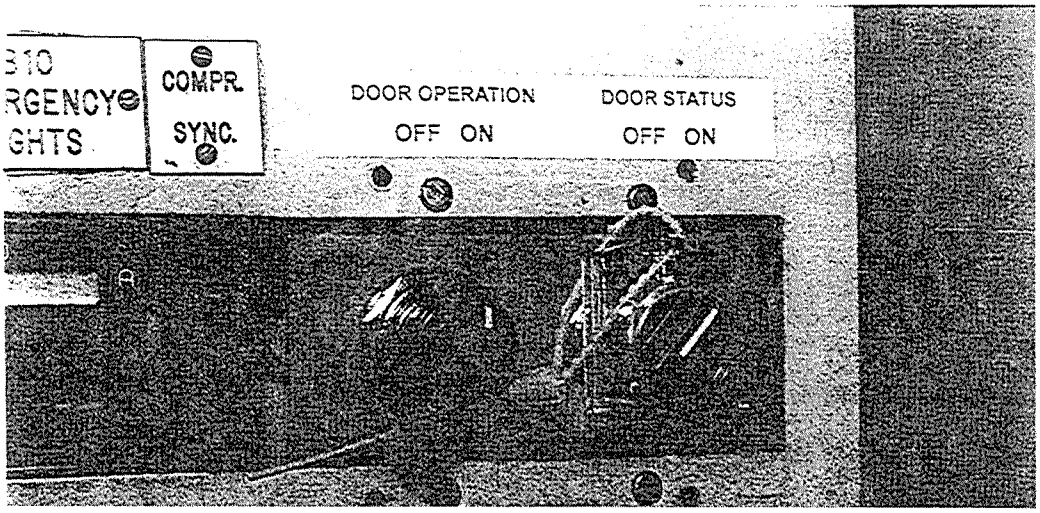
6.3 General Door Operating Instructions

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.



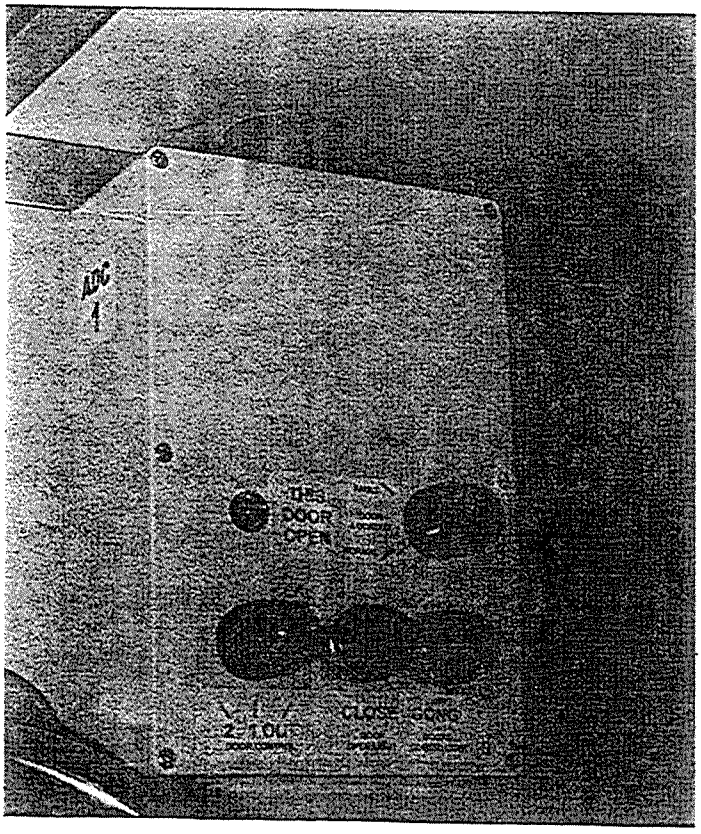
This switch, when operated, will isolate closed, all doors in that car. To isolate the whole DMU, the switch in both the ADL and ADC will need to be operated.

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 "Status Isolation" switch in the DC electrical cabinet of the ADL and ADC of all DMU's in the consist. 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.

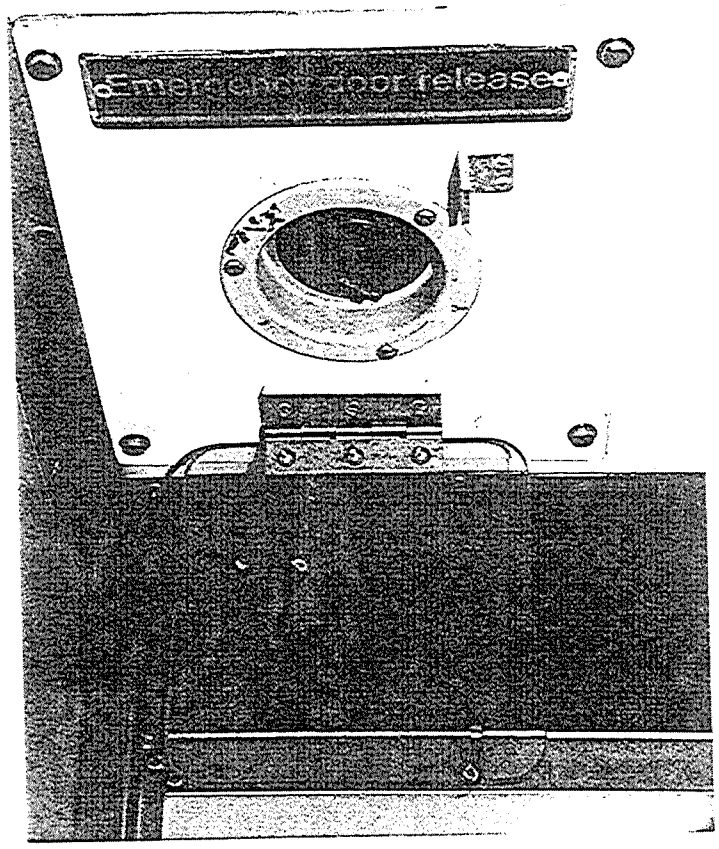
6.4 Bell Codes.



One Bell	-	Close doors (Instruction 6.2 only).
Two Bells	-	Proceed (Guard aboard).
Three Bells (given quickly)	-	Stop.
Five Bells	-	Bell test (see air brake continuity test).
Continuous Bells		Open Doors

(Only to be used when stationary at platform)

6.5 Emergency Door Release



If the bi-parting doors jam, an emergency door release (with a sealed cover) can be turned to "manual" position or mushroom button on early model pushed in and doors opened by hand (inside each car by door partition).

There is also an emergency door release cock underneath the cars on each side between crew door and first bi-parting door.

Cars must not travel with passengers in if the doors cannot be closed. The car must be taken out of service. A strict check must be kept to prevent passengers boarding the defective car. If travelling with emergency door release in "manual" position with passengers and doors can be closed by hand, a constant check must be kept on doors to ensure passengers do not try to open the door whilst the unit is moving.

The normal position of the internal switch is auto, covered and sealed. (Early models have a pushbutton instead of a switch which should be out.)

Appendix 2

NEW ZEALAND RAIL LTD **RAIL OPERATING CODE**

Code Supplement R4.10
Operating Instructions for ADL and ADC
Diesel Multiple Units (DMU)

Page: 3.1

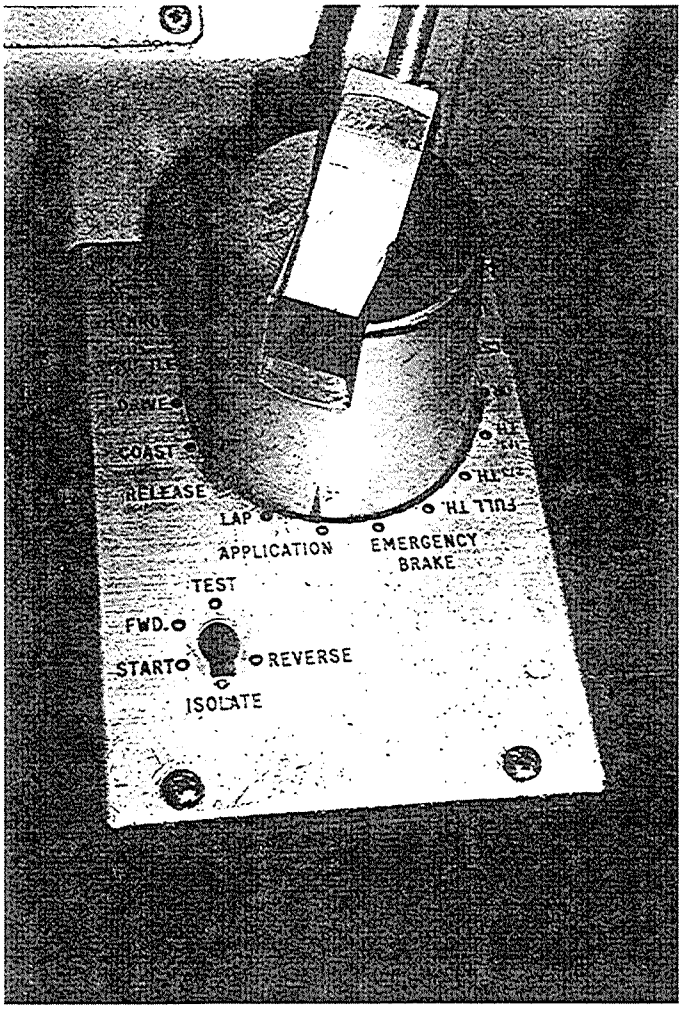
Date Effective: 15 August 1993

Subject: Controls, Switches and Gauges

Issue No.: Original

3.0 Controls, Switches and Gauges

3.1 Driver's Console



3.1.1 Master Controller

The master controller is of the combined throttle/brake (TB) handle type with a mechanically interlocked reverser switch. The TB handle controls all braking, engine throttling and some transmission functions whilst the reverser switch controls direction selection. The controller is provided with a key, which can only be inserted or removed when the TB handle is in the "brake application" position and the reverser switch in the "isolation" position.

The notches for the TB handle are as follows:

Emergency Brake - provides full braking effort for emergency braking.

Application - provides brake application for normal braking conditions. Braking effort increases dependent on length of time the handle is held in this notch.

Lap - this notch will hold the braking effort selected in the "application" position.

Release - releases brakes.

NOTE: Manipulating the TB handle between "application", "lap" and "release" will provide the required braking effort for most normal braking situations.

Coast - this is the "neutral" position where the transmission is not hydraulically coupled to the engine and the brakes are in the released mode, allowing the cars to "coast".

Drive - Hydraulic engaging of the transmission occurs, in preparation for throttling up the engines.

1/3 Throttle)
) provide desired
2/3 Throttle) acceleration
) and speed of cars
Full Throttle)

The reverser has the following positions:

Isolate - can only be engaged when TB handle is in "brake application". This position is used when stabling or changing driving ends or when the cab is not occupied. With the key removed the master controller is locked.

Start - Reverser is moved to this position when engine starting sequence is commenced.

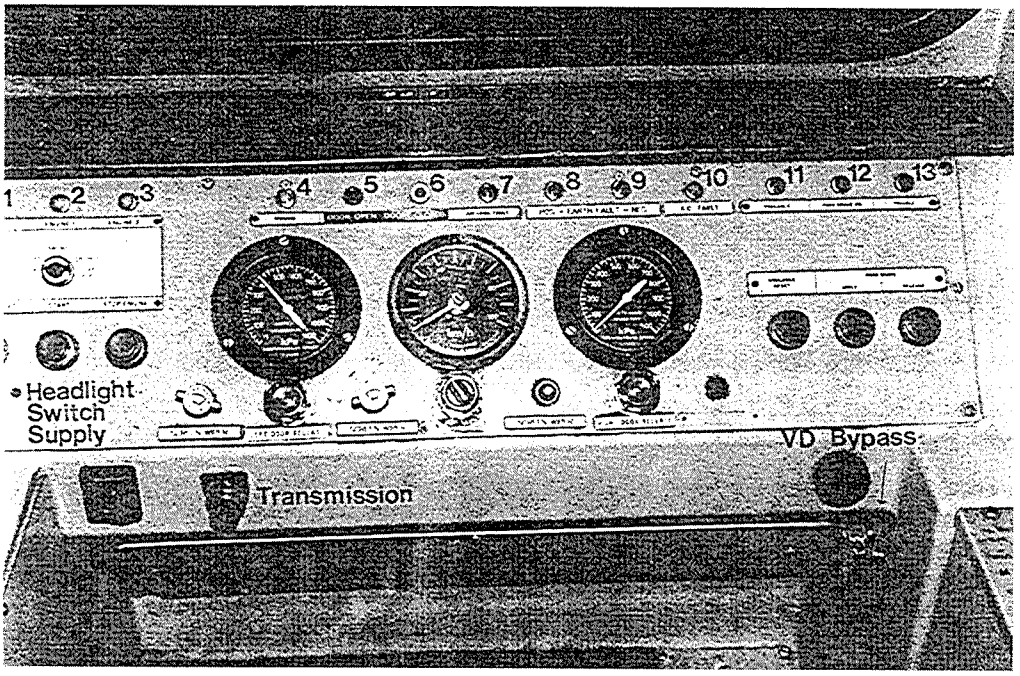
Forward)
) provides direction selection
Reverse)

Test - allows testing of engines and transmissions under brake application conditions.

3.2 Indicator Lamps

Thirteen indicator lamps are provided on the console facia to monitor the following functions:

1. **D A Set**) Illumination of any of
2. **Engine 1**) these lamps indicates that
3. **Engine 2**) engine is not running



* Late model only

4. **Engage** - illumination indicates a transmission has not reached an "end position" ie. has not fully reversed. Throttling-up of engines is not possible when this lamp is glowing. Lamp will flash momentarily when changing direction.

5.& 6. **Door Status Indicators** - Red light indicates any bi-parting door is open. Blue light will indicate that all bi-parting doors are correctly closed.

7. **Aircond. Fault** - indicates that a fault condition exists in an air conditioning unit fan.

8. & 9. **Earth Fault Pos & Neg** - (disconnected).

10. **AC Fault** - Indicates AC to 240 DC fault.

11. **Vigilance** - glows periodically to indicate vigilance is operational and is reset by pressing the adjacent "Vigilance Reset" pushbutton or by moving TB handle in throttle range.

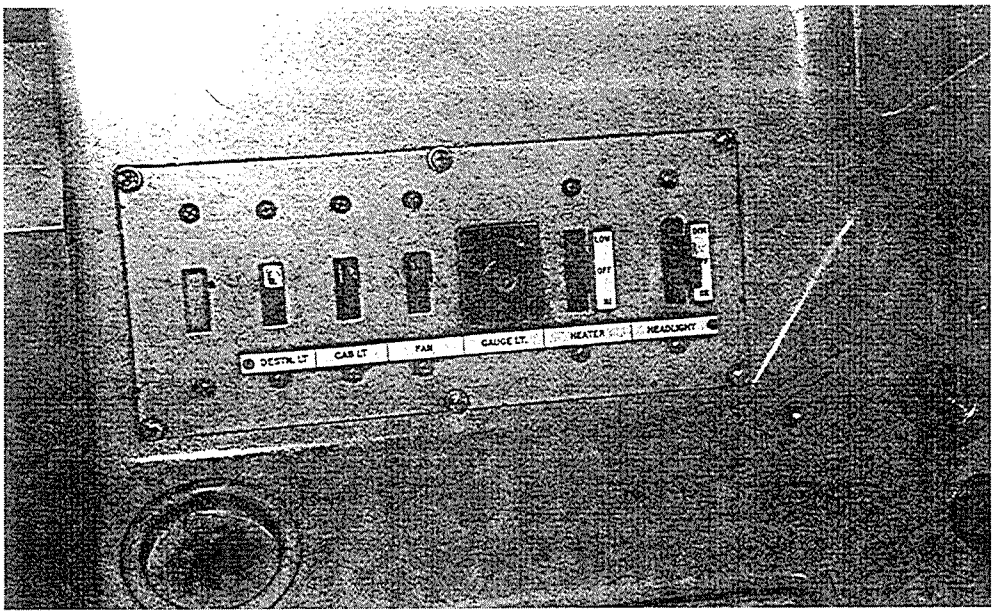
12. **Park Brakes On** - indicates parking brakes are applied.

13. **Trouble** - glows in conjunction with one of the engine lights to indicate an engine shutdown.

3.3 Switches

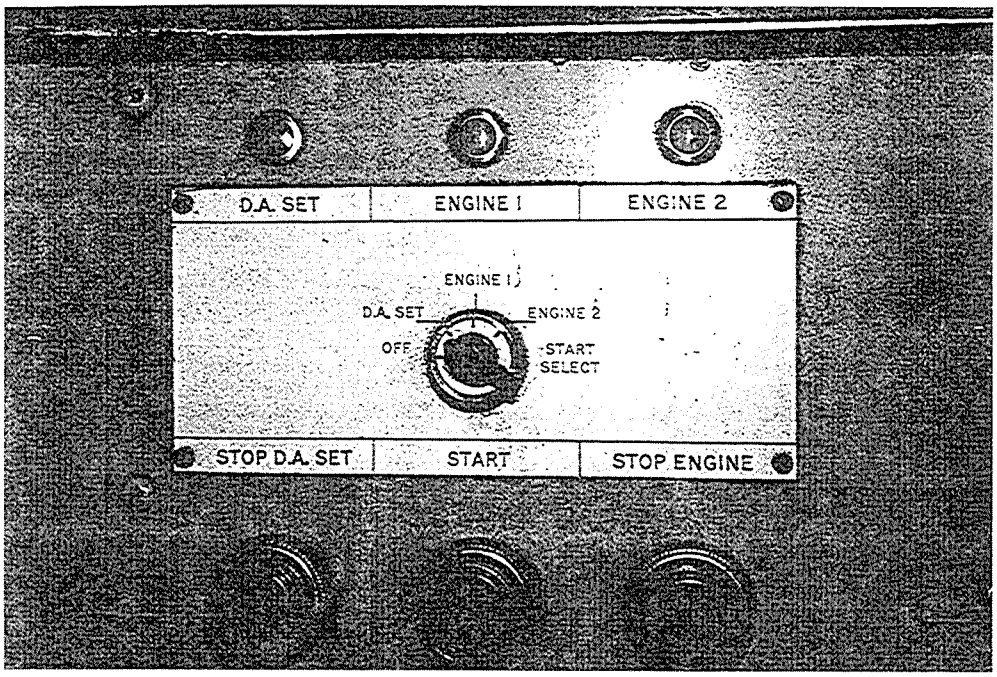
"On"-"Off" switches are provided on the left hand switch panel for illumination of destination indicator and crew compartment, operation of cab fan, and three position switches for crew compartment heater/demister and headlights.

A rheostat/switch is provided for instrument illumination.



The main facia panel controls consist of:

Four position selection switch for engine starting. Positions are "off", "DA set," "engine 1", "engine 2". (Used in conjunction with the "engine start" pushbutton.) In a multi car consist, all DA sets in the consist are started at the one time by depressing the "engine start" pushbutton in the driving cab. Similarly, all No.1 Engines and all No.2 Engines can also be started simultaneously.



"**Engine Start**" pushbutton for starting all engines (provided selection switch positioned correctly).

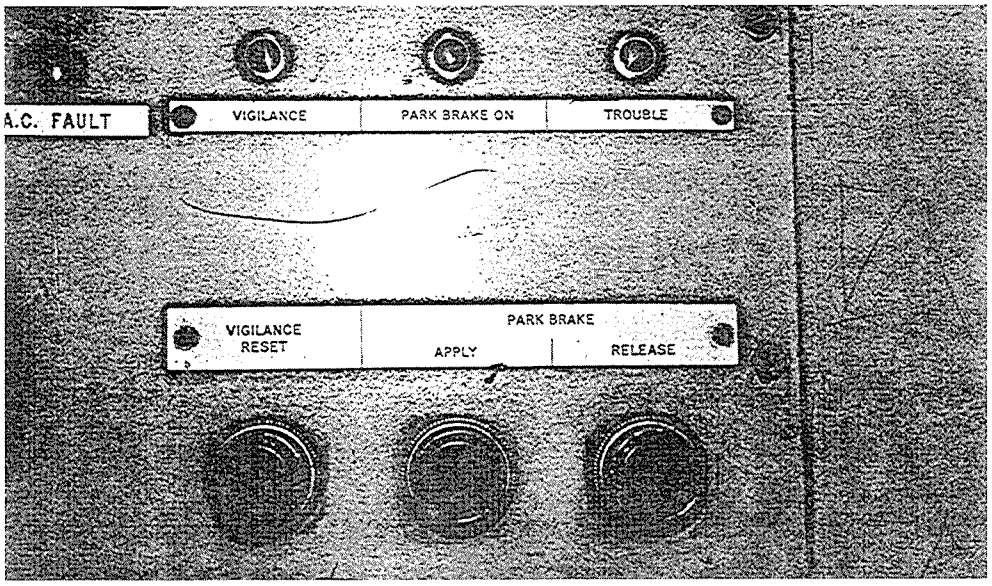
"**Stop Engine**" pushbutton stops all traction engines in the consist.

"**Stop DA set**" pushbutton stops all DA sets in the consist.

"**Vigilance Reset**" pushbutton for acknowledging and resetting vigilance timing sequences.

"**Park Brake Apply**" pushbutton for applying parking brakes.

"**Park Brake Release**" pushbutton for releasing parking brakes.



Door Control Buttons

There are 3 buttons for control of the bi-parting doors:-

Left Door Release

This button **MUST** not be pushed unless the train is stationary and the platform is on the left side.

Door Close

This rotary switch will close all doors which are open except a door set which has the Guards key inserted. This must NOT be operated unless in the depot or during a door control failure when the Locomotive Engineer recieves a " Close Door" bell signal from the Guard.

Right Door Release

This button **MUST** not be pushed unless the train is stationary and the platform is on the right side.

Caution: If door release is pushed whilst vehicle is moving, doors will instantly open.

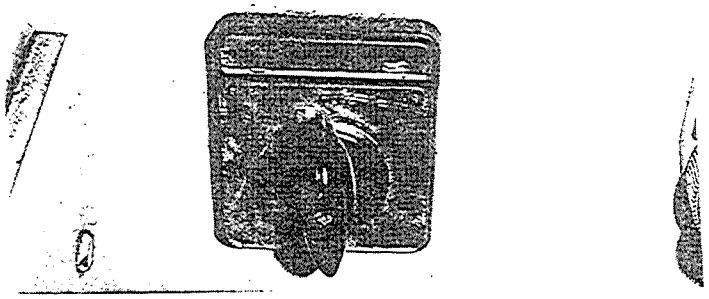
Saloon Lights

Pushbuttons are provided by the right sliding door to operate lights "on" or "off". The DA set motor must be running for light operation.

"Screen Wiper" switches. Three wiper switches allow independent operation of the three pneumatically controlled windscreen wipers.

"Headlight Supply"

This switch provides an emergency back-up supply for operation of the headlights should the DA set supply fail. (Only on late models.) In both ADL and ADC cabs.



Overload Relays

Four pushbutton reset overloads, positioned at the left hand side bulkhead of the console are provided for protection of the headlights circuit. Should any of the two headlights fail in one of the switching modes (dim/bright), resetting of these overloads should restore operation. (Late Models only.)