



Australian Government

Australian Transport Safety Bureau

Signal passed at danger and derailment of empty Tangara service 109D

Hornsby, New South Wales, 17 December 2015

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Addendum

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Signal passed at danger and derailment of empty Tangara service 109D

What happened

At approximately 1600 Eastern Daylight-saving Time¹ on 17 December 2015, the rostered driver of 109D arrived at Hornsby Maintenance Centre (HMC) to take charge of the train. The rostered driver was scheduled to meet with the preparing driver of 109D at 1606. However, when the rostered driver arrived at the train, he was unable to find the preparing driver and found the train's controls were in an isolated state.

The rostered driver was in process of cutting in (starting up) the train when he received a bell from the guard on 109D. Confused by the bell, the rostered driver called the guard on the train intercom. The guard said they needed to conduct a 'continuity test'². The rostered driver agreed then commenced with the continuity test.

Shortly after, another driver (passenger driver) arrived at the crew compartment guard side door and asked the rostered driver if he could travel as a passenger to Epping Station. The rostered driver agreed and continued with the continuity test.

At 1606, the HMC yard shunter approached 109D and provided a hand gesture (wave) to the rostered driver, which the rostered driver understood as a signal to depart from HMC. After a second wave from the HMC yard shunter, the rostered driver indicated his intent to depart. The rostered driver recalled feeling under pressure to depart the train and did not complete the continuity test or log onto the Metronet radio³ before departing the train.

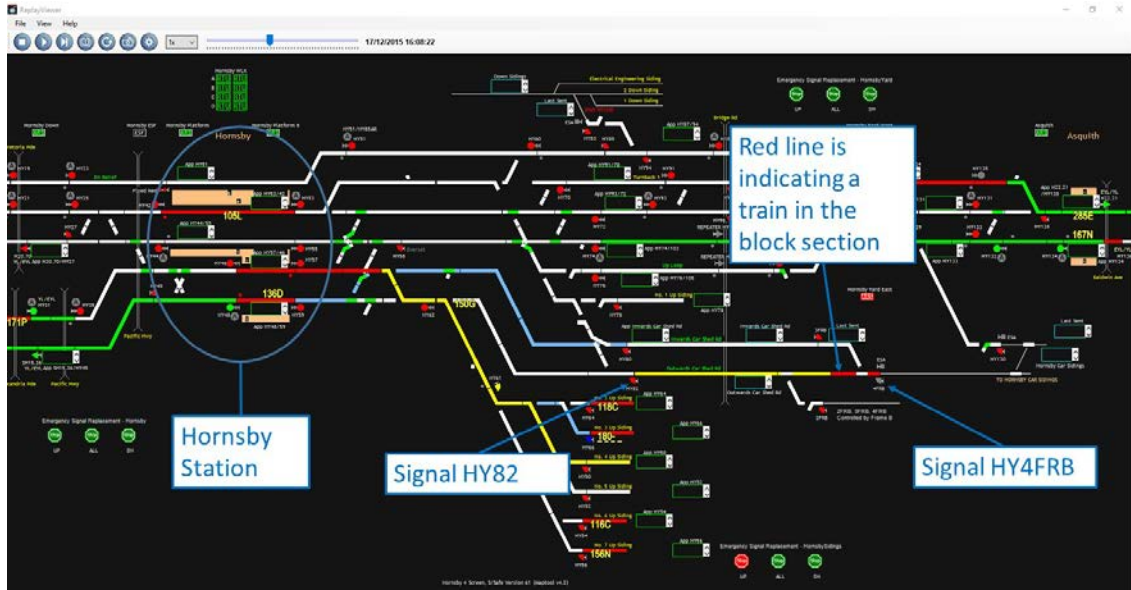
At 16:08:22, 109D departed from signal HY4FRB on the Outwards Car Shed Road (OCSR). See Figures 1 and 2.

¹ Eastern Daylight-saving Time (ED-sT): Coordinated Universal Time (UTC) + 11

² A continuity test is a check of the train's air brakes and communications systems.

³ The Metronet radio is the closed communication system used between train drivers and Network Control Officers on the Sydney metropolitan rail network.

Figure 1: Train detected in block section after Signal HY4FRB



Source: Sydney Trains ATRICS⁴, annotated by ATSB

Figure 2: View from train driver’s cab to signal HY4FRB at HMC



Source: ATSB

As the train progressed along the OCSR towards signal HY82, the rostered driver and passenger driver recall discussing work schedules with each other.

The passenger driver asked the rostered driver for his route diagram⁵. The rostered driver recalled seeing signal HY82 displaying a 'proceed at caution' indication (amber light) before attempting to locate the route diagram from inside his workbag, located on the nearby driver's seat.

⁴ ATRICS (Advanced Train Running and Information Control Systems), is the software package developed for the Sydney metropolitan rail system. It is used to control the signalling system and provide feedback to train controllers about the position of points, status of signals and location of trains.

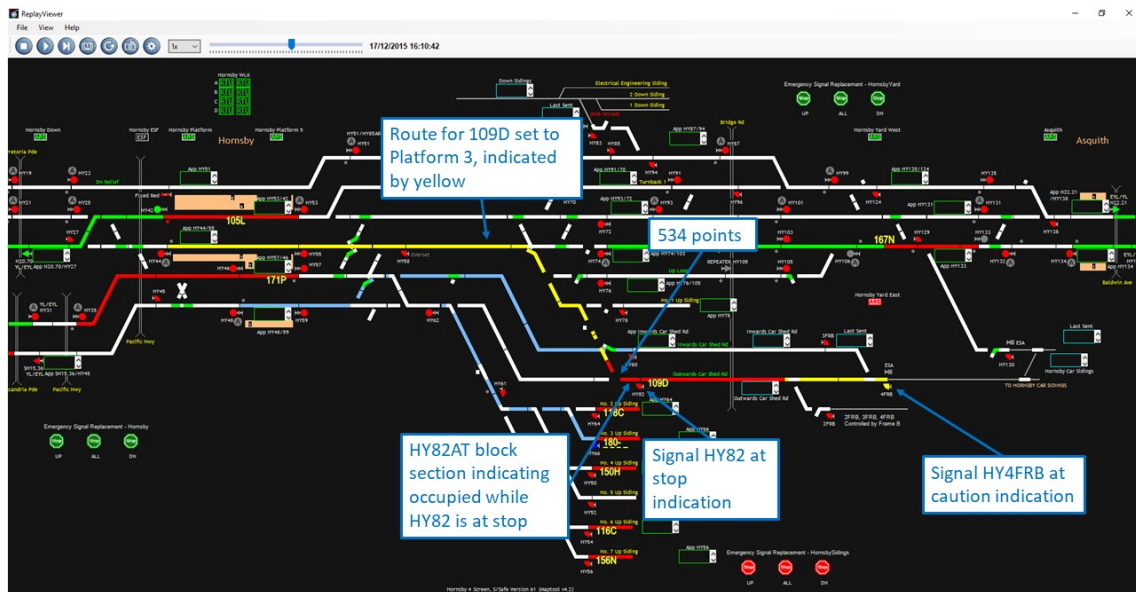
⁵ The driver's route diagram is the driver's work schedule for the day which typically includes times and train service numbers that the driver is required to meet.

The rostered driver gave the route diagram to the passenger driver who looked at the diagram to confirm the scheduled arrival time at Epping station before handing it back to the rostered driver.

At 16:09:07, 109D appeared on the ATRICS board when the train occupied the block sections between signals HY4FRB and HY82. HY4FRB had a 'proceed at caution' indication and HY82 had a stop indication.

At 16:10:42, a yellow line from 534 points to Platform 3 Hornsby Station appeared on ATRICS, which indicated the Network Control Officer Hornsby Panel⁶ (NCOH) had requested the intended route for 109D. Additionally, ATRICS indicated 109D occupied the block section directly after signal HY82 (HY82AT) with signal HY82 displaying a stop indication. This was also reflected in the Weslock data log⁷. This meant 109D had passed signal HY82 at stop – Signal Passed at Danger (SPAD). See Figure 3.

Figure 3: Route set for Platform 3 and 109D is occupying block section HY82AT.



Source: Sydney Trains ATRICS, annotated by ATSB

Examination of the ATRICS and Weslock data showed that signal HY82 was at stop and 534 points were set to direct traffic towards platforms 1 and 2 (normal position) as train 109D approached. See Figure 4.

Less than one second before 109D passed signal HY82 at stop, the NCOH had requested a route from signal HY82 towards Platform 3, requiring 534 points to move to the reverse position.

⁶ The NCOH is one of many network control officers who manage the safe movement of trains around the network through operating track points and controlled signals.

⁷ Weslock is the precision data logging system and this information is similarly represented in the ATRICS.

Figure 4: Signal HY82 and 534 points. 534 points set for movement straight ahead (normal position)



Source: ATSB

Train 109D was able to pass signal HY82 and travel the seven metres to 534 points before the points could change position. As the lead bogie of the first carriage travelled over 534 points (still in the normal position), the points started to reverse position, directing the trailing bogie towards Platform 3. The opposing movements of the leading and trailing bogies caused the carriage to twist and eventually derail the train. See Figure 5.

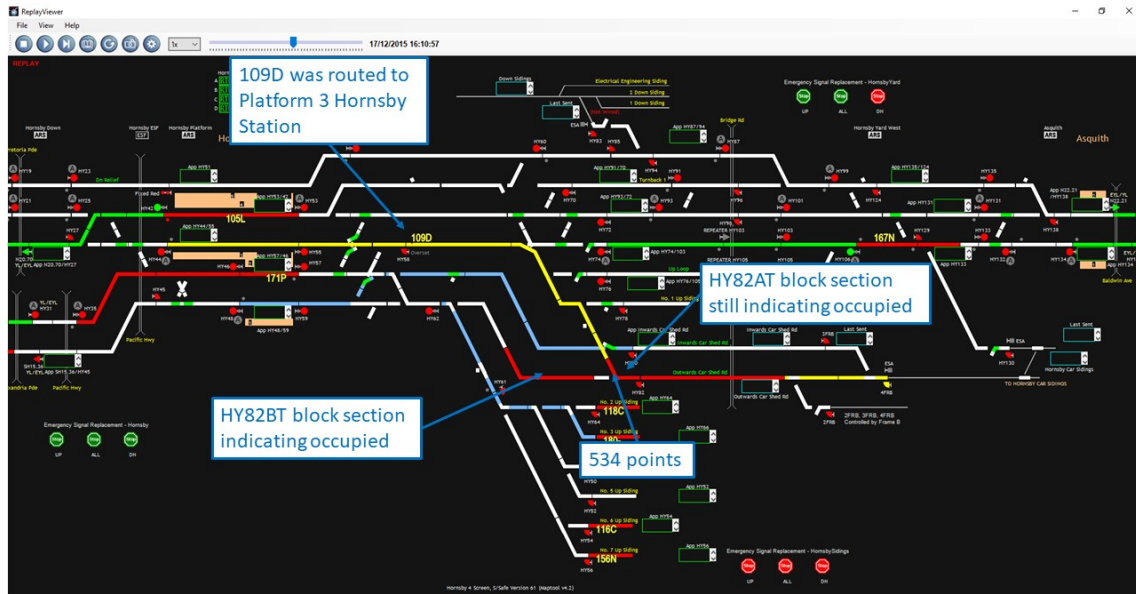
Figure 5: 109D derailed over 534 points



Source: ATSB

At 16:10:57, 109D is indicated on ATRICS as occupying block HY82AT and block HY82BT. See Figure 6.

Figure 6: 109D occupying section HY82AT and HY82BT



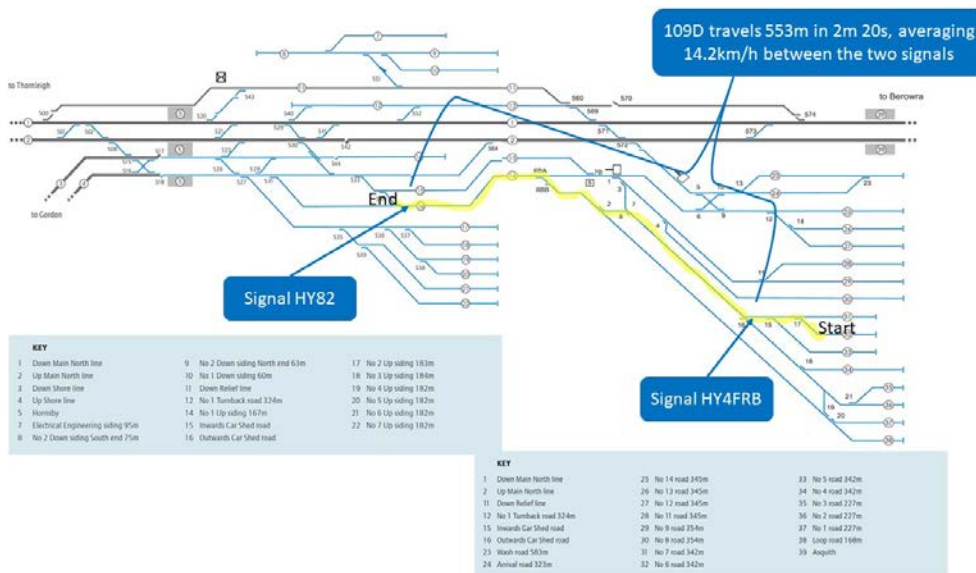
Source: Sydney Trains ATRICS, annotated by ATSB

The leading bogie was confirmed to have travelled straight ahead as it triggered occupation of block section HY82BT. However, the trailing bogie of the first carriage and the remainder of the train had been diverted towards Platform 3 Hornsby Station (block section HY82AT).

The rostered driver recalled feeling the train twist in an awkward way as he passed over 534 points and applied the brakes to stop the train.

109D travelled 553 metres in 2 minutes and 20 seconds between Signal HY4FRB and Signal HY82, averaging a speed of 14.2 km/h. See Figure 7.

Figure 7: Path of 109D from OCSR to 534 points



Source: Sydney Trains NLA 302 Hornsby, annotated by ATSB

At 16:11, SPAD alarms sounded at Homebush Control Centre on the Hornsby ATRICS panel. The NCOH received alarms and attempted calls over the Metronet radio but was unable to speak with the caller.

At 16:14, the NCOH attempted to receive another call however was still unable to connect with the person on the other end.

At 16:15, the NCOH made contact with another driver on 167N, which was on the Up Main line and asked for confirmation whether 109D had derailed. The driver of 167N was able to confirm that 109D had derailed.

At 16:16, the driver of a nearby train, N24, called the NCOH. The driver of N24 could see the derailed train describing it to the NCOH as “a bogie in the dirt”. The NCOH requested the driver of N24 to pull up, to make an emergency stop.

The NCOH informed the Train Controller and Operations Controller at the Rail Management Centre (RMC) that 109D had SPAD and possibly derailed.

At 16:18, the NCOH made an emergency broadcast for all trains in the Hornsby Area to come to a stop. The NCOH attempted to contact 109D without success.

At 16:20, the Incident Rail Commander (IRC) was informed by the Shift Manager RMC of a SPAD coming out of the OCSR and was required to attend. The IRC advised he would be there in approximately 15 minutes.

At 16:21 the driver of N24 called the NCOH and provided a phone number of the passenger driver on 109D.

At 16:40, the IRC arrived at Hornsby and approached 109D from a side gate halfway between Hornsby Station and the sidings. The IRC recalled recognising a train technician and seeing another person on the track ahead near 109D.

The IRC contacted the Signaller and created a safe place utilising the disabled train⁸.

At 17:05, the IRC discussed the condition of the situation with the relevant disciplines (Overhead electrical, Signals, Civil and Train Technician). The IRC determined that the train could be pulled back from 534 points to release the interlocking of the signals caused by the presence of 109D occupying the block sections HY82AT and HY82BT.

At 17:17, the IRC had 109D propelled back to signal HY82. The IRC informed Train Control the movement was successful and standing train protection would remain with the train now standing on the down side of signal HY82.

By 18:15, Overhead electrical, Civil and Signals had certified the infrastructure fit for purpose.

Due to delays caused by the SPAD and derailment over 534 points, 109D remained at signal HY82 until after the peak period before being moved back into HMC.

⁸ Creating a safe place utilising standing rail traffic is colloquially known as ‘Standing Train Protection’. *NTR 432 Protecting activities associated with in-service rail traffic* is the procedure which describes this process.

Safety analysis

Driver distraction

The rostered driver allowed the passenger driver to ride in the driver's cab to get to Epping Station.

While this practice has been accepted by the organisation, this situation heightens the risk of distraction to the driver operating the train. In this incident, both the rostered driver and passenger driver recall making conversation about their days and their work schedules as the train departed from HMC and traversed the OCSR towards signal HY82 and 534 points.

At the time of departure from HMC and onto the OCSR, the rostered driver passed two signals:

- The first signal, HY4FRB, when leaving HMC on the OCSR.
- The second signal, HY82, which was approximately 550 metres further along the OCSR and the signal that was passed at danger.

HY4FRB displayed a 'proceed at caution' indication (amber light), while HY82 displayed a stop indication (red light) for the duration of the incident.

The rostered driver recalls spotting a 'proceed at caution' indication when asked about the aspect of signal HY82. However, it is likely the signal with a 'proceed at caution' indication was HY4FRB. It is likely the rostered driver lost situational awareness and missed seeing signal HY82 due to being involved in conversation with the passenger driver.

Emergency communication systems

When train drivers prepare a train for service, they are required to log onto the Metronet train radio system to ensure they have communications with Train Control.

In this incident, there was a preventable delay in establishing communications between the Signaller and the train crew on 109D after the incident had occurred. Had the Metronet radio system been logged in, there would have been direct communications between the Signaller and the train driver of 109D.

Reliable communications between Train Control and train services, including train crew, is paramount for safe operations, especially during degraded and emergency situations.

Route familiarity

This was the first occasion the rostered driver had departed the HMC without supervision, since his familiarity training of the area approximately three months before.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- The rostered driver of 109D was distracted by interaction with the passenger driver at the critical time of approach to signal HY82.
- Without being logged onto the Metronet radio system, effective communications could not be made between Train Control and 109D.
- This was the rostered driver's first unsupervised departure from HMC onto the OCSR since being qualified as a driver.

Safety action

The ATSB has been advised of the following proactive safety action in response to this occurrence.

Sydney Trains

- Conducted briefings with train crew on compliance to network rules and procedures and a previously issued safe work instruction on eliminating in-cab distraction.
- Completed a major upgrade of the track and signalling in Hornsby yard. This included the reconfiguration of various tracks and points on through lines as well as the provision of new signalling, train stops and signal telephones.

Safety message

Train drivers must maintain situational awareness at all times when driving trains. Any driver riding as a passenger in the driver's cab must respect the driver's requirement to be vigilant and not engage in any way that may distract the driver in control of the train.

General details

Occurrence details

Date and time:	17 December 2015 at 1612 EDsT	
Occurrence category:	Incident	
Primary occurrence type:	Rail	
Location:	Hornsby, New South Wales	
	Latitude: 33° 41' 57" S	Longitude: 151° 5' 59" E

Rolling stock details

Manufacturer and model:	A. Goninan & Co, Tangara	
Operator:	Sydney Trains	
Carriage number:	D6171	
Type of operation:	Rail	
Persons on board:	Crew – 2	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Rolling stock damage:	Minor	

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

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

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

About this report

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