

**Final Report of the Investigation into the incident
that occurred on 5 September 2002
at North Point Station of the Tseung Kwan O Line**

Introduction

The investigation into the incident that occurred on 5 September 2002 at North Point Station of the Tseung Kwan O Line includes a technical investigation and a management review with a view to achieving the following objectives –

- (a) To determine the cause of the incident in which the incident train was halted with an indication of a problem at the train coupling point;
- (b) To examine the involved devices with regard to all aspects of design, installation and maintenance;
- (c) To examine the handling of the incident throughout and to comment on the effectiveness and appropriateness of the instructions given and actions taken to overcome the defect initially reported on train T28 and deal with the service disruption and recovery of train service;
- (d) To identify areas for improvement with a view to providing effective and appropriate communication with the travelling public during any service disruption; and
- (e) To identify areas for improvement with a view to preventing similar occurrence.

The Incident

2. On Thursday, 5 September 2002, a service disruption occurred on the Tseung Kwan O Line. As Passenger train T28, running from Po Lam Station to North Point Station, with passengers on board, entered platform 4 at the North Point Station at 0838 hrs, the train was brought to a stop with only the first 2-cars in the platform (see Diagram 1).

3. The Passenger Train Operator (PTO) found the Train Divided Indication (TDI) was on, the Train Line circuit breaker (TLB) was tripped open and the emergency brakes had been applied.

4. The PTO reported this to the Traffic Controller (TC) in the Operations Control Centre at Tsing Yi and attempted to reset the TLB and other troubleshooting devices, but in vain. The PTO was unable to release the brakes, and the train could not be moved

5. A Train Staff Supervisor (TSS) who was supervising the operation at the other end of the platform of North Point Station, noticed the incident and ran to help. At 0841 hrs, on arrival at the incident train, the TSS offered assistance to the PTO. They agreed that to minimize delay to the passengers, the PTO should begin detrainment from the front 2 cars and for the TSS to try to drive the train from the rear cab, in accordance with standard procedures.

6. The PTO arranged with the TC to detrain the passengers via the first 2 cars that were in the platform. The station staff and a spare train operator on the platform manually opened 4 Emergency Exit Doors in the platform screen doors and manually opened the adjacent train doors for detrainment of all passengers (see Diagram 2).

7. At 0842 hrs, the TSS proceeded towards the rear driving cab, inspecting the inter-car gangways on the way. The TSS found no sign of abnormality in any gangway connection, confirming the train was not divided. The TSS was frequently stopped by the passengers on the train seeking additional information as to the nature of the problem.

8. At 0845 hrs the TSS arrived at the rear cab, and attempted to 'open up' the cab to drive from the rear. However, after two attempts, the same faults still persisted and the TSS advised the TC that a push-out, by the following train, would be required.

9. At 0850 hrs after reaching agreement with the Traffic Controller, the TSS and the PTO began to release the brakes on the defective train ready for push-out. At the same time, the Traffic Controller informed the PTO of the following train (T29) of the push out arrangements.

10. At 0850 hrs, in view of the delay and the need for a push-out, the Chief Controller initiated the Crowd Management Plan for all stations on the Tseung Kwan O Line and prepared the "Red Alert" for issue.

11. At 0852 hrs, the Chief Controller declared a Major Incident and issued the "Red Alert" by fax at 0854 hrs.

12. At 0856 hrs when detrainment of the defective train T28 was completed, the following train T29 coupled up to the defective train, and prepared to push-out. At 0907 hrs, the coupled consist had moved forwards so that T29 was now in North Point Platform, and the passengers on board T29 alighted in the normal way.

13. At 0909 hrs after all passengers had alighted, T29 pushed the incident train T28, as a coupled consist, to siding 2, which can accommodate one train, and stabled the incident train there.

14. At 0914 hrs after reapplying the brakes on the incident train and completion of the necessary safety procedures, the assisting train uncoupled. A train operator in the rear cab drove the assisting train T29 back to North Point Station clear of the cross-overs, arriving North Point at 0922 hrs. The assisting train then departed for siding 1 in the normal manner.

15. At 0924 hrs, after checking to ensure the line was clear and safe for service, the train service resumed normal and the Major Incident was stood down.

Effect to Train Service and Passengers

16. During the incident, train service on Tseung Kwan O Line was suspended between North Point and Tiu Keng Leng for 37 minutes and between Tiu Keng Leng and North Point for 47 minutes. A loop service was maintained between Po Lam and Tiu Keng Leng stations with a 3-minute headway. Passengers for the Island were advised to travel via Tsim Sha Tsui to cross the harbour.

17. No one was injured during the incident, nor at any of the stations along the line.

Initial Investigation and Remedial Actions

18. Immediately after the incident, an examination of the defective train at siding 2 confirmed that a device used to monitor the coupling between train cars had short-circuited, generated a false alarm, causing the train to stall and unable to move under its own power. Initial investigation showed that the protective tubing connecting to the switch had fractured.

19. A complete fleet check on all the 760 nos of similar devices was conducted on the same day before train service commenced in the morning of 6 September 2002. It was confirmed that all the 760 devices were intact and working normally.

Technical Investigation

20. The Technical Investigation has shown that the train divided trip-switch on the coupler between the 6th and 7th cars had short-circuited, causing the Train Divided Indication and stopping the train as designed. This was the first occasion such a failure has occurred on the railway.

21. The train had not divided and this was a false alarm. The wires to the train divided trip-switch, run in a special heavy-duty polyvinyl chloride conduit under the train, were entering the trip-switch box close to the wheels of the train. This switch and associated conduit were installed on the fleet between 1998-2001. The conduit to this trip-switch on this train was found broken and damaged at the junction with the trip-switch box. This allowed the conduit to drop by approximate 20 mm and caused the wires inside to rub against the trip-switch box, eventually causing a short-circuit and tripping the Train Line circuit Breaker (TLB) which could not be reset.

22. The train divided trip-switch circuit is fitted with a reset device, which when operated, would in the event of a false alarm, and after the necessary checks, normally enable the train to be driven from either the front or rear cab. However, in this particular incident, the wires made a dead short to the trip-switch box, preventing the reset of the TLB, keeping the brakes applied and preventing the train from being moved under its own power, hence the need for a push-out.

23. The Technical Investigation Team concluded that the conduit was broken either by vibration of the conduit relative to the more rigid trip-switch box, or by being struck by an external object thrown up by the wheels of the train. As the damage to the conduit was significant, not just a simple fracture, and there were other marks on the underside of the train, the Technical Investigation Team concluded it was most likely that the damage was caused by an external object, probably thrown up by the wheels of the train.

Conclusion

24. The Management Review Panel endorsed the recommendations of the Technical Investigation to redesign and relocate the conduit and wires to the train divide trip-switch to both reduce vibration and to provide more protection to the conduit from being struck by any external object thrown up by the wheels.

25. The Management Review Panel noted that an interim modification to make the connection to the train divide trip-switch more robust and to provide more protection from vibration and any external objects thrown up by the wheels has been made to the whole fleet (see Diagram 3). The long-term solution to re-route the cables and to provide even more protection has been prototyped on one train. The design is now being finalized (see Diagram 4) and the materials are being ordered. The permanent modification is expected to be completed on the whole fleet in 6 months' time.

26. The Panel has reviewed the handling of the incident and the train service recovery and found it was handled safely, and fully in accordance with the contingency procedures, which worked well.

27. As to the adequacy of the contingency procedures for the Passenger Train Operator to handle this incident, the Panel found that the procedures are adequate. However, an opportunity for improvement is identified to document the procedure for handling this specific scenario where the Train Line Circuit Breaker could not be reset.

28. The Panel also found all the new stations of the Tseung Kwan O Line had effectively followed the required integrated crowd control plan and had sufficient staff to implement the plan. However, the Panel concluded that it would be helpful if the level of crowd control to be carried out at the different stages of the incident was specified by the Operations Control Centre.

29. During the incident, many passengers were already in the system and at the stations along the Tseung Kwan O Line and they were initially unwilling to leave the stations or use the Kwun Tong Line to cross the harbour; primarily because they first wanted to know how long the delay would be, before deciding to move or wait. In general, because of the relatively short suspension of service, for many passengers, waiting proved to be the faster option. It would be helpful if the expected delay could be announced in stations at the shortest possible time.

30. The Panel concluded that the Integrated Crowd Control should apply not only at stations of the Tseung Kwan O Line but also to those adjacent stations affected by the incident, e.g. stations on the Kwun Tong Line between Choi Hung and Lam Tin, advising passengers to travel via Tsim Sha Tsui or take other modes of transport to cross the harbour.

31. The Panel considered that the provision of information to passengers, staff and the media could be improved. The panel also considered that communication within the Operations Control Centre, between the Operations Control Centre, station /train operators and the Corporate Relations Office could be further streamlined with a view to speeding up the flow of relevant information and providing adequate information to passengers and the general travelling public. Whilst it will always be very difficult at the early stages of any incident as it develops, the better the information flow, the easier it is to keep passengers informed and on the move.

32. The Red Alert was issued in a timely manner at 0854 hrs some 14 minutes after the incident when it became apparent that the delay would extend beyond 20 minutes. However, with the benefit of hindsight, the Panel considered that an Amber Alert should have been issued at 0848 hrs when it first became evident that the incident train could not be driven from the rear, which would give an early warning to external parties.

Recommendations

33. In addition to the technical recommendation to redesign and relocate the wiring to the trip-switch device on all MTR trains, the Panel has identified six key actions for further improvement.

- (a) To streamline communication within the Operations Control Centre during major incident;
- (b) To strengthen the information provided by the Operations Control Centre to stations and trains with a view to providing more useful information, more quickly;
- (c) To make better use of the Passenger Information Display Boards at all stations;

- (d) To develop handy information kits which include notices, signs, information of alternative transport modes, i.e. route numbers with destinations etc for use at stations of the Tseung Kwan O Line to more easily direct passengers to the alternative modes of transport;
- (e) To make better use of the Amber Alert system to give an early warning to external parties; and
- (f) To review the use of the multifax system with a view to developing a more effective and speedy channel for information dissemination to the media during the initial period of an incident.

圖一：北角站事故現場圖

Diagram 1: Layout of the Incident Site at North Point

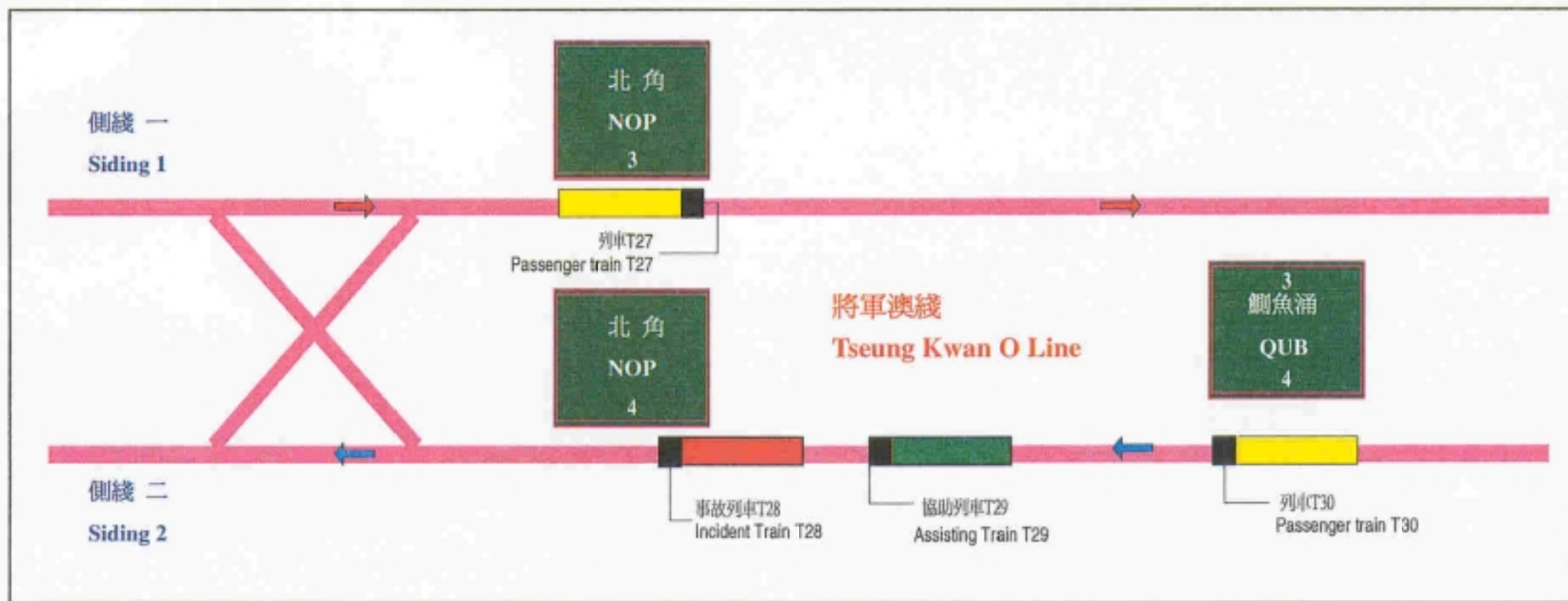


Diagram 4 : Modification of the underframe wiring
圖四：列車車底喉管修改



Photo 3 - Polyvinyl Chloride Conduit Arrangement (Before Modification)
相片三 - 聚氯乙烯保護喉管安裝(修改前)



Photo 4 - Flexible Conduit and TDI Trip Switch Junction Box (After Modification)
相片四 - 軟性保護喉管和車鉤脫卡跳脫閘閘製連接盒(修改後)

Diagram 3 : Modification of the TDI Trip-Switch Wiring Connection

圖三：修改車鉤脫卡跳脫開關掣的喉管接駁



Photo 1 – TDI wiring connection (before modification)

相片一：車鉤脫卡跳脫開關掣的喉管接駁(修改前)

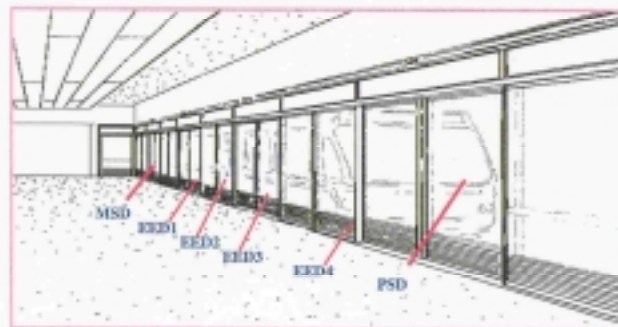


Photo 2 – TDI Trip Switch Conduit and Adapter (After Modification)

相片二：車鉤脫卡跳脫開關掣的保護喉管和連接器(修改後)

Diagram 2: Emergency Exit Doors at Platform 4 of the North Point Station

圖二：北角站四號月台的緊急出口



*EED1, EED2, EED3 & EED4 were opened manually for detrainment.
人手開啟緊急出口 EED1、EED2、EED3 和 EED4，讓乘客離開車廂。