Final Report

TRAIN DEPARTED A STATION WITH AN OPEN-DOOR INCIDENT 17 DECEMBER 2024

TIB/RAI/CAS.015

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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The Transport Safety Investigation Bureau of Singapore

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ABBREVIATIONS

ASM	Assistant Station Manager
CC	Chief Controller
DSS	Door Service Switch
GRB	Gardens by the Bay Station
MRB	Marina Bay Station
OCC	Operations Control Centre
PSD	Platform Screen Door
PV	Passenger Vehicle
SOP	Standard Operating Procedure
TICP	Train Information Control Panel
TEL	Thomson-East Coast Line
TSC	Train Service Controller
VDU	Visual Display Unit
VSS	Video Surveillance System
WB	Woodlands Bound

SYNOPSIS

At 18:30 hours on 17 December 2024, Passenger Vehicle 02 (PV02) on the Thomson-East Coast Line (TEL) arrived at the Woodlands Bound (WB) platform of Gardens by the Bay Station (GRB). As the train doors opened for passengers alighting and boarding, Door B4 of car 4 opened only halfway. At 18:31 hours, when the dwell time was up for train departure, the platform screen doors (PSDs) and train doors began to close automatically. However, Door B4 of car 4, which had opened halfway earlier, did not close and was stuck in the half-opened position.

An Assistant Station Manager (ASM), who was on board PV02, was asked by the Operations Control Centre to investigate the door fault. The ASM used the train door service switch (DSS) at Door B4 to try to get Door B4 to close, but he inadvertently turned the DSS in the wrong direction, resulting in PV02 starting to move off from the GRB platform for Marina Bay Station (MRB) with all doors closed except Door B4, which remained stuck in the half-opened position.

Upon arrival at MRB, the ASM managed to get Door B4 to close and PV02 continued its service.

The Transport Safety Investigation Bureau of Singapore classified this occurrence as an incident.

1 FACTUAL INFORMATION

(Note: Diagrams are not to scale)

1.1 Sequence of events

1.1.1 At 18:30 hours on 17 December 2024, Passenger Vehicle 02 (PV02), travelling in Automatic Mode (AM) on the Thomson-East Coast Line (TEL), arrived at the Woodlands Bound (WB) platform of Gardens by the Bay Station (GRB). As the train doors opened for passengers to alight and board, Door B4 of car 4 (hereinafter "Door B4 of car 4" will be simply referred to as "Door B4") opened only halfway (see **Figure 1**).

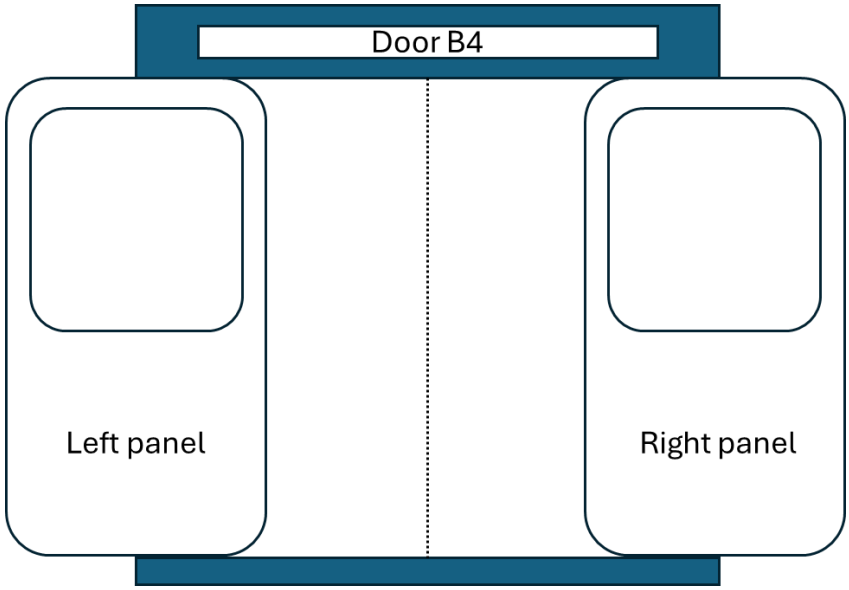

Figure 1: Door B4 opened only halfway

1.1.2 When the dwell time was up for the train to depart GRB at 18:31 hours, the platform screen doors (PSDs) and PV02 train doors were command to close. However, Door B4 did not close and was stuck in the half-opened position. PV02 could not depart from GRB. The signalling system applied a train hold to PV02, which commanded all the train doors and PSDs to open, but Door B4 remained stuck in the half-opened position. At the same time, the Train Service Controller (TSC) at the Operations Control Centre (OCC) received an alarm from PV02 indicating that there was a train door fault at Door B4. He verified the situation through the station's CCTV.

1.1.3 The TSC, as instructed by the Chief Controller (CC) and with the intent to get Door B4 to close, pressed the train hold release button on the control screen to have the train doors and the PSDs close automatically. All the train doors and PSDs closed except that Door B4 remained stuck in the half-opened position. The signalling system again applied a train hold to PV02 to open all the train doors and PSDs. Again, Door B4 did not move and remained stuck in the half-opened position.

1.1.4 The TSC contacted the Assistant Station Manager (ASM), who was on board PV02, and instructed the ASM to go to Door B4 to investigate. While the ASM was making his way to Door B4, the TSC, as instructed by the CC, pressed again the train hold release button[1]. The train doors and PSDs closed except that Door B4 did not move.

1.1.5 After the ASM had arrived at Door B4, he did a quick check and found no obstacle that could have prevented Door B4 from closing. The ASM reported the situation to the TSC. The TSC asked the ASM to isolate the door[2] in the closed position. However, Door B4 remained stuck in the half-opened position despite the ASM's attempt to push the door close. Without reporting to the TSC that Door B4 was still stuck, the ASM decided to try turning the train door service switch (DSS) at Door B4 to the "Test" position[3] to get Door B4 to close[4]. However, the ASM turned the DSS to the "Off" position[5] (more on DSS in paragraph 1.6). PV02 then started to move off from the GRB platform towards Marina Bay Station (MRB), with all train doors closed except Door B4 that was stuck in the half-opened position[6].

[1] The TSC and CC knew that the correct procedure (see paragraph 1.5) was that the TSC needed to seek confirmation from the ASM that the door was closed before the train hold could be removed. In their eagerness to resolve the matter, the CC, believing that releasing the train hold would allow the door to close on its own, instructed the TSC to release the train hold, and the TSC executed the instruction accordingly.

[2] To isolate a door means to remove the electrical power to the door opening/closing mechanism by turning the train door service switch (DSS) to the "Off" position (more on DSS in paragraph 1.6).

[3] The "Test" position could cause Door B4 to close. The "Test" position is for train maintenance purpose and should not be used when trains are in passenger service (see paragraph 1.6.2). The rail operator did not teach ASMs about the "Test" position. According to the ASM, he had observed the DSS being turned to the Test" position to open and close the train doors during the testing and commission phase of the TEL.

[4] The DSS is located behind the door cover above a door frame. It is possible to insert a switch key into the DSS through a small sliding cover to turn the DSS, without opening the door cover. This was what the ASM did.

[5] The ASM had intended to turn the DSS to the "Test" position and then back to the "Normal" position to get the door to close, but he turned the DSS in the wrong direction to the "Off" position instead. The ASM had relied on his memory as to the direction of turning for the DSS. The ASM realised that he had inadvertently turned the DSS in the wrong direction to the "Off" position when PV02 started to move.

[6] The actions described in paragraph 1.1.5 took place before the signalling system applied a train hold to PV02 to open all the train doors and PSDs.

1.1.6 The ASM reported the situation to the TSC. During the train journey from GRB to MRB, there were about fifteen passengers in the train car. The ASM stood at Door B4 to ensure that they would not come near the door.

1.1.7 After PV02 had arrived at MRB, the OCC asked the ASM to close Door B4 and to isolate the door. According to the ASM, he turned the DSS to the "Test" position and then to the "Normal" position and Door B4 closed. He then turned the DSS to the "Off" position to isolate the door and PV02 was able to continue its service.

1.2 Injuries to persons

1.2.1 No one was injured in the incident.

1.3 Damage

1.3.1 There was no damage in the incident.

1.4 Personnel information

1.4.1 The table below shows the length of service with the rail operator of the personnel involved as well as their experience.

Personnel	Age	Date employed	Length of service at time of incident	Experience in the role
ASM	27	Jul 2021	3 years and 5 months	3 years and 1 month
TSC	30	Jan 2023	2 years	1 year and 7 months
CC	33	Jun 2018	6 years and 6 months	2 years and 6 months

1.5 Procedure on handling train door fail-to-close fault

1.5.1 The rail operator's Standard Operating Procedure (SOP) for handling a train door fail-to-close fault was as follows:

(a) The OCC will send a train doors close command via the control screen. (More on train doors close command in paragraph 1.7)

(b) The OCC will monitor the train doors' closing through the station's CCTV.

(c) If the train doors close command does not get the faulty door to close, the OCC will deploy an ASM (or station staff) to investigate the faulty door (e.g. to check for any obstacle at the doorway that might have prevented the door from closing).

(1) If the ASM cannot push close the door after the investigation, the ASM will report to the OCC that the door is still open, and the OCC will order a detrainment of passengers and withdraw the train from service.

(2) If the ASM manages to push close the door after the investigation, the ASM will report to the OCC and seek the OCC's permission to isolate the door. The OCC will arrange for a stock change of train (i.e. for the train to be withdrawn after reaching the terminal station or earlier).

1.6 Train door service switch (DSS)

1.6.1 A train DSS comes in the form of a keyhole and is located at each train door behind the door cover (see **Figure 2**). The DSS keyhole has three positions: "Off", "Normal" and "Test" and is accessible through a hole on the door cover. The hole is covered by a sliding cover and is visible when the sliding cover is slid open. The wording for the DSS positions ("Normal", "Test" and "Off") is not visible.

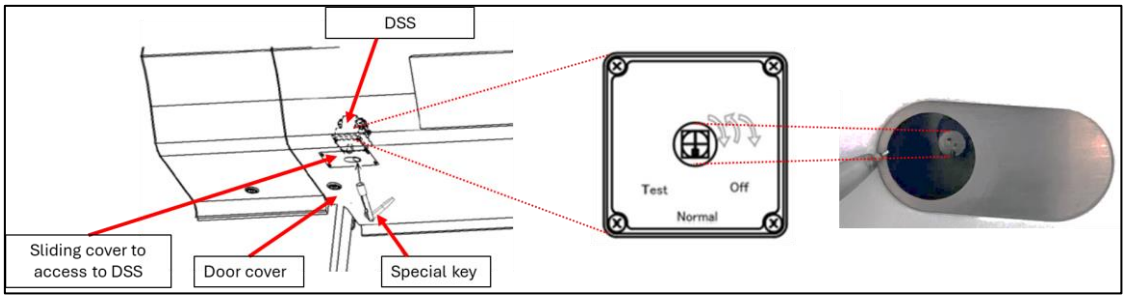

Figure 2: DSS and its positions

1.6.2 The "Test, "Normal" and "Off" positions can be selected by staff by inserting a special key into the DSS keyhole and turning the key to the appropriate position. The function of the three positions are as follows.

DSS position	Function
Test	The “Test” position is for train maintenance purpose (e.g. to test a door’s opening and closing) and should not be used when trains are in passenger service[7]. The DSS is spring loaded at the “Test” position to prevent inadvertent selection, i.e. if the key is rotated to the “Test” position and then released, the DSS will rotate back by itself to the “Normal” position.
Normal	The DSS is usually in the “Normal” position during service.
Off	The “Off” position is to prohibit the door operation by cutting the door motor power and thus isolating the door electrically[8]. The DSS is not spring loaded at the “Off” position, i.e. if the key is rotated to the “Off” position and then released, the DSS will stay in the “Off” position. An OFF status will be shown at the Visual Display Unit of the train driving console.

1.6.3 According to the rail operator, ASMs were not taught about the “Test” position and were only taught about the “Off” position (in case they are required to push close a door). They were taught to turn in a certain direction for the “Off” position, but they were not required to open the door cover to view the DSS positions before turning the DSS.

1.7 Train doors close command vs Train hold release command

1.7.1 When a train hold is in effect, pressing the train doors close command will cause the train doors to close, but the train hold is still active, and the train will not move even if the DSS is turned to the “Off” position.

1.7.2 Pressing the train hold release command will also cause the train doors to close, but it will also discontinue the train hold. Thus, the train may move off

[7] The ASM was aware that the DSS should not be turned to the “Test” position when trains are in passenger service.
[8] When a door has been isolated, the status of this door will not be taken into consideration by the train departure logic.

from the platform if the DSS is turned to the “Off” position.

2 ANALYSIS

The investigation team looked into the following:

(a) Cause of Door B4 of car 4 opening only halfway at GRB platform

(b) Cause of PV02's departure from the GRB platform with Door B4 opened

(c) Non-adherence to SOP

(d) Visibility of the DSS positions

2.1 Cause of Door B4 of car 4 opening only halfway at GRB platform

2.1.1 After PV02 had arrived at GRB, nothing was found by the ASM that could have prevented the Door B4 from opening fully. The rail operator's inspection of Door B4 at depot after the train was withdrawn from service also did not find any abnormality. The Door B4 was able to open and close normally during the inspection.

2.1.2 The investigation team is unable to determine the cause of Door B4's inability to open fully at GRB platform. The investigation team has noted a postulation by the rail operator that there could have been a hidden foreign object along the doorway which prevented Door B4 from opening or closing and that this foreign object somehow dropped off from the doorway during PV02's movement from GRB to MRB.

2.2 Cause of PV02's departure from the GRB platform with Door B4 opened

2.2.1 The train departed GRB with all train doors closed except Door B4, which was stuck in a half-opened position. This was because the ASM had inadvertently turned the DSS to the "Off" position, which isolated Door B4. Isolation means the door open/closed status would not be taken into consideration by the signalling system's departure logic. Thus, when the train hold command had been removed, and all the train doors other than Door B4 were in the closed status, the signalling system concluded that the train was ready to depart GRB.

2.3 Non-adherence to SOP

2.3.1 There was a number of instances when the rail operator's SOP for handling train door fail to close fault was not adhered to:

(a) Instead of reporting to the OCC that Door B4 was still stuck and awaiting the OCC's instructions (e.g. detrainment of passengers, withdrawal of train), the ASM attempted on his own to get Door B4 to close by turning Door B4's DSS to the "Test" position, although he was aware that the "Test" position is for train maintenance purpose and should not be used when trains are in passenger service.

(b) The OCC did not ascertain the situation with the ASM before pressing the train hold release button which would remove the train hold command.

(c) As mentioned in paragraphs 1.1.3 to 1.1.4, when the train doors could not be closed, the CC instructed the TSC to press the train hold release button with the intent to get Door B4 to close, instead of pressing the train doors close command.

2.3.2 Had the SOP been followed and the train doors close command been used while the train hold command was still in effect, the train would not have moved regardless of the DSS switch position. It would be desirable for the rail operator to remind its operational staff to adhere to SOP so that correct steps are taken for handling a train door fault.

2.4 Visibility of the DSS positions

2.4.1 The DSS is located behind the door cover above a door frame. It is possible to insert a switch key into the DSS through a small sliding cover to turn the DSS, without opening the door cover. This was what the ASM did. However, without opening the door cover, one will not be able to see the wording for the DSS positions ("Normal", "Test" and "Off"). Thus, the ASM relied on his memory as to the direction for turning to the "Test" position but he remembered wrongly the direction and ended up turning the DSS to the "Off" position.

2.4.2 Without opening the door cover to view the wording for the DSS positions, there is a risk, as shown in this incident, that operational staff could recall wrongly the direction in which they should turn the DSS. If there were markers or wording on the door cover to indicate the “Test”, “Normal” and “Off” positions, operational staff would not have to rely on memory when deciding on the turn direction and this train-departure-with-door-open incident would not have occurred.

2.4.3 It would be desirable for the rail operator to mark the DSS positions on the door cover, so that operational staff do not have to rely on memory to determine the correct turn direction when the door cover is not opened.

3 CONCLUSIONS

From the information gathered, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

3.1 The cause as to why Door B4 was stuck could not be determined, although there was a possibility of a hidden foreign object along the doorway which prevented Door B4 from opening or closing and that this foreign object had dropped off from the doorway during the train's movement from GRB to MRB.

3.2 The train departed GRB with all train doors closed except Door B4, which was stuck in a half-opened position. The ASM had inadvertently turned the DSS to the "Off" position, which isolated the door. Isolation means the door open/closed status was not taken into consideration by the signalling system's departure logic. The signalling system concluded that the train was ready to depart GRB when it detected that all the train doors were closed.

3.3 There were instances when the rail operator's SOP for handling train door fail to close fault was not adhered to:

(a) The ASM did not report to the TSC that Door B4 was still stuck and did not await the OCC's instructions, but attempted on his own to get Door B4 to close by turning Door B4's DSS to the "Test" position, although he was aware that the "Test" position is for train maintenance purpose and should not be used when trains are in passenger service.

(b) The OCC did not seek confirmation from the ASM that the Door B4 was closed before pressing the train hold release button, which would remove the train hold command.

(c) The TSC, as instructed by the CC and with the intent to get Door B4 to close, pressed the train hold release button instead of pressing the train doors close command.

3.4 Without opening a door cover, one will not be able to see the wording for the DSS positions (“Normal”, “Test” and “Off”). There is a risk of operational staff turning the DSS to the wrong position if they rely on their memory when deciding on the turn direction.

4 SAFETY ACTIONS

Arising from discussions with the investigation team, the organisation(s) has/have taken the following safety action.

4.1 The rail operator has issued a reminder to its operational staff on the importance of adhering to the SOP for handling a train door fault.

4.2 The rail operator has designed a sticker to be affixed to the door cover to guide operational staff on the correct way to turn the DSS. Installation of the stickers is now in progress and is targeted to be completed by end July 2025.

5 SAFETY RECOMMENDATIONS

A safety recommendation is for the purpose of preventive action and shall in no case create a presumption of blame or liability.

In view of the safety actions taken by the rail operator, no safety recommendation is proposed.