DEPARTMENT OF TRANSPORT

RAILWAY ACCIDENT

Report on the Collision that occurred on 26th September 1985 near Paisley

IN THE
SCOTTISH REGION
OF BRITISH RAILWAYS

HER MAJESTY'S STATIONERY OFFICE

£2.75 net

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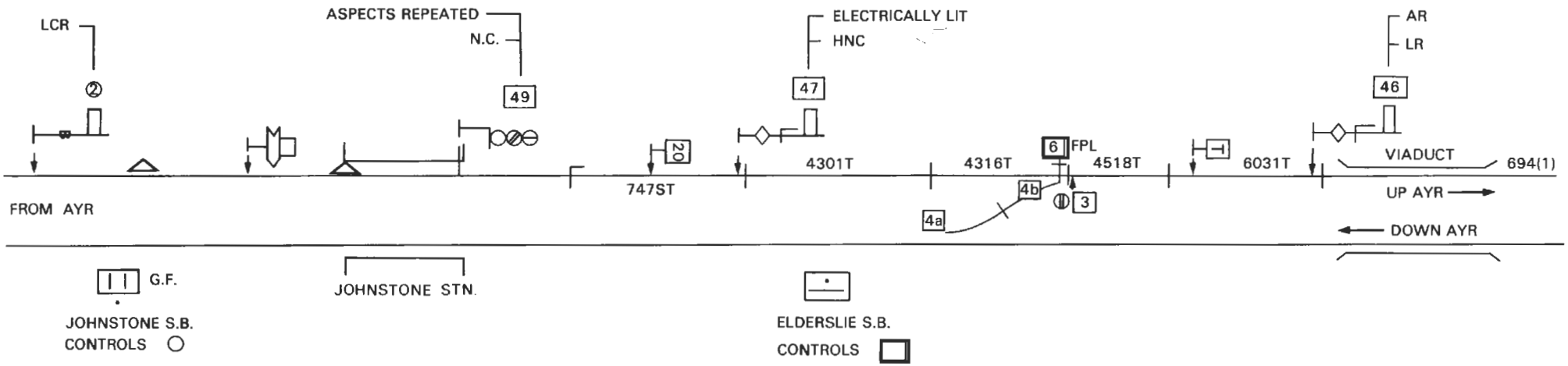
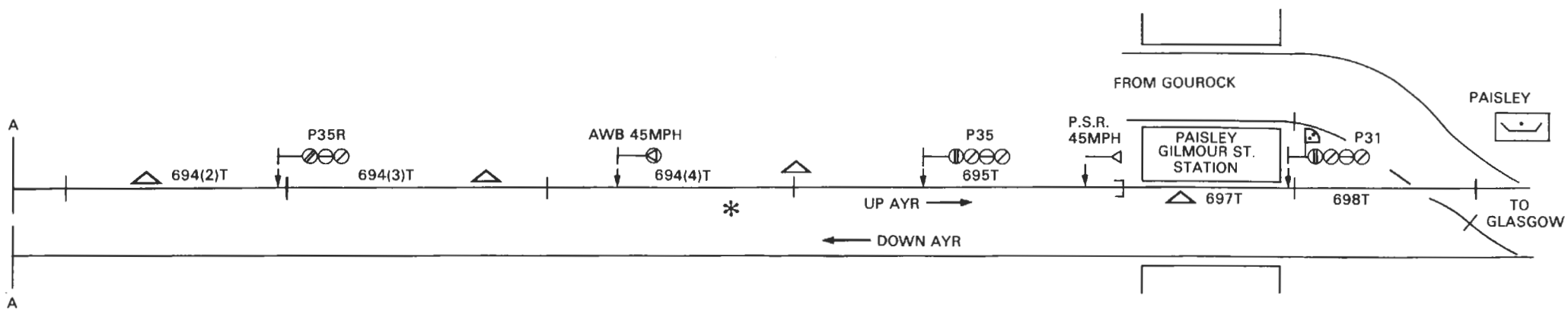
LONDON: HER MAJESTY'S STATIONERY OFFICE

COLLISION BETWEEN 2A14, 1230 GIRVAN TO GLASGOW
& 7D13, 1421 HUNTERSTON TO RAVENSCRAIG
THURSDAY 26TH. SEPTEMBER 1985





* POINT OF COLLISION

RAILWAY INSPECTORATE
DEPARTMENT OF TRANSPORT
2 MARSHAM STREET
LONDON SW1P 3EB
16th February 1988.

SIR,

I have the honour to report for the information of the Secretary of State for Transport in accordance with the Direction dated 2nd October 1985, the result of my Inquiry into the collision between a passenger train and a freight train that occurred at about 14.12 on 26th September 1985 near Paisley in the Scottish Region of British Railways.

2. Although he complied with a 20 mile/h temporary speed restriction at Elderslie, the driver of the 12.30 Girvan to Glasgow Central passenger train (a 3-car DMU) then drove his train past the Elderslie semaphore starting signal which was at Danger. An iron-ore train was standing at the next Stop signal, a colour-light, held at Danger by a track-circuit failure ahead. The driver of the passenger train saw the rear wagon of the iron ore train at a distance of about 200m and, with his train travelling at 45/50 mile/h, made an emergency brake application, and attempted to vacate the cab. The passenger train collided with the iron-ore train at about 20 mile/h.

3. In the collision 39 passengers and the driver and guard of the passenger train received injuries and were treated in hospital, but only 6 persons were detained. The emergency services were quickly on the scene, having been summoned by the signalman at Paisley who was told of the collision by the driver of the iron-ore train.

4. At the time of the collision it was a clear, bright, and sunny afternoon. There was no derailment as a result of the collision, although one pair of wheels was lifted from the rails, but the front of the leading car of the DMU, including the driving cab in which the driver was trapped, was demolished and pushed back about 0.6m along the underframe. Some of the passenger seats in the leading car became detached from their mountings and others were damaged in the impact.

DESCRIPTION

Description of the Line

5. The line between Ayr and Paisley is mainly double tracked with passenger and freight loops. At the time of the accident trains were signalled under the Absolute Block Regulations and controlled by the operation of semaphore signals although Elderslie Signal Box was a fringe box to the area controlled from Paisley Signal Box under Track Circuit Block Regulations. The line was in the process of being rationalised and re-signalled with full multiple-aspect signalling and fully track-circuited and electrified as part of the Ayrshire Coast electrification scheme. The signalling described in this report is that existing at the time of the accident.

6. The line from Ayr to Glasgow had a maximum permissible speed of 75 mile/h. In connection with track remodelling works associated with the Ayrshire Electrification Scheme, a temporary speed restriction (TSR) of 20 mile/h had been in force since Sunday 22nd September 1985 between approximately the Up Home and Up Section Signals at Elderslie. The line falls gently towards Glasgow and at the scene of the accident is on a gradient of 1 in 1560. Leading up to the accident site there are reverse curves with a left-hand curve of 78 chains radius followed by a right-hand curve of 78 chains radius towards the end of which was the point of collision.

Signalling

7. Signalling controlled from 3 signal boxes was concerned in the accident. Approaching from Ayr the first was Johnstone, a block post from which trains were signalled to Elderslie under the Absolute Block Regulations. From Elderslie, trains were signalled to the next signal-box, Paisley, under the Track Circuit Block Regulations with a telephone link for descriptions. Johnstone signal-box was burned down some time before the accident and the signals were controlled from a 2-lever ground-frame outside a portable cabin providing accommodation for the signalman and housing the block instruments. In the Up direction (towards Glasgow) there was one semaphone Stop Signal (No.2). Before the Johnstone signalman could reverse the lever and clear this signal, the signalman at Elderslie had to turn the commutator on his block instrument to

'Line Clear' setting both block instruments to 'Line Clear'. (A miniature stop semaphore signal on the instruments in the proceed position was used for this indication). This provided a 'One pull Line Clear Release' (LCR) to Johnstone.

8. The next Up signal, a 3-aspect colour light, had been the Johnstone starting signal but the red aspect was blanked out and the lever disconnected when the signal box burned down. The yellow and green aspects, which were formerly the Elderslie Up Distant controlled by Elderslie lever No.49, had been set to show a fixed yellow. This signal had an associated AWS magnet.

9. The next signal, Elderslie Up Home (No.47), was a semaphore stop signal. The berth track circuit to this signal (7475T), when occupied, put the block instruments at Johnstone & Elderslie to the 'Train on Line' position if they had not already been placed in that position by the Elderslie signalman. This is with the miniature semaphone signals of the instruments in the horizontal or Stop position which also indicates 'Line Blocked'.

10. Before the signalman at Elderslie could turn his commutator to 'Line Clear' to give a release to the signalman at Johnstone, lever No.47 had to be 'normal', the signal arm horizontal, and Signal No.49 alight and showing a yellow aspect. (Home Normal Control (HNC) and Normal Contact (NC) respectively).

11. A further control on Signal No.47 was that the lever could not be reversed until track circuits 4301T, 4316T, 4518T and 6031 were clear, ie the track was clear to the Elderslie Up Semaphore Section Signal No.46. This was the last Up signal controlled by Elderslie, the next signal P35 and its repeater P35R are controlled by Paisley and have AWS magnets.

12. Elderslie Signal Box was on the Down side almost opposite Signal No.47. There was electric and mechanical sequential locking between levers Nos. 46 and 47 so that 47 could not be reversed if 46 was already reversed. In addition, the arm of Signal No. 46 had to be proved horizontal before lever No. 47 could be reversed.

13. Track Circuits 694(1), (2), (3), (4), and 695T had to be clear, ie to the overlap of Signal P35, and Signals P35 and P35R alight before lever No. 46 could be reversed. AWS magnets were provided at the Warning Board for the 20 mile/h. TSR and the Advanced Warning Indicator for the 45 mile/h Permanent Speed Restriction at Paisley. A diagram of the signalling is at the front of the report.

The Course of the Accident

14. The passenger train (2A14) had departed on time from Ayr but had later been subjected to signal checks as a result of the slower iron-ore train running ahead. On approaching Elderslie the train was approximately 7 minutes late and after negotiating the TSR it passed Elderslie Up Section Signal (No.46) at Danger. The train then accelerated away from the restriction and subsequently collided with the rear of the stationary iron-ore train despite a brake application having been made at some stage after the iron-ore train came into view. The Up Line was returned to traffic at 23.10 and the Down Line at 00.14 the following day. There was no damage to either track or signalling equipment. During the period the lines were blocked there was considerable disruption to train services. Ayr to Glasgow services were turned back at Johnstone and there was a bus service between Johnstone and Paisley where passengers connected into electric services to Glasgow and vice versa. Some services were diverted.

The Trains Concerned and the Damage Caused

15. The 14.21 Hunterston High Level to Ravenscraig No.4 freight train (7D13), running early, was composed of 21 PTA high capacity iron-ore tippler wagons loaded with iron-ore hauled by 2 Class 37 diesel locomotives working in multiple. The total train weight was 2293 tonnes and its length 987ft. The two pipe automatic air brake was in operation throughout.

16. The 12.30 Girvan to Glasgow Central (2A14) was composed of a Derby built 3-car Class 107 diesel multiple-unit and consisted of a Driving Motor Second leading with 65 seats, a Trailer Second with 71 seats, and a Driving Motor Brake Second with 52 seats trailing. The total weight of the train was 92 tonnes and the two-pipe vacuum brake system was in operation. The maximum permissible speed of the train was 75 mile/h and both driving cabs were fitted with BR AWS.

17. The cab of the leading vehicle was extensively damaged as was the ex-first class compartment immediately behind. The main frames were damaged at both the front and rear. The leading bogie centre pin was bent and the frame damaged, with the brake cylinder and rigging also damaged. One gearbox was destroyed and the transmission was damaged. The rear bulkhead of the coach and the gangway were damaged. Many of the seat frames were badly damaged and torn from their mountings. In the second coach, whilst there was

damage to the equipment at both ends of the vehicle such as buffers and gangways, it was notable that two seat frames were torn from the floor and ten were buckled. On the third vehicle there was minor damage to the interior of the vehicle but again five seat frames were damaged, some being torn from the floor. The rear wagon of the iron-ore train was very slightly damaged.

Evidence

18. The driver of the iron-ore train was *R. McDermott* of Motherwell who booked on at 10.13. He was fully conversant with the route and had been on the same duty all week. The Johnstone signal was at Stop as he approached but was cleared as he stopped and blew his whistle. He set off again and although the Elderslie Up Distant was at caution, both the Home and Section Signals were at proceed when he saw them. He obeyed the 20 mile/h TSR which commenced opposite Elderslie Signal Box and as a result his speed did not exceed about 25 mile/h from Johnstone to Signal P35 which was at Danger.

19. He spoke to the signalman on the signal-post telephone and was told to wait. He regained his cab and was looking at his payslip when there was a buffing-up from behind and, looking back, he saw a cloud of dust and a passenger train. He told the signalman and put down track-circuit operating clips and detonators to protect the other line.

20. Driver McDermott assured me that the AWS at all the signals and speed restrictions was working correctly and that, although it was a sunny day, he had no difficulty from the sun or any other cause in seeing the signals clearly. He was sure that he got a good view of the Elderslie Section Signal from a position opposite the signal box and that nothing then interfered with the sighting of that signal. He confirmed that he found driving no more difficult than before the alterations commenced and that all had been described in weekly notices. He was also certain that the angularity of the Elderslie Section Signal was what is called 'a good off'.

21. Looking out of the rear coach of the DMU was *Driver W. B. Bryson* travelling to Glasgow Central to start work at 15.00. He did not drive trains over the line but had done so some 7 years before. He travelled regularly over the route on his way to and from work. He joined the train at Johnstone and was travelling with a Supervisor with whom he talked occasionally. He claimed that the train slowed for the 20 mile/h TSR and then appeared to slow again as if being stopped at the Elderslie Home (No.47) Signal. The train did not actually stop at the Home Signal and as they went past it, Bryson saw the signal arm drop back to the horizontal position. He did not see the position of the Elderslie Section Signal (No.46) since he was talking again.

22. He thought the train then accelerated to about 40 mile/h, coasted, and there was then what he claimed was a slight brake application before the collision. He said that this was not a full or emergency application. He did not have experience driving DMUs but had gained experience of the vacuum brake on freight trains. Because of the second brake application after the start of the TSR he felt that the Home Signal was at Stop and that meant that the Section Signal would also be at Stop. Driver Bryson was of the opinion that 5 seconds elapsed between the final brake application and the collision and that the speed at that collision was 25–30 mile/h.

23. Travelling as a passenger in the front right-hand seat of the DMU in the direction of travel was *Rolling Stock Maintenance Controller P. MacCrorie*. He joined the train at Newton-on-Ayr and said that they had a poor journey being slowed and stopped at several signals. After the stop at Johnstone he ceased reading and was looking forward out of the windscreen. He knew where the 20 mile/h TSR commenced but was not aware of the position of the Home Signal. As the train accelerated away from the speed restriction he saw a semaphore signal about 25m ahead which appeared quite high up in the windscreen although he did not have to bend down to see it. The signal arm was horizontal and remained so until it passed out of his view.

24. He explained that he was not familiar with signalling but was uneasy at passing the signal at Danger. However, he thought the driver might have had instructions at a station or received a notice because of the confident way he accelerated past the signal.

25. He was not aware of any other signals but was looking well ahead when an iron-ore train came into view among the trees. When he first saw it, it was between 300–400m away and the rear was not very distinctive. It was not until 2 or 3 wagons came into view that he realised that they were on the same line as the DMU.

26. He thought the train was some 200m at that stage when the driver of the DMU made a full brake application. MacCrorie was still sitting down and felt sure the DMU would stop but then realised that there

would be a collision and got up and was at the rear door of the compartment when the DMU ran into the iron-ore train.

27. Although he was injured in the accident he was taken back to the scene about a week later. There he clearly identified the signal which had been at Danger as No.46, the Elderslie Section Signal, a semaphore signal mounted on a post 7 metres high to the left of the line with a large electricity pylon behind it. He said that he had known Driver MacKenzie at work for 8–10 years and considered him an above average driver who handled the units in a sympathetic manner.

28. *Signalman J. P. Regan* was on duty in Johnstone Signal Box at the time of the accident. He described to me how he operated the block instruments and signals as the iron-ore train was signalled from Howwood to Johnstone and on to Elderslie. He was quite sure that when he gave the bell signal for 'Train Entering Section' to Elderslie, the Elderslie signalman acknowledged and moved the block instrument to 'Train on Line'.

29. After putting his signal to Danger he sent the 'Train Out of Section' signal to Howwood for the iron-ore train and was immediately offered 2A14 which he accepted. Just before it arrived at his box he was sent the 'Train out of Section' bell signal from Elderslie for the iron-ore train. He at once offered 2A14 to Elderslie, it was accepted and he went outside to clear the signal as the train came round the corner to the platform. He went back into the signal box and gave 'Train Entering Section' to Elderslie which was acknowledged on the block instruments and by bell. He gave 'Train Out of Section' to Howwood and went outside to put the signal to Danger. He always checked that the tail lamps of trains were present.

30. While he was waiting for the 'Train Out of Section' for 2A14 from Elderslie, the signalman there telephoned him. He said "that train has just passed my Starting Signal at Danger" then he put the telephone down. He sounded upset and panicky as though he just had to tell somebody what had happened. A few minutes later there was another call from Elderslie in which the signalman said he feared there may have been a bump but that he wasn't too sure what had happened and some minutes after that a third call when the signalman at Elderslie said that he feared the worst, that he thought the passenger train had gone into the back of the iron-ore train and that both his lines were showing occupied. There was nothing that Regan could do since his signals were at Danger and the collision had been in the next section. There were no more telephone calls.

31. At the time of the accident *District Relief Signalman A. Brodie* was on duty in Elderslie Signal Box. He described how 7D13 was offered to him and was signalled on to Paisley. Before he was offered the iron-ore train both his Home and Section Signals were at Danger. Because the track circuits on the line to Paisley were clear, he telephoned Paisley Signal Box and advised them that 7D13 was approaching. As soon as he turned the commutator on the Johnstone Block instrument to 'Line Clear' he therefore cleared both his signals.

32. When Johnstone gave him the 'Train Entering Section' signal he operated the block instrument to 'Train On Line' and, as the iron-ore train passed, he replaced signals to Danger behind it. After checking the tail lamp on the rear of the iron-ore train he gave the 'Train Out of Section' bell signal to Johnstone and restored the block instrument to normal.

33. He was using lever collars on both his Starting Signals to remind him that a train had gone by. In the Up direction this was because the train describer had been removed some weeks beforehand and in the Down direction the appliance was required by regulation because there were no 'Train On Line' discs on the two-position block instruments. He could see Signals Nos 46 and 47 from the box and there was also an arm repeater for No.46. It was his custom to look at the signals and the repeater after operating the levers 'Reverse' or 'Normal'. After Signal No.46 had been returned to Danger behind the iron-ore train, he replaced the reminder appliance on the lever and watched the illuminated diagram for the track-circuit indication to clear.

34. He was then offered 2A14 by Johnstone, operated the block instrument to 'Line Clear', and was almost immediately given the 'Train Entering Section' bell signal. He was quite certain that he had not touched any signal levers until the passenger train was very close to Signal No.47 and claimed that it was almost at a stand before he reversed the lever, although the horn was not sounded. He said that the train was travelling at about 20 mile/h at the time.

35. A shopman from the permanent-way department then came up the signal-box stairs as the train was approaching and passing Signal No. 47. Brodie replaced it to Danger immediately the train passed it and made an entry in the train register book as the man entered the box. The shopman wanted to use the telephone and because they were talking Brodie did not see the driver of the train. However he saw the train going along to his right without slackening or increasing speed and pass Signal No.46 at Danger.

36. Brodie said to the shopman "I hope he stops" pointing to the train. The shopman replied "No he's just carrying on, look". Immediately after the train passed Signal No.46 he telephoned Paisley Signal Box in

accordance with the Regulations and made a call to the Control Office and to the signalman at Johnstone to let them know what had happened.

37. When a track circuit on the other line showed occupied he again telephoned Paisley and said that he thought there had been an accident and that they should call the emergency services. He thought he might have made another call to Johnstone to tell him that there would be a collision. Eventually the shopman was able to use the telephone and left the signal box. Brodie assured me that from the time he cleared Signal No. 47 for the passenger train to the time the train passed Signal No. 46 he did not touch or go anywhere near lever 46.

38. At the time the passenger train was passing there were no men that he could see working on the track or signalling. There was no one working beneath the signal box. The signalling equipment was operating correctly.

39. *Shopman P. McVey* had just finished repairing an on-track machine in Elderslie sidings at about 14.00 when his radio pager called him to telephone his depot. He cleared up and went along to the signal box. As he climbed the steps he heard no bell signals or sounds of levers being operated. On entering the signal box the signalman was standing back well clear of the levers. He asked McVey to look at the train in the distance going towards Paisley and say if it was moving. McVey noticed a signal, just as the train was going past it, in the horizontal position, the 'down' and not to go position. About one coach of the train was past the signal when his attention was drawn to it.

40. He stayed in the signal box for another 3-4 minutes, made his phone call, and left after having put his name and clock number in the train register book. The only thing the signalman did while he was in the box was to use the telephone about 5 times. McVey was quite sure that the signal arm was horizontal as the train went past it and that no levers were operated from the time he climbed the stairs until he left the box.

41. *Signalman R. Brougham* was on duty in Paisley Signal Box at the time of the accident. Just as the Elderslie signalman told him of the approach of 7D13 on the telephone, he noticed that a track circuit was showing occupied in the route over which he wished to signal the train. He called for assistance and when the driver of the iron-ore train telephoned from Signal P35 he told him that there would be a delay. Shortly after, another signalman in Paisley took a call to say that the train from Ayr had passed Elderslie Section Signal at Danger.

42. He carried out the full emergency procedure in both directions and then the driver of 7D13 told him on the telephone that something had collided with the rear of his train. He therefore called for the emergency services to attend. He confirmed that the Elderslie signalman had correctly described the approach of 7D13 but that he had not attempted to advise him of the approach of 2A14.

43. I was unable to interview *Driver D. H. MacKenzie*, the driver of 2A14, until 28th January 1986, some 4 months after the accident, when he felt sufficiently recovered from his injuries to speak to me.

44. He explained that the day of his accident was the fourth day of his duty on that roster in which he booked on duty at Corkerhill at 05.55, drove a return trip to Ayr, took a personal needs break at Glasgow Central at about 09.30 and then drove a return trip to Girvan going off duty at 14.55 after 9 hours of duty. During his break he would have consumed coffee and sandwiches in the restroom. There would have been a period of about 40 minutes between arrival at Girvan and departure on the return journey and he spent this at the station. He was not receiving any medical treatment at the time of the accident and had not consumed any alcohol the previous night or during his duty.

45. He told me that the DMU which he took over at Glasgow Central, after his personal needs break at about 10.00, was in good working order and that he had no complaints with the way in which it handled. He drove with the blind over the window behind his seat and that over the window in the sliding door separating his cab from the leading passenger compartment, in the lowered position. He said that he did not think he was due to do anything special on the Thursday evening and that the Friday was to have been his rest day when he would probably have accompanied his wife shopping. After finishing duty on the Wednesday he had gone to bed for an hour or two, taken an evening meal, and then retired at about 21.00, rising at about 03.40 and then walking to Corkerhill.

46. He could not recall anything particularly notable about any of the journeys that week. Because of the work for the Ayrshire Coast Electrification there were a number of permanent way speed restrictions and he had experienced adverse signals. He could recall the journey from Ayr at 13.15 and believed that the stop at Johnstone might have been overlong; sometimes the guard or ticket collector would alight to obtain change

there. Approaching Johnstone he was sure that the semaphore Home/Section Signal was in the off position and the colour-light signal at the end of Johnstone platform was showing a single yellow aspect.

47. Despite what was said by Signalman Brodie at Elderslie, Driver MacKenzie was sure that Signal No.47 was in the 'Off' position when he first saw it from about the position of the old Elderslie No. 2 Signal Box, which was before passing the commencement board for the TSR. This 20 mile/h TSR had been in force for some time and he remembered looking ahead for the termination board to see if it had been moved. At this point the Section Signal came into his view. This was before he would have passed the existing signal box. He was sure that he looked ahead at the signal and that it was 'Off' when his train passed the signal box. The cab of his DMU was almost at the Section Signal when he started to accelerate away from the TSR and he was sure he would have been looking at the signal occasionally since it first came into view until he went past it.

48. He thought that on seeing the repeater for Paisley Signal 35 his train would have been travelling at about 40 mile/h and that when he saw the yellow aspect he would have allowed the train to coast rather than changing into 4th gear. He had passed over the magnet for the Advance Warning Board for the 45 mile/h speed restriction at the junction ahead when he saw the iron-ore train some 200m ahead. I put it to him that tests had showed that the iron-ore train would have been visible from a distance of at least 400m but he said that the background of brown leaves and autumn colours made it difficult to distinguish the brown wagons against the background. He applied the brake at once but continued to hold down the DSD. At a late stage he realised that there would be a collision. He thought he rose, slid back the door to the passenger compartment, and stepped into it then the collision occured.

49. I described the signalling and the safeguards to him in detail and explained how the mechanical interlocking and electric locking with the track circuits and block instruments prevented a signalman from making an error. I also summarised to him all the evidence that I had heard at the public inquiry and discussed in detail with him the evidence given by Driver Bryson and Maintenance Controller MacCrorie. I also went through in detail with him the conversation between Shopman McVey and Signalman Brodie at Elderslie Signal Box.

50. Despite agreeing that the signalling equipment had been shown to be in good order by the tests that had been carried out and understanding that the locking would have stopped the signalman making an error, he was still sure that he had seen the signal in the 'Off' position. He was sure that he had not been distracted and had not lost concentration. I suggested that he might have been concentrating on the end of his duty but he said that this would not have been the case. He agreed that the provision of AWS was a great assistance in the driver's observance of signals. He advanced the theory that vibration from the iron-ore trains might have affected the signalling in some way but I pointed out to him that any fault would have had to have disappeared by the time the tests were carried out and that, in addition an electrical fault would have required two defects and a mistake by the signalman at the same time. He remained convinced that the signal had been in the 'Off' position.

Tests

Tests of Train Operation

51. Examination of the Train Register Books on the route from Kilwinning shows that there were many signal checks on the journey of 2A14. Tests on the ground suggest that after passing Signal P35R the four rear wagons of 7D13 would have come into view at a distance of about 500 metres, the rest of the wagons being obscured by lineside vegetation.

52. In a further test a marker was placed at the point of collision and a train was driven towards it at a speed of about 45/50 mile/h. The driver reacted to the sight of the marker by making an immediate emergency brake application and the train stopped some 200 metres short of the point of collision. The wagons used for the iron-ore traffic are of a dull appearance which is made worse by the spillage of their contents during terminal operations. It is clear, despite the presence of the tail lamp which was found to be in place on the iron-ore train, that the rear wagons of the train did tend to merge against the background of trees and autumn vegetation.

Signalling Tests

53. *Mr L R Waugh* is the *Maintenance Assistant* to the Motherwell Area Signal and Telecommunications Engineer, he had been at Motherwell for 12 years and had been responsible for signal maintenance in the section in which the accident occurred for about a year. He described the signalling and the safeguards to me and then described the tests he had carried out after the accident. He tested to see whether the arm of Signal No. 46 could be mechanically obstructed from going back to Danger, if the signal could be cleared irregularly, and to prove that it could not be left in the 'Off' position between trains. The tests demonstrated that with the

iron-ore train standing at Signal P35 it was impossible to clear Signal No. 46 and that 46 had not stuck 'Off' or been left in the 'Off' position irregularly.

54. He had checked both the mechanical and electrical sequential locking between Signal No. 46 arm and lever and No. 47 lever. The 'Line Clear' releases from Elderslie to Johnstone and Johnstone to Howwood were in order. Insulation tests were carried out on the connections between Signals P35, P35R, Track Circuits 694 and 695 and Elderslie Signal Box. All the track circuits between Signal No. 46 and the overlap of Signal P35 were found to be within specification. The block instrument circuits were shown to be in order including the HNC and NC controls.

55. When he first went to Elderslie Signal Box after the accident he noticed a collar on lever No. 46 but he did not ask the signalman why it was there. He had had no reports of serious faults on the signalling in the area over the past 3 months, only of minor defects which would not have had any influence on the signalling of the two trains concerned. He explained what had been done to the Elderslie Up Distant Signal No. 49 and that it was now a fixed Yellow, he agreed that this fact should have been put in weekly notices so that drivers would know. He had checked the arm proving of Signal No. 46 and the repeater in the signal box, the gauge showed that the contact broke before the arm was 5° from horizontal.

56. He had interviewed all his men out on the line at the time and was satisfied that they had not interfered with the existing signalling. The new signalling was completely separate from the old. He agreed that the wire from the signal box could have been pulled at some point along its route to clear signal No. 46 irregularly but he had found the wire run to be unobstructed and pointed out that the signal and wire run were in full view of anyone looking at the railway.

Rolling Stock Examination

57. *Mr D Rose* the *Maintenance Engineer Scottish Region* told me that the DMU had a classified repair in November 1984 and had undergone A and B examinations at Ayr the day before the accident. There were no repairs outstanding after the examination, and he could find no record of repeated defects in brakes or AWS or in the train's other safety equipment.

58. Brake tests carried out the day after the accident on the trailer car and rear power car showed that the brakes were within specification. The leading vehicle was so badly damaged that no proper tests could be conducted on the brake cylinders. Brake valves and other components were however sent to main workshops, tested, and found to be within specification.

59. He had noted that some seats in the leading carriage had become detached from their fastenings. This was because the specification in 1961, when the vehicles were built, was lower than that currently in force. He had discussed matters with the designers, to see if something could be done to improve the fastenings during the remainder of the vehicle life (to 1987).

Discussion

60. The evidence of the two men in the signal box and that of the BR employee travelling at the front of the train leaves no doubt that the Elderslie Up Section Signal was clearly visible and was in the horizontal (Danger) position as the train approached and passed it. This is supported by the evidence of the tests of the signalling equipment that were carried out immediately afterwards, by the block controls, and the electrical and mechanical interlocking.

Conclusion

61. Although Driver MacKenzie maintains that he is certain that the Elderslie Up Section Signal was in the 'Off' position, there is no doubt that it was at Danger as he approached. I cannot be certain that Signalman Brodie brought the train almost a stand before clearing Signal No. 47, but he says that he did so and there is some corroboration from Driver Bryson. The train was driven past the Elderslie Up Section Signal at Danger and this is the cause of the collision.

Remarks

62. If Driver MacKenzie had seen the rear of the iron-ore train at the same time as Mr MacCrorie I think that he might have realised that it must be on his line. The fact that he did not commence a brake application until it was too late to prevent a collision indicates that his attention to the line at that point was not what it should have been. I believe that he may have concentrated too hard on observing the TSR and failed to observe

the position of the Section Signal. There has been some evidence in previous studies of signals passed at Danger that after a meal break and towards the end of a shift a driver's attention may relax.

63. There are some indications of an increase in the number of reports of signals passed at Danger. The number has been increasing in real terms since 1982 and the rate per million train miles has shown a rising trend since 1976. The Board are well aware of this trend and are monitoring special studies to establish the facts and to seek remedies. A number of measures are already being considered including a review of the Rules and Regulations examinations, an increase in the number of Traction Inspectors, a reduction in the number of footplate permits, to reduce possible distraction, and a review of driving and braking techniques. I make no specific recommendation but support the BRB in their present investigations into the reasons signals are irregularly passed at Danger.

64. To improve the conspicuity of the rear wagon of the iron-ore trains, they now carry battery electric flashing tail lamps, I believe this is a sensible precaution, especially where permissive working on freight lines may be involved, and, is being introduced throughout BR.

65. I was slightly concerned to hear that the conversion of Elderslie Signal No. 49 to a fixed distant had not been announced to drivers in a weekly notice. It has no bearing on the accident but it is most important that all signalling alterations be speedily notified whether major alterations are being made or not.

I have the honour to be,

Sir,

Your obedient Servant,

A. G. B. KING
Major

The Permanent Under Secretary of State
Department of Transport

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