

DEPARTMENT OF THE ENVIRONMENT

RAILWAY ACCIDENT

Report on the Derailment that
occurred on 27th December 1973
at Lower Darwen

IN THE
LONDON MIDLAND REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

1974

© Crown copyright 1974

ISBN 0 11 550354 4

RAILWAY INSPECTORATE,
DEPARTMENT OF THE ENVIRONMENT,
2 MARSHAM STREET,
LONDON SW1.
9th September 1974.

SIR,

I have the honour to report for the information of the Secretary of State the result of my Inquiry into the derailment of the 17.35 Manchester (Victoria) to Blackburn Down passenger train that occurred at 18.28 on 27th December 1973 at Lower Darwen on the single line between Blackburn and Bolton in the area controlled by Preston Signal Box in the London Midland Region, British Railways.

The train, a four-car diesel multiple-unit, had been diverted via a goods loop line to by-pass a set of worked catch points that had been giving trouble, and the driver had been instructed to pass the loop exit signal, which was being held at Danger by the failed points, and thence to proceed onto the single line again. The driver, after traversing the loop exit points at caution, allowed his train to accelerate on the steeply falling gradient to a speed of some 40 mile/h, when it arrived at a second set of worked catch points which were set wrong for it, and diverted it into a short spur terminating in a stop block.

The train crashed through the stop block at speed and into a stack of track panels consisting of rails fixed to sleepers; it threw some of the panels onto the running line, and one rail pierced the front of the cab and passed through the passenger seating at the front of the train. The train was completely derailed except for the last bogie of the rear car, and its front was badly damaged.

Householders living beside the railway at Lower Darwen called the police and ambulance services, who were quickly on the scene, and they also gave immediate aid and succour to the 18 passengers. One passenger suffered a dislocated shoulder and a fractured shoulder blade, seven suffered head or leg injuries and nine were shocked, but none was detained in hospital. The driver, however, who was thrown out of his cab onto a bank, suffered severe fractures of both legs and other injuries, and the guard slightly injured his left shoulder.

It was dark but dry at the time of the accident.

DESCRIPTION

The Track and Signalling

1. The line, which is shown at Figure 1 at the end of this report, is single from Bolton Junction, where it connects with the Up East Lancs Line, to Darwen Station where there is a passing loop, and thence to Bromley Cross. An Up and Down goods loop parallels the single line from Blackburn to Bolton Branch Junction, and the Huddlesden goods loop serves sidings west of the line north of Darwen. (Down is to the north.) The single line rises steeply from Blackburn and four sets of power-worked catch points have been provided between Blackburn and Darwen. No. 780, at which the accident occurred, lies about 2,995 yards north of Darwen station, and another set, No. 781, lies 1,595 yards north of the station and within the section of line paralleled by the Up and Down goods loop, so that the goods loop exit points connect with the single line some 120 yards north of No. 781 catch points.

2. Preston Signal Box was commissioned in stages between November 1972 and October 1973. The East Lancashire lines, including the newly singled line between Blackburn (Bolton Junction) and Bromley Cross, were commissioned on 23rd and 24th September 1973. The single line is fully track circuited and controlled from Preston signal box through a remote relay interlocking at Blackburn, on the standard track-circuit block principle. The Darwen Down Starting signal PN 466, a three-aspect colour light, is located 174 yards beyond the platform end, at the exit of the loop, where worked trap points and a spur have been provided. It carries a left-hand junction indicator and a subsidiary aspect, for signalling trains into the Goods loop, the connection for which is some 440 yards ahead of the signal. The line falls steeply at a gradient of from 1 in 71 to 1 in 101 for about 1½ miles (Fig. 2) and then curves left in a cutting where catch points No. 780 are situated. Signal PN 461 is on the single line at Bolton Branch Junction, and its two-aspect colour light Distant signal PNR 461 is situated 2,450 yards on the approach side of it, and 183 yards on the approach side of No. 780 catch points. Signal R 461 comes into view as a train has cleared the connection from the Goods Loop to the single line at Huddlesden Junction.

The Catch Points

3. No. 780 catch points are fitted with a slotted joint. The Westinghouse Style 63 point machine has its facing point lock blade removed, and a facing point lock is provided in the four-foot which only locks and detects the points in the reverse or closed position for the passage of a train.

The points are called reverse by the setting of a route for a Down train from signal PN 466 at Darwen, or PN 463 at the exit of the goods loop. After these routes have been cancelled the points remain set and locked reverse until they are called normal or open by the setting of a route for an Up train from signal PN 458, or signals PN 456 or PN 457 at Bolton Branch Junction. For any of these three signals to show a

proceed aspect the lie of the points does not have to be proved. In order to reduce wear on the points, they are reversed by the occupation of track circuits 788T or 789T, but if the points nevertheless remain normal and open for the spur, they are reversed when the wheels of the train strike the open switch blade and 'mid-stroke' contacts in the facing lock mechanism are made. The points revert to their normal position after the passing of the train until a route is set for a Down train to pass over them. 781 catch points operate in a similar manner.

The Signal Box

4. Preston Signal Box contains a standard British Railways miniature push button entrance/exit type M3 panel. It is divided into four sections, 'A' to 'D', each worked by one signaller. The Darwen line forms part of the signalling on section 'B'. The signaller on this panel controls the West Coast Main Line from the end of the Warrington Signal Box control area, to Farington Junction, and the Central lines from Euxton Junction to Blackrod Junction (exclusive). The signaller on Section 'B' also controls the East Lancs lines from near Preston to Blackburn Station and he signals trains around the Farington curves between the West Coast Main lines and East Lancs lines which are controlled by Section 'C'. Finally he controls the single Darwen line from Blackburn to the fringe signal box at Bromley Cross. The signallers work on a different section of the panel each day, in rotation.

5. The panel (Fig. 3) is composed of 80 mm × 40 mm mosaic units placed at an angle of 10 degrees to the vertical, its top edge being 1930 mm (6 ft 4 in) above the floor. Beneath it there is a writing surface at an angle of 5 degrees to the horizontal some 480 mm wide and 950 mm (3 ft) above the floor. The panel faces the railway and the signal box windows. Desks are provided for the Area Controller, train regulators and other staff who, when seated at their desks, are about 13 feet from the face of the panel. Figure 5 shows a part of section B which includes Darwen Station and signal PN 461 approaching Bolton Branch Junction. It shows the indicator placed just below the single line to the left of the goods loop which indicates the direction for which trains are signalled on the single line and the point switches situated in the third row of mosaic units from the top of the panel some 6 feet above the floor, including those which can be used to operate the automatic catch points in case of failure. In the mosaic unit above each of the latter there is a sealed release push-pull key.

6. As shown in Figure 4, the point switches have a central position for automatic route setting and normal and reverse positions for setting points individually. The push-pull key above each catch point switch requires to be in the pushed-in (F) position for the point switch to be operative, and in the fully pulled out (T) position for the points to be automatically operated by the route setting procedure as described in paragraph 3. When the switch is in the T position a key-hole collar can be dropped over it to hold it out and a paper seal through which the button protrudes is then glued to the collar to seal it. Movement of the collar to release the button will break the paper seal on which the words "Sealed Release" are printed. The signaller on section B has eleven such releases along the top of his panel, and there are four more elsewhere on the Preston signal box panel. In addition to these fifteen sets, there are five sets of catch points within shunting areas also with sealed releases, which close automatically on signal clearance and track circuit occupation all on double lines of railway signalled for one direction working only.

7. Individual or groups of track circuits are separately indicated on the panel using different colours and those on the Darwen line are coloured alternately green and brown. The minimum number of route setting lights in a track circuit is two although most have at least three. The track circuits on the Darwen line are shown in Fig. 5 and are indicated as follows:

TC 785	8 lights	green background
TC 786	3 lights	brown background
TC 787	5 lights	green background
TC 788	2 lights	brown background
TC 789	4 lights	green background
TC 790	6 lights	brown background
TC 791	8 lights	green background (one being on the goods loop exit)

Two of the lights of TC 789 are only lit when catch points 780 are set reverse.

The Trains

8. The train consisted of two coupled two-car diesel multiple-units each consisting of a motor brake second (numbers M 51946 and M 51943 at the ends of the train) and a motor composite (L) (numbers M 52061 and M 52058) marshalled between them. It was running on time and carrying 18 passengers, a driver and a guard. It was powered by eight 150 horsepower engines, weighed 114 tons and was 243 feet long overall.

Damage to Track and Train

9. The only damage to the track was the destruction of the stop block at the end of No. 780 catch points spur and the breaking of the track-circuit interrupter at the catch points which caused track circuit 789T to show occupied. The train remained coupled throughout, upright and in line. The driver's cab was

wrecked when the train hit the buffer stops and the stacked track panels beyond them. On the leading car two solebars and two longitudinal chassis members were badly bent and broken and two centre casting transoms torn off. All the brake rigging was damaged and the fuel tanks destroyed as well as the batteries and terminal boxes. The gear box was torn away and both cardan shafts broken. The leading axle was bent and there was considerable damage done to the car's interior. The damage to the other three cars was much less. The gangway and jumper cables were torn off the second vehicle and its cardan shaft, fuel filling pipe, and panelling were also damaged. The rear two cars were only superficially damaged.

REGULATIONS FOR SIGNALLING TRAINS ON THE DARWEN LINE

10. The following instructions applied to the operation of the Darwen line:

Preston Signal Box Signaller's Manual.
London Midland Region—Northern Sectional Appendix.
London Midland Region—Special Notice 1330G September 1973.
British Railways Board—Rule Book.
British Railways—Regulations for Train Signalling and Signaller's General Instructions.
British Railways—General Appendix to Working Timetables and books of Rules and Regulations.

11. The signaller's manual, on page 1 of Section 2, states that the track circuit block system applies on the Down and Up Darwen line between Preston and Bromley Cross signal boxes; and on page 9: "Should there be a failure of any track circuit on the section . . . working by Pilotman must be introduced". The use of individual point switches is detailed on page 15.

12. The Northern Sectional Appendix, on page 206, states that "the instructions (to trainmen and others concerned) for working single lines by the Tokenless Block System shown in the General Appendix will apply with the exception of Instructions 1 & 6. The section of line is fully track circuited and the clearing of signals PN 456, 457 or 458 at the Blackburn end of the single line, and the Down Starting signal at Bromley Cross box will be the driver's authority to proceed onto the single line. Except as shown in Instructions 3, 4, 5 & 7, drivers must not proceed unless signals PN 456, 457, or 458, or the Down Starting signal at Bromley Cross, as the case may be, has been cleared. The Special Notice, which is issued to drivers, guards and signaller-men, states, on page 3, that the Tokenless Block System will apply. Paragraph 7 of the Tokenless Block Regulations in the General Appendix states, at (A), "Should there be a failure of the signalling equipment, working by Pilotman must be introduced. . . ."

13. Section E of the Rule Book lays down, at paragraph 4.1, what a signaller must do when he becomes aware of a defect in the signalling equipment, and at paragraph 4.9.3. that "when authorising a Driver to pass a defective signal, the Signaller must advise the driver of the circumstances and instruct him to travel cautiously to the next signal, or as far as the line is clear towards the next signal, as the case may be". At paragraph 4.9.5. the Rule Book states that when it is necessary for a signal to be passed at Danger, either in connection with a failure of such signal or a track circuit failure, any power operated points . . . over which the signal applies need not be secured . . . provided:

b. *At route setting panels*

The signaller must observe the special instructions which detail the action to be taken in each case.

I have listed the relevant instructions in paragraphs 47 and 48.

Rule E 8.1. (Duties of Drivers) states "In every case when a train is required to pass a signal at Danger, the Driver must give one long blast on the horn and proceed cautiously in accordance with the handsignal or instructions given to him by the Signaller or Handsignaller . . . when a Handsignaller is not on duty the Driver must not pass any facing points . . . until he has satisfied himself that they are correctly set in position for the route over which the train is to run".

EVIDENCE

14. *Driver W. Fieldhouse* was the driver of the 17.05 2P73 Manchester (Victoria to Blackburn) train which preceded that involved in the accident. He passed signal PN 468 approaching Darwen showing a yellow aspect, and after completing station duties he drew the train down to signal PN 466 which was at Danger. On telephoning the signaller he was told that there was trouble with the catch points at Hoddlesden Loop, so he went back to ask his guard to warn the passengers that there might be some delay, but by the time he had walked back again with the guard the signal showed a yellow aspect with a left-hand junction indicator to signal him into the goods loop. Because he was not sure if he was authorised to go into the goods loop he told the guard that he would telephone again to get authority, but as he got down to do so he saw the signal revert to Danger. When he asked the signaller why this was so the signaller told him that he wished to attract his attention to advise him of the diversion via the goods loop, and that he was to proceed at caution and stop at the loop exit signal PN 463.

15. By the time he had got back into his cab the signal again showed a yellow aspect with the junction indicator, so he drove down to the loop points which he traversed at about 10 mile/h, and drew forward to signal PN 463, which was at Danger, at about 5 mile/h, and telephoned from there. He was told to pass the signal at Danger and to obey all other signals. He left the loop at about 20 mile/h, but when he saw signal PN R 461 showing a green aspect he allowed the train's speed to increase to 45 mile/h when he shut off power.

16. When I questioned him, Driver Fieldhouse was quite certain that when he had been told to pass the signal at Danger he had not been told to drive with Caution to the next signal. Seeing signal PN R 461 showing a green aspect indicated to him that the signal ahead was also showing a proceed aspect and that the line ahead must be clear. Even if signal PN R 461 had been a semaphore Distant signal showing a green aspect he would have assumed that the line was clear, but had he been accompanied by a Pilotman and been instructed to proceed under caution he thought that 30 mile/h would have been a safe speed.

17. I interviewed *Driver A. Fletcher*, the driver of the 17.35 Manchester to Blackburn train, in Blackburn Royal Infirmary on 24th January. He told me that he, too, had been stopped at signal PN 466 at Darwen Station. When he telephoned the signalman he was told that there was trouble with some points and that he was to be routed via the Goods loop. He received a yellow aspect at signal PN 466 with a junction indicator and he drove his train down to the loop exit signal cautiously. On telephoning from that signal he was told to pass the signal at Danger and to obey all other signals. He drove slowly over the points leading onto the single line, which were set correctly, and he then saw the signal ahead displaying a green aspect, so he allowed the train to build up speed to about 40 mile/h at the signal (PN R 461), but as he passed it he felt a lurch and just had time to apply the brakes before his train hit the stop block at about that speed. As Driver Fletcher was in pain I questioned him no further.

18. The signalman in charge of Section B at the time that the two trains passed through Darwen was *Signalman J. Foulkes*. He came on duty that day at 14.00 and when he did so he noticed that the paper seal of the sealed release on 780 catch points was broken and the collar was hanging off-centre over the push-pull switch which was free to be moved. He restored the collar to its normal position by putting it back on the button, but he did not replace the paper seal; there was no trouble with the points at that time and he made no entry in the signalbox register. He noted that the seal on the release of No. 781 points was intact.

19. At 17.48, as the 17.37 train from Blackburn was approaching Darwen, the light above the 781 point switch began flashing 'out of correspondence', and he noted the event in his occurrence book. He therefore broke the paper seal on the release and with the button fully pressed in tried to work the points by using the point switch, turning it first to the normal position and then to the reverse, and back to the centre position, but this had no effect. *Area Supervisor R. A. Hammill*, who was on duty in the signalbox, watched him for a moment or two and then called for the technician. At that time the 17.05 train from Manchester was standing in Darwen Station, and when it had drawn forward to signal PN 466 the driver telephoned him and he told the driver that there was trouble with a pair of catch points. Foulkes told me that a moment later Mr Hammill suggested that the train could be routed through the goods loop so as to by-pass the failed points, so he tried the route and set it all the way into Blackburn. Having set the route he realised he had not told the driver so he replaced signal PN 466 to Danger and when the driver came on the telephone told him to proceed under caution through the loop. At that time, he told me, he was fully expecting that signal PN 463 would clear as the train approached it because it is approach released, but the driver telephoned again from that signal and reported that it was still at Danger. He then cancelled the forward route.

20. He tried the route again but the signal would still not clear, but Mr Hammill and he came to the conclusion that it must have been the failure of the detection on 781 catch points which was causing the difficulty. He therefore set the route for the train to proceed from signal PN 463 into the bay platform at Blackburn, and also set the point switches for 784, 783 and 782 points, and noted that 780 catch points were in the correct position and indicated as being reversed, or closed. He said he also put reminder appliances over the entrance button at signal PN 463 and also over the point switch of 782 points and beside the switches of 780 and 781 catch points. When I asked him why he did not set the 780 point switch as well, he replied: "I didn't use it because at that time I was rather uncertain as to the actual operation of these points; I wasn't sure whether they were operated by the track circuits on the approach". He then told the driver to proceed and he saw the train indicated as having arrived at Blackburn.

21. Foulkes told me that at this time there were various trains en-route from Preston to Blackburn and leaving Preston for Manchester. He was handling a Colne to Preston train and there was a goods train marshalling in Blackburn Yard. After the 17.05 train had arrived at Blackburn he cleared the route from signal PN 463 and tried again to clear the trouble with 781 points. He set routes from signal PN 462 to PN 465 in the Up direction, and from PN 466 at Darwen to PN 461 in the Down direction, but the centre light above the switch for points 781 still flashed 'out of correspondence'. While he was busy handling other trains, one of the controllers in the signalbox told the station staff at Darwen to tell the driver of the 17.35 train to telephone the signalman as soon as his train arrived at signal PN 466. Foulkes spoke to the guard of the train and then cleared the signal for it to enter the goods loop, and told him to telephone again as soon as the train arrived at signal PN 463. Because of the shunting in the yard he could not move the 17.05 train out of the bay platform, so he telephoned the Station Supervisor at Blackburn that he would route the 17.35 train into platform 2. He told me that he set the route from signal PN 463 into Blackburn Station, and set the point switches as before. He then told the driver of the 17.35 train to pass signal PN 463 at Danger and to

obey all other signals. After seeing on the panel that the train had moved off, he went to work on the west side of the panel. Foulkes later told me that he thought he heard a failure buzzer sounding at about this time but he did not know why it sounded, nor even whether it applied to his section of the panel.

22. When he returned he saw that track circuit 789T was showing red indicating the presence of the train, whereas the other track circuits, including 790T were showing white lights, so he told *Controller H. Guy* that he thought that the 17.35 train had failed. He therefore cancelled the route by removing the reminder appliance and pulling the entrance button at signal PN 463 and saw the white lights extinguished leaving only track circuit 789T lit in red lights. At about 19.00, sometime after the accident, *Signal Technician P. J. Fogg* telephoned him from 781 catch points, and he told him to go down to 780 catch points to see what the trouble was.

23. Foulkes is a Class E signalman with 27 years' experience. He joined the new Preston Signal Box at its commissioning in November 1972 after a two-week's course of instruction. He told me that he had never previously worked in a power signal box, nor had he ever worked a Tokenless Block section. He described the working of the single Darwen line as track-circuit block operated from Preston signalbox and he thought there was little difference between working the bi-directional lines through Preston station, and the Darwen line. He had never been involved with automatic catch points prior to coming to Preston, and he did not remember seeing any in the Derby box where he had been trained. He thought that they had been mentioned on the course, but not in any great detail. He was able to describe to me their method of working, but he agreed that it had only become clear to him since the accident. He told me that during the afternoon he had trouble with 788 catch points near Entwistle Station but he had overcome it by operating the point switch. The signal technician had not been called and he had made no entry in his register. He agreed that he should have recorded the breaking of the sealed release on 781 catch points but that he had not done so. He had not discussed pilot working with Mr Hammill because he had hoped that the signal technician would have been able to put the trouble right quite quickly, as he had on other occasions. Signalman Foulkes is 5 feet 8 inches tall and he told me that he has to stand back on his toes to see the point indication lights above the switches at the top of the panel, particularly when reminder appliances are placed over neighbouring switches. (See Fig. 4.)

24. *Area Supervisor R. A. Hammill* confirmed Signalman Foulkes' evidence. He watched the signalman try to correct the faults on points 781, and then authorised him to signal the 17.05 train through the goods loop. He watched the panel as the train approached signal PN 463 and confirmed that the signalman had put reminder appliances on the route entrance button at signal PN 463, and on the point button of 782 points. He confirmed that although the signal had not cleared, all the route lights were on, and he said that both he and the signalman, together, checked that all the points were indicated as lying in the correct positions, including 780 catch points. He also was 5 feet 8 inches tall and agreed that he had to step back and stand on his toes to see the lights indicating the positions of the points.

25. He recorded 781 points as having failed at 17.48 when he put out a staff call for the signal technician whom he contacted at 17.55 and told of the problem. When Mr Hammill returned to Section B the 17.35 train was approaching Darwen and Foulkes was still trying to clear the trouble with 781 points using the point switch. He then went about his other duties for about 20 minutes.

26. He next returned to section B at the time of the accident and saw that the route from signal PN 463 had been cancelled but track circuit 789T was showing red lights indicating that the track was occupied. He saw that the point switch of 780 catch points was in the central position and the detection lights showed that the points were set normal (open for the spur). He confirmed that the collar was over the release button and appeared to be seated correctly but the paper seal had been broken. He saw no reminder over the point switch itself. The light above 781 switch was still flashing 'out of correspondence' but he did not note the position of the points. He was certain, however, that the sealed release button for 781 points also had a collar on it.

27. The signalman on duty on Section A was *Signalman R. Eastham*. His duty involved signalling trains into Blackburn, and there were times when he became involved in setting routes on Section B. He was adamant that only Foulkes had set any routes on the Darwen line. He said that he thought that the Preston station area on Section C was the busiest, but the task of the signalman on Section B was also a difficult one. They had had trouble with the automatic catch points on the Darwen line which had increased the work. He too was 5 feet 8 inches tall and he had to stretch up to reach the point switches and stand well back to see the indicator lights over them.

28. *Controller H. Guy* had told the Railway Officers at a previous inquiry that he had seen all the route lights lit between signals PN 463 and PN 461. When I questioned him on this however he agreed that he had only seen the route light on after the accident must have occurred; all the track circuit lights were showing white except those on track circuit 789T which were showing red, as seen by Mr Hammill.

29. *Signal Technician P. J. Fogg of Blackburn* was at Accrington when he heard the 'Staff Call' at 17.55. It took him forty-five minutes to get to 781 catch points where he found that there were pieces of grit and small stones on the detection slides which were preventing detection being made although the points seemed to be well greased and otherwise in order. He had called in to the office at Blackburn on his way but

at no time did he visit the relay room there. When he telephoned the signalman from 781 points to ask him to operate them he was told of the trouble at 780 points, so he went straight down there in his van and found 780 points set in the normal position, and showing no signs of damage or maladjustment.

30. When *Mr D. Badley the Assistant Area Manager, Blackburn* arrived at the scene of the accident, both the police and ambulances had arrived, and the passengers had been taken care of. He visited 780 catch points and found them set normal and open for the spur. He found *Guard Abdul Hameed* of Manchester Victoria, the guard of the train in a shocked state. Mr Badley therefore went back and protected the line by putting down detonators which he obtained from the guard. The driver had already been taken to hospital.

31. *Area Signal Engineer G. C. Hawkins* when told of the accident at 19.21, went straight to Preston Signal Box. He found that 780 points were indicated as being normal with the point switch in the centre position and the collar on the sealed release button was in position. 781 points were indicated as being in reverse with the point switch also in the reverse position. The collar on its sealed release was hanging down so that the button was free to be pushed or pulled. 782 points were showing reverse and the point switch was in the centre position. There were no reminder appliances on the point switches but he did not notice if there were any on the panel itself. He saw that track circuit 789T was showing occupied but the rest of the route was not illuminated.

32. He then contacted the signal technician at 780 points who told him that he had left points 781 in reverse when he had been called to 780 points after the derailment; he confirmed that there was no damage to 780 points except to the track circuit interrupter which had been broken. He then set the route over the points and the points responded correctly. He also tested the operation of the points using the point switch, both normal and reverse, and they worked properly. He also tried using the point switch without pushing the sealed release button but found this to be impossible. The arrival of the breakdown crane made further testing impossible.

On the Testing of the Signalling

33. The signalling equipment was fully tested after 08.30 on 28th December, under *Mr E. Oliver, Senior Technical Officer (Testing)*. Full functional tests were carried out with 780 points, and these were followed by a further set of tests with a simulated detection failure on points 781, and no fault was found at all. The functioning of the emergency sealed release button was also fully tested and found to be operating correctly. The insulation of all the lineside cables from Blackburn relay room to the point machine itself were tested and found to be satisfactory and the control system between the signal box, the relay room and the points themselves were thoroughly tested and nothing untoward found. I have received a schedule of all the tests carried out and I am satisfied that they were comprehensive.

34. *Technician Bentham* in charge of the maintenance technicians at Blackburn confirmed that none of his staff entered the relay room on the evening of the accident, and that when he visited it on the morning of the 28th December the door was properly locked. His staff also found the lineside cupboard near 780 points in which the vital relays are housed properly secured.

FURTHER INVESTIGATIONS

35. When visiting the Blackburn relay room on 24th January I was shown the place where a small metal crimp, left behind after the installation of the new signalling equipment, had been found under a cover and almost hidden at the bottom of the equipment frame. I am satisfied that it could not have fallen from any of the vital signalling circuits controlling 780 or 781 points. Its discovery however shows the thoroughness with which the checking subsequent to the accident was carried out. An electrical contact was also found between two wiring tags on another frame in the relay room, but I am satisfied that it could not have affected any of the equipment involved in this accident, nor could a similar fault on its own have caused the points to malfunction.

On the Use of the Signal Box Instructions

36. At the end of my Inquiry I handed Mr Hammill and Signalman Foulkes copies of the Signalman's Manual for the signal box and asked each to find, in the attached tables, the particular routes concerned with the accident. Mr Hammill then told me that the tables for the Darwen line had been issued separately, but Signalman Foulkes admitted he had not known this.

On the Reliability of the Signalling

37. Because the worked catch points on the Darwen line seem to have been somewhat unreliable I asked for a study to be made of their reliability in relation to the rest of the signalling controlled by Preston signalbox. The six sets of catch points which are traversed in both directions had caused trouble on 19 occasions between their installation and the date of my Inquiry. Either they could not be set normal or reverse,

or they could not be detected and the point light on the panel flashed 'out of correspondence' or they worked intermittently. In addition there were a number of occasions when such failures cured themselves and a temporary fault was not recorded in the book, as was the case with 788 points on the afternoon of the accident. Trouble had been experienced with the catch points on the following occasions:—

775 points 17th Oct., 16th Jan.

778 points 17th Oct., (twice), 26th Nov., 5th Jan., 12th Jan.

780 points 26th Nov., 7th Dec., 26th Dec., (the day previous to the accident).

781 points 27th Dec., 17th Jan.

787 points 28th Nov., 18th Dec., 21st Dec., 27th Dec., 21st Jan.

788 points 7th Oct., 6th Dec.

Normal power-operated points on the line had also caused trouble on the following occasions:—

774 points 23rd Oct.

779 points 28th Nov.

782 points 6th Nov.

784 points 1st Oct.

786 points 15th Oct., 7th Nov., 6th Dec., 1st Jan., 4th Jan.

In addition there were 13 occasions on which routes could not be set and 5 where they could not be cancelled, as well as other occasions when track circuits showed occupied when in fact they were clear of trains. It must be stressed however, that on all the above occasions the equipment failed to safety.

38. Between the commissioning of the signalling on 27th September and the date of the accident there were 55 faults, including those listed above, affecting traffic on the branch of which 36 were reported by the maintenance staff. The staff responsible for the installation of the new signalling were still on site and they dealt with a number of faults, but the total recorded failures on the branch line represents about 1 per single track mile per month. On a similar basis, the failures on the three new signal boxes on the West Coast Main line for similar four-weekly periods amounted to:—

	<i>Per single track mile</i>	<i>Per signalled route</i>
Warrington SB	0.2	0.04
Preston SB	0.29	0.03
Carlisle SB	0.11	0.025

Carlisle, which controls long sections of automatic signalling and no complex junctions has been more trouble free than the other two, but there is nothing to indicate that the signalling controlled by Preston Signal Box is any less reliable overall than that of the other two signal boxes.

39. An analysis of the faults on the Darwen line shows that almost half the faults occurred in the first four-week period which was followed by two weeks of almost fault-free operation. The rate went up again with the start of bad weather and at the time of the accident it had settled to a figure of some 3.5 faults per week. Notably there were no incidents of vandalism although this area had suffered badly in the past. In his report to me *Mr F. W. G. Smith the Divisional Signal and Telecommunications Engineer* agrees that the failure rate of the branch had been higher than desirable but he added "catchpoints are notoriously difficult to maintain mainly because only one switch is normally run upon, and when this is allied to the necessity to provide standard detection for route setting purposes, as on this line, a slight loss of travel (of the points) which would not be apparent in spring catch points assumes some importance in the signalling system—and a detriment to operation, this being a single line". Of the thirteen catch point failures attended by the technician prior to the accident, eleven were caused extraneously (e.g. grit or stone in the switch blades).

40. When I visited the signalbox on the evening of 1st April 1974 I found that 17 track circuit indicating lights were fused, 3 of them being in a group within one track circuit. I was told that about 50 of these lamps have to be replaced each week, out of a total of some 12,500 lamps.

On the Training of Signalmen

41. A full training programme was arranged for all staff affected by the commissioning of the new signalbox and a Divisional School was established at Preston. Prospective panel operators were withdrawn from their mechanical signalboxes in groups of five and attended a two-weeks theoretical course in the school followed by a week of practical training on similar equipment in Derby Power Box. Finally, all the signalmen attended a further week of intensive training revision immediately prior to the introduction of the first stage of the resignalling on 5th December 1972. The final week included a complete review of the Signalman's Manual which had not been available for the basic training. Preston signalbox was progressively commissioned in stages between November 1972 and October 1973 and this gave full opportunity, in the early stages at least, for practical training on the job and for study of the relevant documents and manuals. Prior to the commissioning of the East Lancashire area a diesel multiple-unit was used on three occasions for staff training. Signalman Foulkes's course began on 28th August 1972 and his report read:—

"This student is quietly confident and should adapt himself to panel operating without much difficulty".

Tokenless Block signalling was included on the Friday of the first week, and point failures on the following Monday, but power-worked catch points were not especially discussed.

DISCUSSION

On How 780 Points became Set Normal

42. Nothing was found during the testing subsequent to the accident to indicate that the points were operating other than safely and satisfactorily, and a study of all the faults of the signalling equipment on the line shows that all were to safety. I am satisfied therefore that it was not a signalling failure that caused the accident.

43. 780 points could only have been moved into the open or normal position (into the spur) after the passage of the 17.05 train by:

- (a) a route being set over them in an Up direction or,
- (b) their being set thus by use of the point switch in conjunction with use of the emergency sealed release button.

Had Signalman Foulkes set such a route in trying to clear 781 points before signalling the 17.35 train down to signal PN 463 (he said that he had not) the row of white lights extending to signal PN 465 would have been obvious to him, and if the route had been left set he would not have been able to signal the train down to signal PN 463. With such a route set, signal PN 461 could not have cleared, and PN R461 could not have shown a green aspect as seen by Driver Fletcher. I do not think therefore that the points were set by an Up route being set.

44. The three point switches at the top of Section B are numbered 780, 781, and 782, the first two having emergency sealed releases above them. The layout of the points on the track however is in the order 780, 782, 781. When I asked Signalman Foulkes to point out to me on a diagram of the panel where the switch for 781 points was, his finger momentarily wavered between 780 and 781 before settling on the correct switch. It is possible therefore that in trying to clear points 781 he mistakenly used the switch for points 780. The most convenient way to use the switches is first to turn the point switch and then to lift the collar and press the emergency button to make the 'F' contacts. He might have been watching the signal indication on the line in the middle of the panel to see if the signal would clear, and not have noticed his mistake. The setting of the route from signal PN 463 however should have called the points into their reverse position and for them to have remained set normal on the approach of the 17.35 train, either the point switch must have been left in such a position, or the points must have failed to respond to the route calling and remained set wrong, but this had not occurred on any of the occasions listed in paragraph 37. Both Mr Hammill and Mr Hawkins saw the point's switch in the central position after the accident and a failure seems therefore to be the likeliest reason. However the paper seal on the sealed release had been broken and it is possible in spite of Mr Hammill's evidence, that the collar was not properly central so that the 'T' contacts were not made and the points could not be called by the route setting method, and thus remained as last set. There is also the possibility that the signalman in spite of what he said in his evidence, actually set catchpoints 780 to normal believing, in a moment of thoughtlessness, that he was closing them, but I believe it to be unlikely for a signalman of Foulkes's experience to have made this mistake.

On the Signalling Regulations

45. The Signalman's Manual for Preston Signal Box clearly states that the line is operated by the track-circuit block system. For a route to be set between two opposing signals on the single line, all track circuits between the two must be clear and indicated as such and the opposing signals and routes must be set normal with no train closely approaching them. The integrity of the line's safety depends on the integrity of the track circuits and of the route setting interlocking. If the section signal of a route being set will not show a proceed aspect when all the track circuits are showing clear then, so long as all the points en route are indicated as being correctly set and are locked in that position by the use of the point switches on the signal box panel, it is safe for the train to proceed. The Signalman's Manual had clearly been written on this basis.

46. The Tokenless Block system of signalling a single line is an entirely different arrangement. The single line is worked between two signal boxes and the line is not fully track circuited. The integrity of the line's safety depends on the integrity of circuits between special block instruments in the two signal boxes and the arrangements at either end which detect the entrance or the exit of trains into or out of the single line section. The 'Instructions to Trainmen And Others Concerned' at paragraph 7 on page 48 of the General Appendix, says that working by pilotman must be introduced should there be a failure of the signalling equipment (for any such failure destroys the integrity of a Tokenless Block system).

47. The London Midland Region Notice 1330G of September 1973, on page 3 says that the Tokenless Block System will apply—this notice is directed to drivers, guards, and signalmen. The Northern Sectional Appendix however says that the Instructions for working single lines by the Tokenless Block System shown in the General Appendix will apply with the exception of Instructions 1 and 6. There therefore seems to have been some confusion as to whether the Track Circuit Block system or the Tokenless Block System applied on the Darwen line. There were at the time of the accident no specific Regulations on the London Midland Region for operating single lines under the track-circuit block system when controlled from one signal box, and for this reason the Region gave the instructions that the Tokenless Block Regulations should apply, and under these pilot working must be introduced when a section signal cannot be cleared.

48. The tables included in the Signalman's Manual are issued as three lists:—

- List A—Lists of defective routes showing to which entrance buttons reminder collars are to be attached.
- List B—Lists of defective points showing to which entrance buttons and point switches reminder collars are to be attached.
- List C—Lists of points which must be clipped or secured by scotch when hand signalling is in operation.

Each list is subdivided into sections by remote interlocking areas, and the separately issued sections for the East Lancashire Area include those for the Todmorden, Copy Pit, Rose Grove, Accrington and Blackburn areas.

49. In the Blackburn section, List A, for a defective route from signal PN 463 to the Up and Down Darwen line, requires reminder collars to be attached to entrance buttons 456R, 457R, 458R, 462, 463R, 463Y and 466. When 781 points are defective, List B requires collars to be attached to entrance buttons 456R, 457R, 458, 462, 463R and 466. When handsignalling from signal PN 463 to the Up and Down Darwen line when the route cannot be secured by setting the points by switch, or the points are not properly detected, List C requires catchpoints 781 to be secured by clip in the normal position, catchpoints 780 and points 782B to be clipped reverse, and points 782A to be secured by scotch in the reverse position after all the points have been set by their emergency keys. When read as a book the pages are printed sideways and upside down to one-another and this made it difficult to find the appropriate entry quickly, although the East Lancs supplement was printed normally.

CONCLUSIONS

50. The accident occurred because, under signal failure conditions, Signalman Foulkes failed to set and lock 780 worked catch points, which the train had to traverse in a facing direction, by means of the point switch and emergency sealed release. Having set the route from signal PN 463 he cannot have checked properly the lights above the switch indicating the lie of the points, and he must have failed to notice that of the four panel lights in track circuit 789T, the two indicating that the points were correctly reversed were not illuminated.

51. The failure of 781 worked catch points was already holding signal PN 463 at Danger, and the signalman wrongly assumed that this was the only fault and that the route was working as it should have been. I believe however that, in trying to clear the trouble with 781 points he mistakenly used the switch for 780 points and set them normal for the spur and that when he called them reverse by setting the route over them they failed to respond. The positions of the switches high up on the panel with their indicating lights above them may have contributed to the signalman's error but are not a cause of the accident.

52. The previous train had passed over the line in a similar way, and 780 points must have responded correctly when the route was called and were set reverse, but both Signalman Foulkes and Mr Hammill failed to use the point switch to set and lock these points. The signalman said that he did not use it because he was not certain how the automatically worked points functioned: but it is fundamental on route setting panels, when full detection cannot be obtained by the clearance of the signal, that *all* points affecting the route must be individually set and their correct lie checked by the signalman and both men should have known this; they also both failed to refer to the relevant lists.

53. Signalman Foulkes failed to instruct Drivers Fieldhouse and Fletcher to travel cautiously as he was required to do under Section E 4.9.3. of the Rule Book. Nor evidently were all failures properly recorded in the signal box registers for action by the signal technicians and this included the breaking and replacing of the paper seals on the emergency point releases.

54. Fundamentally track circuit block applied, and there was no track circuit failure. Had the points been able to be correctly set, their lie correctly indicated, and the points locked by use of the point switch, there was no reason from a safety point of view for introducing pilot working. Had they not been able to be set by switch there was no option but to have them clipped and padlocked for the safe passage of trains as laid down in List C. The fact that the correct action was not taken, and that Signalman Foulkes did not know that Lists A to C for the East Lancashire area had been issued as a separate document, show that the lists, which are part of the Signalman's Manual for the signal box were not in regular day-to-day use by the signalmen.

55. Drivers Fieldhouse and Fletcher were correct in not insisting on the introduction of pilot working when instructed to pass signal PN 463 at Danger because the Northern Sectional Appendix specifically stated that only the starting signals at Bolton and Bolton Branch Junction were to be Section Signals under the Tokenless Block Regulations. Moreover they both knew that the line was fully track circuited and that all the signals were controlled from Preston Signal Box, and it was reasonable for them to accept the signalman's assurance that it was safe to proceed. Had the line in fact been controlled by Tokenless Block instruments it would have been quite wrong for them to pass the signal at Danger without the pilotman. Both men had been instructed by the signalman to pass signal PN 463 at Danger and to obey all other signals. The

signalman clearly meant Stop signals under the terms of Rule E 4.9.3. and in spite of the signalman's failure to tell them to proceed cautiously I consider speeds of up to 40 mile/h far too fast for the drivers to see that the line ahead was clear under Rule E 8.1. Signal PNR 461 is replaced to Caution by occupation of the track circuit ahead of it but, because it is a Distant signal, it does not protect the catch points and both drivers should have known this. Indeed, the points were set wrong for Driver Fletcher's train.

REMARKS AND RECOMMENDATIONS

56. When working correctly, modern route relay interlocking makes it almost impossible for a signalman to set up a dangerous situation. Under failure conditions, however, because the full protection afforded by the interlocking can no longer be relied upon, signalmen are required meticulously to follow the emergency instructions, and to check very carefully all the necessary indications. This was clearly not being done in Preston Signal Box for which Signalman Foulkes must bear the major blame, but Area Supervisor Hammill and Mr A. F. Cotgreave the Area Manager, Preston, must also bear some responsibility.

57. In the light of a number of recent accidents the whole question of the provision of catch points is under discussion. Few catch points are signalled to be traversed in both directions, but those that are, are complicated, expensive and have led to a number of accidents. Those on the Darwen line have been less than satisfactorily reliable since their introduction. Because very few unfitted trains now use this line I recommend that the worked catch points should be removed, and this has been agreed. Unfitted trains can be signalled clear of an unprotected incline before a passenger train is allowed to proceed up it and I suggest that they should be handled thus on the Darwen line.

58. A signalman operating a power signal box must rely entirely on panel indicating lights for his knowledge. With reminder appliances placed over point operating switches at the top of the panel, the signalman cannot easily see the point indicating lights, and I recommend that those at the top of panels should be placed below their switches and not above them as at present. Points should be numbered consecutively along a line so that their switches, which should remain positioned in numerical order, shall more logically apply to the points they operate.

59. The British Railways Board are drafting new instructions for the operation of fully track-circuited bi-directional lines operated from one signal box and until they are ready the emergency regulations appropriate to Tokenless Block Regulations are being applied in the London Midland Region. The arrangement is not satisfactory and tends to be confusing to the signalmen and I trust that the new instructions will not be too long delayed.

60. The Preston Signalman's Manual and its lists are difficult to use quickly and the signalman did not use it in this emergency. I recommend therefore that the lists be logically laid out in a special cabinet for quick reference. One well laid out cabinet would be of more use than the sheets of lists at present in use.

I have the honour to be,

Sir,

Your obedient Servant,

A. G. TOWNSEND-ROSE,
Lieutenant Colonel

The Permanent Secretary,
Department of the Environment.

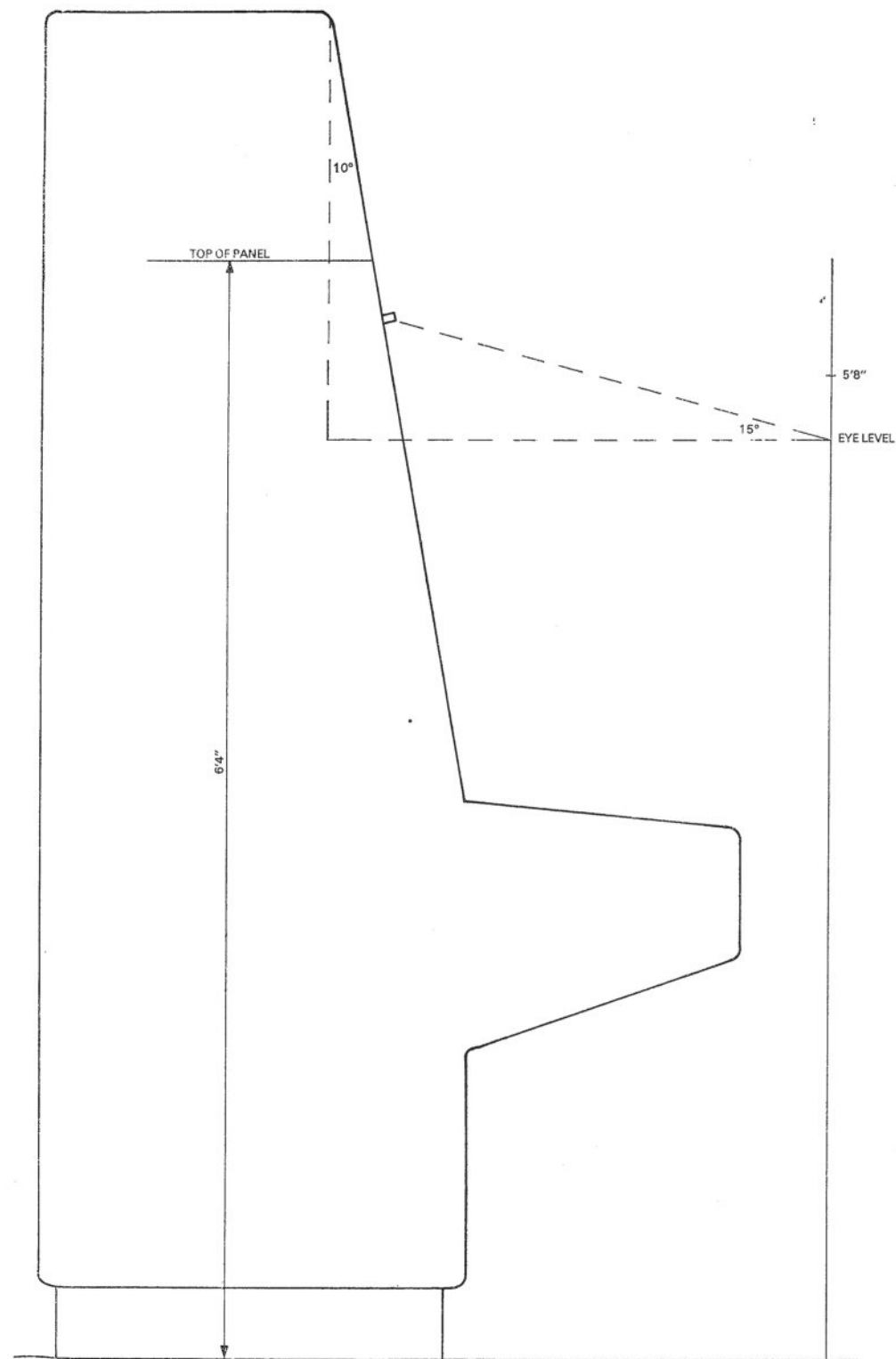
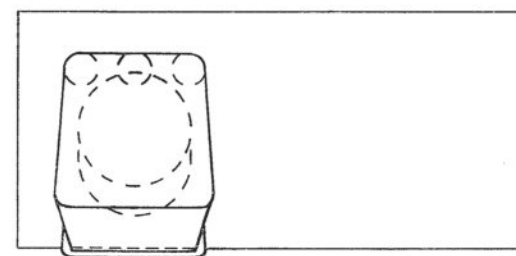
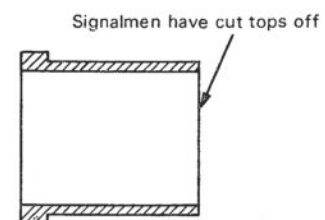
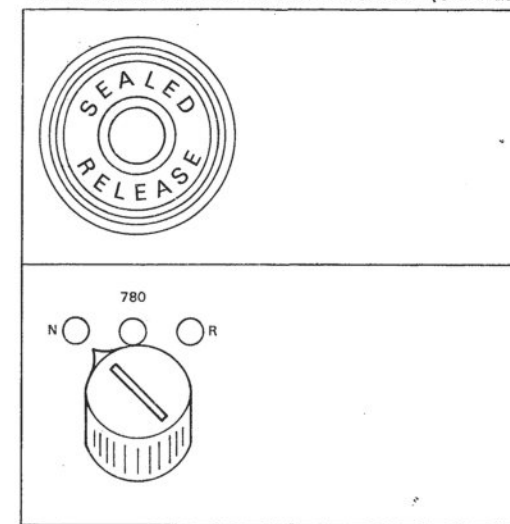


Fig 3

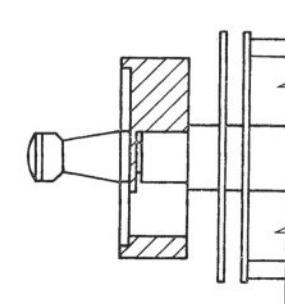
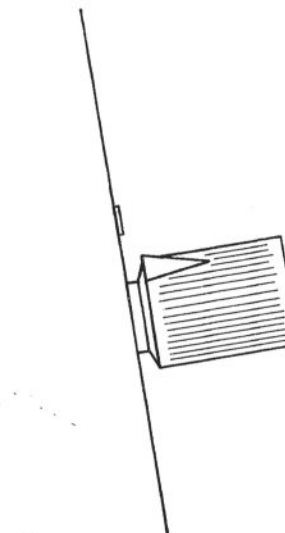


POINTS SWITCH VIEWED FROM 25° BELOW
WITH REMINDER APPLIANCE

RELEASE KEY MODULE WITH COLLAR (SEALED)



POINTS SWITCH VIEWED HORIZONTALLY



PART SECTION COLLAR
FITTED TO PANEL

Fig 4

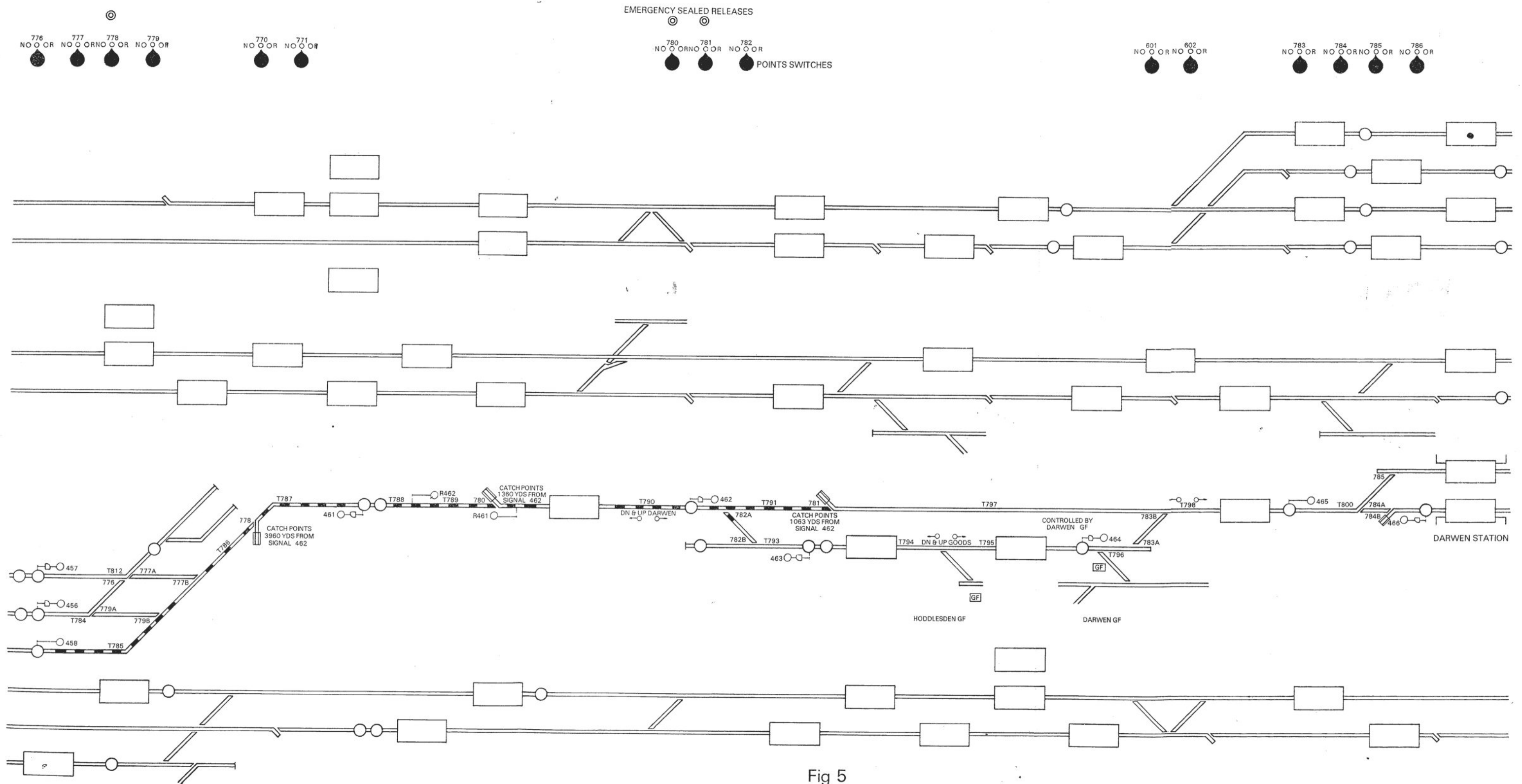


Fig 5