MINISTRY OF TRANSPORT

RAILWAY ACCIDENT

REPORT ON THE COLLISION

that occurred on

5th February 1962

at

POLMONT EAST

in the

SCOTTISH REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE
1962

THREE SHILLINGS NET

MINISTRY OF TRANSPORT,
ST. CHRISTOPHER HOUSE,
SOUTHWARK STREET,
LONDON, S.E.1.

29th August 1962.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order dated 6th February 1962, the result of my Inquiry into the collision that occurred, at about 7.20 a.m. on 5th February 1962, between an express passenger train and a freight train ahead of it on the Down Main line just east of Polmont East signalbox, on the former London and North Eastern Railway route between Edinburgh and Glasgow in the Scottish Region, British Railways.

As a clear cold dawn was breaking after rain, the steam-hauled 6.50 a.m. Class A Edinburgh to Callander five-coach passenger train, which had been irregularly admitted into the Bo'ness Junction—Polmont East block section before the previous train had left it and which was running under clear signals, collided at a speed of 35-40 m.p.h. with the rear of the steam-hauled 5.25 a.m. Niddrie to Glasgow Class C goods train, which was drawing ahead at 15-20 m.p.h. after having been stopped at the Polmont East Outer Home signal.

The collision occurred shortly after the night shift signalmen in the Bo'ness Junction and Polmont East signalboxes had been relieved by the early shift men, and the signalling of the trains involved was carried out partly by the night shift and partly by the day shift men.

During the night the berth track circuit at Polmont East had been failing intermittently, locking the block instruments, and first the night shift and then the day shift signalman had been working the trains irregularly, when it suited him to do so, by manipulating the track proving relay in such a way as to unlock the block instruments and eliminate the block controls. The passenger train was irregularly accepted in this way by the day shift signalman while the goods train ahead of it was still standing at the Polmont East Outer Home signal: he had forgotten all about the goods train because its occupation of his berth track circuit was not shown on his diagram, his manipulation of the relay having made that track circuit inoperative, and because the night shift signalman had failed to record its acceptance in the train register and he himself had missed the "Train Entering Section" signal. Only the acceptance and "Train Entering Section" signals for the goods train had been recorded by the night shift signalman in the Bo'ness Junction register but, in anticipation of the passenger train's being offered, the Polmont East signalman had manipulated the relay in good time and had moved the block instrument's needle to "Line Blocked", and the Bo'ness day shift signalman, in offering the passenger train, assumed from this indication that the goods train had cleared the section, despite the facts that his predecessor had not entered the "Train out of Section" signal for it in the register and that he had not himself heard it.

The goods train enginemen had been unsuccessful in their attempts to telephone the signalbox, when stopped at the Outer Home signal, because the signal telephone was an unusual one, the bell code of which they did not know and the bell of which was in any case well nigh inaudible. The fireman was walking towards the box when the signal was pulled off, apparently for the goods train but really for the passenger train in rear. Fortunately the goods train had got smartly under way before the passenger train overtook it.

The point of impact was about 93 yards past the Outer Home signal and the brake van and three rear wagons of the goods train were derailed and destroyed. The brake van and the rear wagon remained ahead of and locked with the passenger train's engine, but the next two wagons were thrown to the left against the side of a cutting from which they rebounded into collision with the side of the leading passenger coach which they damaged. The coupling ahead of these two wagons parted and the front part of the goods train was propelled forward, against its brakes which had been automatically applied when the coupling parted, and came to rest 40 yards further on with its two rear wagons slightly damaged. The engine of the passenger train and its leading coach were derailed but the all-steel coaches were little damaged. The Down line permanent way was damaged and both lines were blocked.

Medical aid was quickly asked for and quickly on the scene but, through an error of judgment, the Polmont Station Master, having on his way to the scene of the collision entered the Polmont East signalbox to ask what had happened, let himself be delayed there unduly with the result that the general aid and advice afforded to passengers on the train was not as good as was possible. There was a supervisor trained in first aid on the train who rose to the occasion commendably.

Fortunately only three of the 30 passengers sustained minor injuries: two of them were conveyed to hospital with the two guards, who had been in the goods train's brake van but who had escaped serious injury: all four were discharged at 12.40 p.m. on the day of the accident. Other emergency arrangements were also prompt and single line working over the Up line was introduced at 5.3 p.m.: working over the Down line, initially at a maximum speed of 15 m.p.h., was restored at 6.10 p.m. and the speed restriction was withdrawn at 8.6 p.m.

Layout and Signals

1. The line on which the collision occurred is part of the main line, classified as 'most important', between Edinburgh (Waverley) and Glasgow (Queen Street), Polmont Station being 22¼ miles on the Down side of Edinburgh and 24¼ miles from Glasgow. Polmont East signalbox is 336 yards on the Edinburgh side of Polmont Station, and for Down trains the signalbox in rear is Bo'ness, two miles away: that in advance is Polmont Junction some 650 yards away. The maximum permitted speed over the main line is 75 m.p.h. but through Polmont Junction the speed limit for trains branching off to Larbert is 25 m.p.h. The passenger train in this case was routed to Callander via Larbert but was booked to stop at Polmont. Gradients approaching the site of the collision are negligible.

2. The diagram shows the general layout at Polmont East, the distance of the signals from the signalbox, the point of impact, and the position of the trains after the accident. To the driver of a Down train the view of the Polmont East Down Main Distant and the Outer Home oil-lit semaphore signals is good, but the close approach to the Outer Home signal is on a gentle left-hand curve and through a cutting for the last 150 yards, and this curve continues past the signal and under an overbridge some 10 yards beyond it. A driver's view of the tail lamp of a train ahead, as its brake van passes the Outer Home signal and under the overbridge, is thus limited to about 200 yards.

3. Automatic warning system equipment is installed on this line. The inductor for the Polmont Junction Down Main Outer Distant, controlled from Polmont, is some 201 yards short of the signal.

Signal Controls

4. The main line between Bo'ness Junction and Polmont is worked in accordance with the British Railways Regulations for Train Signalling on Double Lines by the Absolute Block System, with ex-L.N.E.R. 3-position block instruments: the receiving instruments are of the pegger type and there are separate indicators for the Up and Down lines.

5. The Down Main Starting signal at Bo'ness Junction is controlled by the condition of the block and cannot be cleared until the Polmont East signalman has accepted the train and has released the signal lever by pegging the Down line indicator to "Line Clear"; such a release is for one clearance only and the signal lever once put back cannot be cleared again until another acceptance, and consequently another release, has been given.

6. Controls on the Down line signals at Polmont East ensure that "Line Clear" cannot be pegged, and consequently the Starting signal at Bo'ness cannot be released, unless the Polmont East Down Main Distant signal arm is at Caution and the Down Main Outer Home lever is normal. In addition there is a berth track circuit (TC 547), 211 yards long, immediately approaching the Outer Home signal and its occupation locks the Down line block instrument from Bo'ness Junction at "Train on Line"; if the instrument has not already been pegged to "Train on Line" occupation of the track circuit places it in that position and maintains it there until the track circuit is cleared and the signalman pegs to "Line Blocked". The track circuit beyond the Outer Home signal (TC 1259) also locks, or "places and maintains", the block instrument at "Train on Line" as also does the next track circuit (TC 1260) except when No. 2 facing points are set for the loop. The Outer Home signal is 879 yards from the box and cannot be seen from it, and one function of the berth track circuit (TC 547) is to remind the signalman of the presence of a train standing at that signal. The main purpose of the "place and maintain" control on the block instrument that is exercised by each of the three track circuits is to ensure that the signalman cannot accept a train and peg to "Line Clear", thus releasing the Bo'ness Starter, until the train ahead of it has cleared the section and passed the Outer Home signal by at least 440 yards and he has given the "Train Out of Section" signal and has pegged to "Line Blocked". There is no emergency hand operated release for TC 547.

7. Another purpose of the "place and maintain" control described above should normally be to force the signalman to comply with the terms of Block Regulation 7 when blocking back either inside or outside the outermost Home signal. The control circuits at Polmont East, however, in accordance with the standard practice obtaining on the former L.N.E.R. were such that the "maintain" function of the "place and maintain" control was only effective when the block instrument had previously been placed to "Line Clear". When the instrument was at "Line Clear" occupation of a track circuit placed it to "Train on Line" and that position of the needle was maintained after the track circuit had been cleared and until the signalman pegged to "Line Blocked". By contrast, when the instrument was at "Line Blocked" although occupation of a track circuit placed it to "Train on Line" the needle went back to "Line Blocked" as soon as the track circuit was cleared and without any action by the signalman. Blocking back is not prohibited by instruction at Polmont East but it is not a normal practice there and the block controls were complete for ordinary through working. Nevertheless the fact that the "place and maintain" control exercised by the berth track circuit (TC 547) was to some extent incomplete merits mention here because of the indirect influence that it may have had on the events that led up to this accident. It is of interest that on the former L.M.S.R. lines in Scottish Region the "place and maintain" controls were, in this sense and as standard practice, complete.

Track Proving Relays

8. Each of the three track circuits 547, 1259 and 1260 exercises its "place and maintain" function through a track proving relay in the Polmont East signalbox. Each track proving relay is of the direct

current, neutral line type (gravity drop-away) having four contacts. The essence of such a relay is its dependence on gravity which normally ensures that when the relay is de-energised the track circuit indication will show "Occupied", and that the relay will fail to safety. This dependence on gravity, however, means that if the relay is turned on to its side it will behave as if energised whether it is so or not, and a "track clear" indication will be given when the track circuit is occupied.

9. The relays at Polmont East are kept on shelves in a relay cabinet in the signalbox, and each can be readily identified because it carries a label on which is marked the number of the track circuit to which it relates. The glass-fronted doors of this cabinet, which is of ex-L.N.E.R. pattern, are not hinged to swing open but each must be lifted off to open one half of the cabinet. At the time of the accident the right-hand door was secured by a mortice lock with an ordinary key. When the tongue of this lock was withdrawn, the door could be lifted up an inch or two in its frame thus bringing its lower edge clear of the housing in which it rested when shut, and it could then be lifted clear of its frame and set aside. The left-hand door was secured by an inside sliding catch which performed the same function as did the tongue of the lock for the right-hand door; when the catch was moved to the open position the left-hand door could be lifted up and off and set aside. Thus, if the cabinet was properly secured by lock and catch, access to its left half could only be gained by unlocking and lifting off the right-hand door, sliding the inside catch, and lifting off the left-hand door, but if the inside catch had been left in the open position the left-hand door could be lifted off without unlocking and lifting off the right-hand door.

10. The track proving relays for the track circuits 547, 1259 and 1260 were on a shelf in the left-hand half of the cabinet. There were no special instructions for the safe custody of the key to the cabinet and all the evidence at my Inquiry showed that it was customary for it to be kept on the top of the cabinet under a pile of old block registers. The relays are not secured to the shelves.

Enginemen's Aids

11. The presence of a berth track circuit at Polmont East Outer Home signal is indicated to a driver by the usual white diamond sign on the signal post, and that there is also a signal telephone is shown by a T on the diamond. Under Rule 55 a driver brought to a stand at this signal need not send his fireman forward to the signal box, but he must sound his whistle and, after waiting two minutes, should communicate with the signalman by telephone and remind him of the train's presence; if unable to communicate with the signalman, and if his train is detained an unusually long time, he must send his fireman to the signalbox.

12. The signal telephone at the Outer Home signal is on a post close to the signal. When a driver lifts the front of the telephone cabinet he sees a handset on a hook and two push buttons, one red and one white, on a small panel. This telephone is connected directly to an old type plug board with six plug-in sockets on the back wall of the signalbox. Each socket is connected to a separate circuit: the Polmont East code ring for all six circuits is 'five short'. Code rings other than 'five short' are heard on the bells but are not for this signalbox. The signalman can identify which circuit is being rung on 'five short' by the note of its bell, and when the signalman hears five short rings he has to identify the bell, put in the appropriate plug, and answer. At the time of the collision there were no instructions in the outside signal cabinet to show which button should be pushed, and nothing to show that the code ring was 'five short'; in fact both buttons rang the telephone circuit's bell.

The Trains

13. The passenger train was hauled by an ex-L.M.S. Class 4 MTT tank locomotive with a 2-6-4 wheel arrangement. The locomotive was travelling chimney first and the whole train was 360 ft. long and weighed 243 tons: the train was screw-coupled throughout and all wheels were vacuum braked, the available brake power being 161 tons or 66% of the unladen weight. The train brakes were tested after the collision and found to be in good order. The locomotive was fitted with AWS equipment which was operative at the time of the collision. Each of the five coaches had a steel framed and sheeted body on a steel underframe: the oldest coach was built in 1930.

14. The goods train comprised 18 wagons and a 20-ton brake van hauled by an ex-L.N.E.R. V2 tender locomotive. Including the locomotive the train was 508 ft. long and weighed 322 tons excluding its load: it was vacuum braked throughout and the available brake power was 213 tons or 67% of the unladen weight. Most of the wagons were vanfits but there were two conflats, two cattle vans and a general utility van.

Effects of the Collision

15. The distribution of debris along the track showed that, at the moment of impact, the rear of the goods train was some 280 ft. beyond the Outer Home signal. The passenger train continued some 255 ft. beyond the point of impact before coming to a stand.

16. The brake van of the goods train was completely wrecked as was the 12-ton vanfit ahead of it, but although they were both derailed these two vehicles were not thrown aside by the passenger locomotive but were pushed ahead of it as a tangled mass. The next two vehicles, a vanfit and a conflat, were also completely wrecked but were thrown aside and to the left up the side of the cutting, from which they rebounded into collision with the side of the first passenger coach as it came to rest. These last four vehicles of the goods train absorbed nearly all the effects of the collision: the next two vehicles, the general utility van and a vanfit, were only slightly damaged and the rest of the goods train suffered no damage at all. The couplings in rear of the general utility van parted and the destruction of the last four

vehicles automatically applied the brakes of the train so that the locomotive and fifteen vehicles came to a stand some 49 yards ahead of the passenger locomotive and the tangle of two vans it was pushing.

17. The passenger locomotive was only superficially damaged but it was derailed all wheels; the leading coach was also derailed and the left side of its bodywork was damaged by contact with the wagons of the goods train. The next three coaches were very slightly damaged and the last coach was not damaged at all. There was no telescoping.

Regulations for the Failure of Block Signalling Apparatus

18. Block Regulations 25 sets out the instructions that must be observed in the event of a failure of block signalling apparatus so that trains cannot be block-signalled in the ordinary way. The main instructions that are applicable in the circumstances leading up to this collision are that:—

(a) steps must immediately be taken to have the apparatus put in working order (preamble to Regulation 25);

(b) the signalman at whose box the block instruments have failed must advise the signalman at the opposite end of the section concerned of the failure by telephone (Regulation 25 (a) (ii));

(c) a train must not be allowed to pass a box into a section where a failure exists without having been previously brought to a stand and the driver and guard advised of the failure, and the driver of the train must be instructed to pass at Danger the signal controlling the entrance into the section ahead and to proceed cautiously (Regulation 25 (a) (i)); and

(d) bell signals must continue to be sent in accordance with Block Regulations.

Evidence

19. Four signalmen were directly involved in the series of events that culminated in this collision, since the events started when the night shift signalmen were on duty in Bo'ness Junction and Polmont East signalboxes and the collision occurred soon after the early day shift signalmen had taken over. Signalman J. Hamilton, who had been on duty since 12.5 a.m. handed over at Bo'ness Junction to Signalman J. Fairgrieve at about 7.11 a.m. and Signalman W. Allison, who had also been on duty since 12.5 a.m., handed over at Polmont East to Signalman R. Gentleman at 7.0 a.m. Hamilton was aged 40 and had been a signalman for over 10 years and Fairgrieve was aged 59 and had been a signalman for 39 years. Allison was aged 27 and had been a signalman for 5 years and Gentleman was aged 22 and had been a signalman for nearly 4 years. A fifth man, Relief Signalman P. Cumming, was present in Polmont East signalbox for part of the time but only as a spectator.

20. Relevant extracts, for 5th February, from the train registers for the Down line at the two signalboxes are as follows:—

(a) *Bo'ness Junction*

From Lochmill				To Polmont East			
Bell Signal	Accepted	TES received	TOS sent	Accepted	TES sent	TOS received	Trains concerned
4	6.49	6.54	6.55	6.49	6.55	6.57	A previous passenger train
3–1–1	6.57	7.6	7.8	6.57	7.8	7.11	The Class C goods train
4	7.11	7.16	7.18	7.11	7.18		The passenger train

Entries above and to the left of the double line were made by Signalman Hamilton, and those below it by Signalman Fairgrieve: the time of Hamilton's handover to Fairgrieve was not booked, possibly because the latter was late in coming on duty though both men denied that this was the reason.

(b) *Polmont East*

	From Bo'ness Jcn.			To Polmont Jcn.			
Bell Signal	Accepted	TES received	TOS sent	Accepted	TES sent	TOS received	Trains concerned
4	6.50	6.56	6.58	6.50	6.58	7.1	The previous passenger train
	R. Gentleman on at 7.0 a.m. W. Allison off at 7.8 a.m.						
4	7.15	7.19		7.19			The passenger train

Entries above the thick line and the entry of his signing off were made by Signalman Allison, and the others by Signalman Gentleman. There were no entries in the Polmont East train register for the Class C goods train that was involved in the collision, except as regards its final disposal. Apart from this, and the time of the acceptance of the passenger train from Bo'ness Junction (which is explained in paragraph 25) entries in the two registers agreed generally: the clock in the Polmont East signalbox was evidently about a minute ahead of that at Bo'ness Junction.

21. The first significant event was that early in the morning of 5th February the berth track circuit (TC 547) at Polmont East began to fail intermittently, its indication on the signalbox diagram showing "Occupied" at intervals and the Down line block instrument consequently showing "Train on Line", when no train was about. *Signalman W. Allison*, who had been working at Polmont East for about 7 months, said that he first noticed the odd behaviour of the track circuit indications and of the block instrument at about 1.11 a.m. and recognised that the track circuit was failing intermittently; he appreciated the significance of these failures and their effect on the Down line block controls. He attributed the failures to the weather and said that they were frequent, that the longest ones lasted only 4 or 5 minutes, and that the intervals between them were irregular, the longest being about half an hour. He neither booked the failures in his train register nor sent for a lineman or otherwise took steps to get the fault put right, and he excused himself for this on the grounds that the fault was only caused by the weather. He said that he told Signalman Hamilton at Bo'ness about the failure and its nature, but only as a matter of interest and not with a view to working in accordance with Block Regulation 25 being started. He was quite firm that he told Hamilton this at about 1.20 a.m.

22. Signalman Allison admitted that he had known the terms of Regulation 25 and what he ought to do in the event of a track circuit failure, that working under Regulation 25 should have been put into effect and that he had not told Hamilton to do it, but he excused himself on the grounds that he had thought that the failure would right itself. He said that only once during his shift had it interfered with proper block working in the sense that it prevented his accepting a train regularly from Bo'ness and thus properly releasing the Bo'ness Starting signal. He said that, apart from this one occasion, all the periods of track circuit failure had occurred when no release was required, although once or twice the needle had not gone to "Line Blocked" when he unpegged the instrument after sending the "Train Out of Section" signal to Bo'ness. On this occasion, which was between 2.30 and 3.0 a.m., the needle was wrongly at "Train On Line" when he wanted to accept a train and he said that he then went, at once and without pausing to see whether the fault would clear itself, to the relay cabinet, lifted off its left-hand door, which was already unlatched, and turned on its side the track proving relay for TC 547, thus rendering it inoperative and enabling himself to accept the train and to peg to "Line Clear". As the left-hand door was already unlatched he had no need to unlock the cabinet, though he knew that the key was kept on top of it. He denied that he had previously unlatched the door and said that he had no idea who had left it so. Allison also denied that he had ever before manipulated a relay in this way, although he had known how to do so for some years, having seen it done in Polmont Junction signalbox when he was a booking lad. He said that he did it on this occasion only to save time and that he had left the relay on its side for only long enough to enable him to peg to "Line Clear" and the Bo'ness signalman to pull off the Starting signal, and had then replaced it upright. He had not previously experienced a track circuit failure at Polmont East and he did not send for the lineman to correct this one because he knew that he could manipulate the relay if necessary. I questioned him closely about the readiness with which he had resorted to manipulating the relay on this occasion, as soon as it had become necessary to his convenience to do so, but he was adamant that he had never done it before.

23. *Signalman J. Hamilton*, in Bo'ness Junction box, claimed that he was not told about the intermittent track circuit failure at Polmont East until some time between 5.0 and 6.0 a.m. and then only as the result of his asking Allison what was amiss after he had noticed, for the first time, the block instrument go to "Train on Line" and then to "Line Blocked" for no apparent reason. When questioned on the point he became less certain that he had asked what was amiss before being told, but he remained firm that he was not made aware of the failure as early as Allison said and that he had not noticed any irregular movements of the block instrument's needle during the early hours. He said that what discussion

there was about the failure was casual, that both he and Allison expected the failure to clear itself, and that Allison had said that he would "give (him) a release if it was needed". Hamilton admitted that he knew that the intermittent failure of TC 547 meant that proper block working was no longer possible, that his Down line block instrument was no longer reliable, that the releases he was being given by Allison in such circumstances were irregular, and that working under Regulation 25 should at once have been put into effect; his excuse for not having adopted such emergency working was that the releases he was being given by Allison were "keeping things moving" and that how these releases were in fact being given was none of his concern.

24. Signalman Hamilton went on to say that, after having heard the "Train Out of Section" signal for the previous Down passenger train and seen the indicator go to "Line Blocked", he at once gained acceptance for the Class C goods train and saw the indicator go to "Line Clear"; this was at 6.57 a.m. and he pulled off his Starting signal without delay. He gave the "Train Entering Section" signal to Polmont East at 7.8 a.m. as the train passed the box: he did not see the indicator needle go to "Train on Line", since he made the entry in his register immediately after belling the signal, but when he then looked at the needle it was at "Train On Line". He was not sure whether the "Train Entering Section" signal was acknowledged but he was quite certain that he sent it. He said that Signalman Fairgrieve entered the box to relieve him at about 7.8 a.m., just as he was belling the "Train Entering Section" signal and that he himself left the box about 5 minutes later, without having heard the "Train Out of Section" signal for the goods train. He was sure that he told Fairgrieve that "there was an intermittent track failure at Polmont East affecting the block".

25. *Signalman J. Fairgrieve*, who had been working in Bo'ness Junction box for some six years, confirmed that he reached the signalbox at about the time that the goods train passed, but said that he did not hear the "Train Entering Section" signal being sent for that train. He said that shortly after he took over he offered the passenger train to Polmont East and that it was at once accepted and the indicator went from "Line Blocked" to "Line Clear". He frankly admitted that, in offering the train, he had assumed, from the fact that the indicator was showing "Line Blocked", that the "Train Out of Section" signal had been received from Polmont East, without having heard it himself and without verifying from Hamilton, who he said was still in the box, or from the train register, that this was in fact so. He pulled off the Starting signal and went to enter the acceptance in the register, when he saw that there was no record of the "Train Out of Section" signal for the goods train: he then irregularly made an entry for this himself and said that the time (7.11 a.m.) entered for the acceptance was probably some 3 minutes too early. The passenger train passed the box some 4 minutes later and he sent the "Train Entering Section" signal to Polmont East.

26. As regards the track circuit failure Signalman Fairgrieve was an over-careful and evasive witness. In his original statement to the Regional Officers he had said that the only conversation that he could remember having had with Hamilton before taking over had been about the state of the traffic, but when asked at the Regional Inquiry whether Hamilton had told him that "there was an intermittent track circuit failure at Polmont East which was affecting the block instruments" he admitted that Hamilton "did mention it". At my Inquiry however he was careful to admit no more than that Hamilton had told him that the block instruments were "giving trouble". When faced with the transcript of what he had said at the Regional Inquiry he said that he had not understood the question then put to him and when Hamilton repeated in his presence his statement that he had "told him that there was an intermittent track failure at Polmont East" he said that he could not remember Hamilton's having said so. The burden of Fairgrieve's evidence on this point was that he did not know that there was a track circuit failure, that the block instruments functioned correctly for him despite what they might have been doing before he took over, that as far as he was concerned there was no failure, and that there was therefore no need to introduce emergency working. His attitude throughout was typified by his response to the following questions:—

"Q. Immediately before you gave the signal (the 'Train Entering Section' for the passenger train) the instrument was showing 'Line Clear'?

A. Yes.

Q. You realise now that at that particular moment, 7.18, the goods train was standing on that track circuit, which should have been holding the indicator to 'Train On Line'?

A. Yes.

Q. Yet you say that the instrument was working properly for you?

A. Yes, I am saying that".

and later

"If the instrument works for me it is not a failure".

Fairgrieve denied that he knew anything about the practice by which a track circuit is made ineffective by tilting its proving relay, and I found his denial convincing.

27. As regards the acceptance of the goods train by Polmont East, Signalman Allison said that he accepted it at about 7.0 a.m. but that he failed to book the acceptance because Signalman Gentleman, who had come to the box at about 6.51 a.m. to relieve him, was standing by the train register and he assumed, without any subsequent check, that Gentleman would make the entry. Allison said that he told Gentleman that there had been an intermittent track circuit failure during the night and that it had prevented his proper acceptance of one train. He said that he then showed Gentleman how to get

round the effects of a failure by turning the relay on its side; he was quite sure that after his demonstration he replaced the relay upright, that he did not manipulate the relay for the acceptance of the goods train, and that when he went to accept that train the indicator was at "Line Blocked" and responded normally when he pegged to "Line Clear". He said that he did not hear the "Train Entering Section" signal for the goods train before he left the box.

28. *Signalman R. Gentleman*, who had been working in Polmont East box for about a month after a month there under instruction, confirmed that he was present when Allison accepted the goods train, but he was positive that when that train was offered TC 547 was showing occupied and the indicator was at "Train On Line": according to him the failure was continuous throughout the time he was in the box. He said that Allison, who had told him on his arrival about the intermittent failure and that he had been manipulating the relay, at once lifted off the relay cabinet door, turned the relay on its side, and accepted the train, pegging to "Line Clear": he only left the relay on its side for as long as it would take to pull off the Starting Signal at Bo'ness and then replaced it upright, when the indicator at once went to "Train on Line", and put back the cabinet door. Gentleman said that he had not thought about booking the acceptance of the goods train: he did not hear any "Train Entering Section" signal for this train and quickly forgot all about it. He said that Allison also demonstrated to him how to manipulate the relay but he claimed that he already knew what to do from having seen it done when he was a booking lad, though he needed to be shown which relay was, in this case, the one to be turned on its side. He said that he had known that the relay cabinet key was kept on top of the cabinet and asserted that the cabinet was always left unlocked: he had not himself experienced a track circuit failure in this box before, nor otherwise had occasion to manipulate a relay. Gentleman knew the correct procedure to adopt in the event of a failure, but when questioned about Allison's not having introduced emergency working he replied: "By tipping the relay he did not need to adopt Regulation 25".

29. Signalman Gentleman went on to say that after Allison had left he telephoned Polmont Junction for a lineman and, since there was only one Down train to handle before the lineman would arrive, he decided that he would continue with the irregular working and would "tip the relay" himself, though he had never done so before. He then rang Bo'ness Junction and, when Hamilton answered, asked him to tell his relief "to continue the same way as (they) had been working during the night". When I asked Hamilton what he had thought that Gentleman meant by this he replied "I did not know actually how I was getting the release: nobody told me how they were (giving) the release". He said that he had heard other signalmen discussing the trick by which a relay is tilted to nullify the effect of a track circuit but that he had never done it himself and did not realise that that was what was being done on this occasion.

30. Continuing his evidence, Signalman Gentleman said that, in anticipation of the passenger train's being offered by Bo'ness Junction, he opened the relay cabinet and turned the relay on its side before the offer was made, and pegged to "Line Blocked". He intended to leave the relay on its side until the train had passed and gave as his reason that with it so he "could see what position the block was in". As he had forgotten all about the goods train, it did not occur to him that the "Occupied" aspect shown by TC 547 might represent the true position, and when the passenger train was offered at 7.15 a.m. he accepted it at once and pegged to "Line Clear", the indicator responding to the peg correctly. When he received the "Train Entering Section" signal from Bo'ness Junction at 7.19 a.m. he pegged to "Train On Line" and saw the indicator respond and, having at once gained acceptance for the train from Polmont Junction, he pulled off all his Down line signals. Almost immediately he saw TC 1259, on his side of the Outer Home signal, showing occupied and, thinking that the train had passed through the section very quickly, he telephoned Bo'ness Junction and questioned the time of the "Train Entering Section" signal, and then looked out of the signalbox window and saw the goods train approaching on the Down line.

31. *District Relief Signalman P. Cumming*, who had worked an average of one shift a week at Polmont East, was booked as spare man in the Polmont area on the morning of 5th February. He said that, after failing to get through on the telephone to Control from the telegraph office, he went to Polmont East signalbox to try from there, arriving just before 7.0 a.m. when he overheard Allison and Gentleman talking about the track circuit failure. (Gentleman's evidence confirmed that Cumming entered the box after the manipulation of the relay for the goods train, and the subsequent demonstration, had been completed and after the relay cabinet door had been replaced). Having asked the signalman at Polmont Junction to telephone Control to find out what orders there were for him he went to the lavatory. He said that the doors of the relay cabinet were closed when he entered the box and that he did not see Gentleman's manipulation of the relay for the passenger train. When, just after the accident, he asked why TC 547 was still showing unoccupied Gentleman told him that he had been "fiddling with the relays" and he advised Gentleman to replace the relay upright which he did, taking off the cabinet door to do so. Cumming admitted that he knew the trick of turning a relay on its side to nullify the effect of a track circuit, but denied that he himself had ever done it or that he had suspected that the trick was being used on this occasion. He also knew that the key was kept on top of the cabinet. He said that he did not hear the "Train Entering Section" signal for the goods train and thought that he would have done so had it been sent, in spite of his preoccupation with the telephone.

The Handling of the Trains

32. *Driver J. Stanners* said that his Class C goods train was running some fifty minutes late when it was stopped at the Polmont East Down Main Outer Home signal at Danger. First his fireman and

then he himself tried to gain contact with the signalman by means of the signal telephone but failed to do so, and his fireman had just started to walk to the box when the signal was pulled off. He had not sounded his engine's whistle. He started past the signal at once and his train, being light and fully fitted, was accelerating smartly when he saw the Inner Home signal also "Off", but the Distant signal for the Larbert branch on the same gantry was "Off" as well and, since this signal was contrary to his booked route, he decided to stop at the signalbox to ask what was afoot. He was about to apply the brakes when he felt the impact of the collision and he estimated his speed at this moment at about 20 m.p.h. *Fireman L. Grant* generally corroborated his driver's evidence, but his estimate of the speed was 10-15 m.p.h. Neither of the enginemen could say at what time the train stopped at the Outer Home signal but *Goods Guard P. Jamieson* said that he had looked at his watch at that time and it said 7.10 a.m. and that the signal was pulled off 8 minutes later. His estimate of the train's speed at the moment of collision was 10 m.p.h.

34. *Driver G. Elder* was the driver of the passenger train. He said that when he first saw the Polmont East Down Distant signal it was at Caution but that it was pulled off before his engine passed over its AWS inductor. His speed when he saw the Outer Home signal "Off" was between 50 and 55 m.p.h. and, when he was a little over 200 yards short of the signal and his engine was about to pass over the AWS inductor for the Polmont Junction Down Main Outer Distant signal on the same post, he saw through his footplate window a dark mass on the line ahead. He at once stuck his head out of the cab, recognised that the mass ahead was a train and saw its tail-lamp, made an emergency brake application, and shouted a warning to his fellows on the footplate to hold tight. He estimated that his speed at the moment of impact had been reduced by his braking to between 30 and 35 m.p.h. *Passed Fireman W. Allen*, and *Driver J. Donaldson* who was on the footplate learning the road, confirmed what Elder had said about the signal aspects and his speed of approach but neither of them saw the tail lamp of the goods train ahead until after Elder had shouted. They confirmed that the brake application was immediate, but their estimates of the speed at impact were slightly higher than Elder's.

The Signal Telephone at the Outer Home Signal

35. *Fireman Grant* said that he first tried to telephone the signalbox about a minute after the goods train had stopped at the Outer Home signal (i.e., at about 7.11 a.m. when Gentleman was in charge of the box, Allison having left and Cumming being present). He tried each of the two buttons in turn and, not knowing that there was a bell code, first tried a long ring followed by a short and, when that met with no response, tried a series of short rings, then a series of long rings, and then a further series of short rings. He rang sometimes with the handset off the hook and sometimes with it on, but got no reply.

36. *Driver Stanners*, who tried to get through to the signalbox after Fireman Grant had failed, said that he thought that the signal telephone was of the usual type and that he did not know, and there was nothing on or in the signal telephone cabinet to tell him, that its code was "five short". He tried both buttons more than once, in several different ways and with the receiver on and off its hook, and could get no reply.

37. *Signalman Gentleman* said that the signal telephone usually clicked rather than rang, and said that the clicking was slight. He did not hear any clicking on this occasion and pointed out that, at the critical time, a diesel train was standing on the Down Loop with its engines running. He had reported the bad ringing to Technician Dickson.

38. *Signalman Cumming* described the ring given by the signal telephone in the box as a "sort of buzzing"; he had himself reported its inadequacy several times to Technician Dickson. He said that he heard no clicks or buzzing at the critical time but that after the accident, when he was in charge of the box, he had been telephoned from the signal several times and had had no difficulty in hearing the calls because all the time he was expecting to be telephoned.

39. By a most unhappy chance *Technician A. Dickson* was run down by a train and seriously injured during the evening before my Inquiry. I had however discussed with him, in the Polmont East signalbox before his accident, the ringing of the signal telephone bell and he had demonstrated to me how easily the ringing mechanism could become badly adjusted and the various sounds it made when in its various states of adjustment: these varied from a clear ring, through a dull buzzing, to a series of clicks which were audible enough when listened for but which attracted little attention. He confirmed that the bad ringing of the bell had frequently been reported to him and said that on each occasion he had adjusted it. At my request he adjusted the ringing of the signal telephone bell to the state in which he had found it when he visited the box shortly after the accident and I am quite satisfied that a properly alert signalman could quite easily have failed to hear this bell, unless he was listening for it, particularly if there was the distracting sound of diesel engines running close to the box.

The Relief Arrangements

40. *Station Master A. Millar* of Polmont, who was aged 63 and had been a Station Master for 28 years, said that he was told of the accident by telephone at his home at about 7.35 a.m., and that he went at once to the station where he saw the Station Foreman and learned from the booking office that a passenger train was involved. He assured himself that ambulances were being ordered and then went to Polmont East signalbox, passing on the way and speaking to some passengers who were making their way on foot to the station, checked that the lines had been properly protected, and spoke on the telephone to the passenger train guard and "got the picture from him". He spoke to Control about getting things moving and while doing so could see more passengers walking from the scene of the accident along the Down Loop to the station. The reason he gave for remaining in the box was that he

had had to contend with the situation at the station, which was becoming congested with passengers off heavily-loaded trains arriving from Stirling and Glasgow for whom alternative transport had to be arranged, and that from the box he was in touch with both the station and the scene of the accident. He admitted however that he had not known for certain that there was a doctor with the train until he had returned to the station, without having visited the scene of the accident, at about 8.30 a.m. and that he was uncertain at what time the last passenger was detrained. Mr. Millar gave the impression that, once having gone to the signalbox, he got involved with matters that he considered to be of more importance than going forward to see that the passengers were properly looked after, though he agreed when questioned that in the case of a passenger train accident his first responsibility, after checking the protection of the train, lay with the passengers and that he should have gone on to the train without delay.

41. *Station Foreman T. Brues* also concerned himself almost wholly with arrangements for dispersing passengers from other trains. He did not make any arrangements for getting passengers from the scene of the accident to the station, though at about 8.5 a.m. he saw an ambulance attendant on the station and directed him forward to the train. Shortly after this the only three injured passengers reached the station on foot and the two that needed to go to hospital did not do so till another ambulance arrived at about 8.50 a.m.

The Cause of the Track Circuit Failure

42. *Sub-Inspector J. Thom* said that less than an hour after the accident he visited the site and made certain tests. He found a high resistance fault in a cable connection to TC 547 and said that its effect, on a windy day, would be to produce an intermittent failure of the track circuit. After righting the fault he tested the block controls and found them to be in order.

The Supervisory Aspect

43. When I spoke to him in the Polmont East signalbox on the evening before my Inquiry, *Technician A. Dickson* admitted that the key to the relay cabinet was normally kept on top of it. The key was a small one but he had not thought to keep it on his key ring: when I visited the box it was being kept inside the case of the Down Line block instrument, access to which could only be gained by the use of the technician's special key, and it was clear that this was the place where Dickson should always have kept it. It was obvious that Dickson appreciated keenly the part that his failure to safeguard the key had played in the events leading up to the accident, and I am quite sure that he had been in the habit of leaving the key on top of the cabinet through carelessness only and not to enable the signalman to gain access to the relays.

44. *Sub-Inspector J. Thom*, aged 36 and a Signal and Telecommunications Sub-Inspector for one year, said that he had been in the habit of visiting Polmont East signalbox irregularly but more often than once a month. Dickson was a technician for whom he was responsible but he had no idea that the key was being kept on top of the relay cabinet, until after the accident when he had sent for Dickson to open the cabinet and had seen him take the key from on top of it. He had never checked where Dickson kept the key and had assumed that it was being kept inside the block instrument case. Mr. Thom said that whenever he had visited Polmont East signalbox the relay cabinet had been locked, with the left-hand door properly on the catch. He said that he had never before heard of the trick of tilting a relay to make a track circuit inoperative.

45. *Station Master Millar*, who has never been a signalman, said that he did not know that the key to the relay cabinet was being kept on top of it and said that he thought it should be kept by the technician. He had never heard of the relay tilting trick, had never had any previous cause to suspect that some of his signalmen were behaving irregularly, and had never seen the relay cabinet doors off, except when the technician was at work, or the left-hand door catch free. He said that his habit was to visit Polmont East signalbox daily at irregular times, with a late visit every fourth week at about 10 p.m. (Subsequent inspection of the Polmont East train register, for a six month period before the accident, confirmed what Mr. Millar had said but showed that his latest night visit during this period was at 10.50 p.m. and that he had never visited the signalbox between this time and 8.0 a.m.: 76% of his visits were between 8.0 a.m. and midday, and the rest, except for one a month before midnight, during the afternoon or early evening).

Summary of Events

46. The sequence of events that led up to the collision was as follows:—

At 12.05 a.m. Signalman Allison assumed duty in the Polmont East signalbox. From the start he had easy access to the track proving relay for TC 547 because he knew that Technician Dickson kept the key to the relay cabinet on top of it.

At 1.11 a.m. the first of a series of intermittent failures of TC 547 was noticed by Signalman Allison, who did not however report that something was wrong or take action to get the track circuit put right in accordance with the first sentence of Regulation 25. At some time between

1.20 a.m. (Allison's story) and between 5 and 6 a.m. (Hamilton's story), Allison told Signalman Hamilton of the track circuit failure, but Hamilton did not then start working in accordance with Regulation 25. According to Allison the track circuit failure did not at first hinder block working, but at some time between

2.30 & 3.0 a.m. the Down line block instrument was locked at "Train on Line" when a train was offered from Bo'ness. Signalman Allison then unlocked it by turning the relay on its side, which enabled him to peg to "Line Clear" and give an irregular release.

At 6.57 a.m. Hamilton offered the goods train to Allison and the latter accepted it and pegged to "Line Clear": whether he manipulated the relay in order to do so is material only as regards the extent to which it caused Gentleman, when he took over at Polmont East, to do the same later, since Allison had already resorted to this form of irregular working and this may only have been one of several occasions on which he did so. In any case he had already shown Gentleman how to manipulate the relay. What is material is that Allison did not enter the acceptance in the train register nor check that Gentleman had done so.

At 7.8 a.m. the goods train passed Bo'ness Junction signalbox. Whether Hamilton did or did not send the "Train Entering Section" signal for this train is not clear. What is clear, however, is that the signal, if sent, was not acknowledged.

At 7.10 a.m. the goods train stopped at the Polmont East Outer Home signal and for the next few minutes the enginemen tried to telephone the signalbox without success. The driver did not whistle. Signalman Gentleman had forgotten all about this train and he attributed the "Occupied" indication of TC 547 to the intermittent failure: shortly after the train occupied the track circuit Gentleman made the latter in any case inoperative by his manipulation of the relay.

At 7.11 a.m. Signalman Fairgrieve relieved Hamilton in Bo'ness Junction box. He was told that there was an intermittent track circuit failure, but he evidently decided to wait and see for himself how the block instrument worked.

At about this time or a minute or two later Signalman Gentleman turned the relay for TC 547 on its side in anticipation of the passenger train's being offered from Bo'ness, and pegged to "Line Blocked". He already knew how thus to manipulate the relay and had been shown by Allison which relay to manipulate. The stage was now fully set for the acceptance of a second train into the occupied section.

At 7.15 a.m. Signalman Fairgrieve assumed from the "Line Blocked" indication of his Down line block instrument that the goods train had cleared the section without checking from Hamilton, who was still in the box, or from the train register, that this was so, and without himself having heard the "Train out of Section" signal. As a result he irregularly offered the passenger train to Polmont East where Gentleman at once accepted it, being able to do so only because of his irregular manipulation of the relay.

At 7.18 a.m. the passenger train passed Bo'ness Junction and Fairgrieve sent the "Train Entering Section" signal for it, at which Gentleman gained acceptance for the train from Polmont Junction and pulled off all his Down line signals.

At 7.20 a.m. the passenger train caught up and collided with the goods train, which had started past the Outer Home signal as soon as Gentleman pulled it off for the passenger train behind.

Test

47. When I made a test run over the line, on an engine of the same type as that which had hauled the passenger train on the morning of 5th February, Driver Elder and Passed Fireman Grant were on the footplate. The light conditions at the time of my test were by all accounts very similar to those that obtained at the time of the collision and the signal aspects gave me scope for experiment. I asked Driver Elder to simulate as closely as he could his management of the train on the morning of the accident. The speed and his actions accorded well with his evidence, and he shouted to me at the point at which he had first glimpsed the goods train ahead, and he afterwards explained to me where the tail of that train had been when he first saw it. What he showed me agreed very well with my own calculations in time and space, based on the evidence as to speed and the point of impact, of the earliest view he could have got of the goods train's brakevan, and I am quite satisfied that Driver Elder was fully alert and did everything possible to prevent the collision and mitigate its effects.

Conclusions

48. The cause of this collision was that the passenger train was admitted into the Bo'ness Junction —Polmont East block section, and was running through it under clear signals, before the preceding goods train had left it.

49. The main failures, human and material, that contributed directly to the irregular admittance were that:—

(a) Signalman Allison did not report the intermittent failure of TC 547 or take any action to put it right and, in the meantime, to ensure that working under Block Regulation 25 was introduced:

(b) Signalman Hamilton failed to introduce emergency working when he became aware that irregular releases were being given:

(c) Signalman Allison failed to record his acceptance of the goods train in the Polmont East train register, assuming without check that Signalman Gentleman had recorded it for him:

(d) Signalman Hamilton failed to repeat the "Train Entering Section" signal for the goods train when it was not acknowledged: he may have been deceived on this point by the indicator which, when he looked at it, was standing at "Train on Line" because of the track circuit failure but at this stage he admittedly knew that the Down line block instrument was unreliable:

(e) Signalman Fairgrieve assumed from the position of the block indicator, which he had been told was not working properly, that the goods train had cleared the section ahead and irregularly offered the passenger train to Polmont East; when he then saw that there was no record of the "Train Out of Section" signal in the register he did not stop to think what this might mean but made an irregular entry for it himself:

(f) Signalman Gentleman irregularly manipulated the track proving relay in order to accept the passenger train, having forgotten all about the goods train of which there was no record in his train register and for which he had not heard the "Train Entering Section" signal: the fact that his manipulation of the relay had made TC 547 inoperative contributed very little to his forgetting the goods train, since he would have attributed an "Occupied" indication to the failure of the track circuit and not to its occupation by a train:

(g) the signal telephone at the Polmont East Outer Home signal was in effect unserviceable, partly because its bell was almost inaudible in the signalbox and partly because there were no instructions, on or in the outside signal cabinet, as to its use.

50. The main indirect contributors to the irregular admittance were that:—

(a) The relays in the Polmont East signalbox were easily accessible to the signalman and known to be so, because Technician Dickson had adopted the habit of leaving the key on top of the relay cabinet;

(b) Signalman Allison started giving irregular releases during the night and, when he handed over to Signalman Gentleman, showed him exactly what he was doing and how to do it;

(c) Signalman Fairgrieve disregarded what he was told about the block instruments, and decided to see for himself before taking any action.

51. The extent to which the "incompleteness" of the "place and maintain" control exercised by TC 547 (see paragraph 7 above) had an indirect effect on the events leading up to this accident is necessarily a matter for speculation. If the control had been complete, as it is in former L.M.S.R. boxes in the Scottish Region, Signalman Allison would have had to manipulate the commutator handle of his Down line block instrument, possibly several times, for each of the many track circuit failures that occurred during the night, or be content to leave the indicator at "Train on Line" all the time except when a release was needed. Setting aside the possibility that he might, in these circumstances, have decided to turn the relay on its side at the start and leave it there throughout his shift, he would, I think, have found the repeated manipulation of the commutator wearisome and might well have decided that it would be less trouble to send for a lineman and start emergency working. Alternatively, if he had left the indicator at "Train on Line" almost all the time, Signalman Hamilton could hardly have failed to notice from the start that the instrument had failed, and would have had no excuse, even to himself, for turning a blind eye on what was going on; in my view the longer Hamilton knew that something was amiss the more likely he would have been to have done something about it.

52. Each of the signalmen named in paragraph 50 above must bear some share of the blame for this collision. So also must Technician Dickson whose slackness about the custody of the key made manipulation of the relay possible. There were several other serious irregularities but the manipulation of the relay was the basic cause of the accident since without it the signalmen would have been forced to adopt working in accordance with Regulation 25: the other irregularities and forgetfulness might still, in combination, have led to the passenger train's being admitted to an "Occupied" section, but its driver would have been warned past the Bo'ness Starting signal at Danger and would have been travelling cautiously.

53. In my view, the person most directly responsible for this accident was Signalman Allison. Signalman Gentleman actually manipulated the relay at the critical time, but he was following the immediate example set him by Allison, an older man, and the fact that he sent for a lineman as soon as he took over the box showed that his intention was to put things right, whereas Allison had been content to behave irregularly throughout the night, since this best suited his convenience. Since Allison, the older man, had had failures for some hours without resorting to emergency working it is not surprising that Gentleman followed his example in this also for the short time until the lineman could arrive. In addition, Allison contributed to Gentleman's forgetting the goods train, by his failure to book its acceptance. Manipulation of the relay, which destroyed the protection afforded by the signalling apparatus and so put in jeopardy the safety of passengers and train crews travelling over the line, was plain wrong-doing for which there can be no excuse. There is no merit in Gentleman's argument that with the track circuit inoperative he could at least see what position the block was in: it was the fact that he had made the indicator respond only to the pegger that deceived Fairgrieve into disbelieving in the failure. Neither Allison nor Gentleman is still a signalman.

54. Signalman Hamilton, in addition to failing to repeat the "Train Entering Section" signal for the goods train when it was not acknowledged, clearly condoned irregularities that he knew were being practised by much younger signalmen. On his own admission he became aware, during the night, that

the releases he was being given were irregular and he should have stepped in at once and started emergency working: he should indeed have started such working as soon as he became aware that there was a track circuit failure, since he was at the entry end of the section where the drivers and guards of trains must be warned. He should have realised that every time he accepted an irregular release and pulled off his Starting signal he might be putting a train in jeopardy: his attitude, that what was going on at Polmont East was none of his concern, was wholly wrong.

55. Signalman Fairgrieve's part in the events that led up to this accident was of a different kind. His assumption, without a check and against the clear evidence of the train register, that the "Train Out of Section" signal had been received and his consequent offer of the passenger train were irregular and to his discredit as an experienced signalman, but this irregularity, although it was one of the direct causes of the collision, was in my view stupid rather than disgraceful. I think that Hamilton told him, probably casually, about the intermittent failure and that he let himself be deceived, by the apparently normal behaviour of the block indicator, into thinking that the failure had cleared itself. I do not believe that he knew anything about the plain wrong-doing that was going on.

At the same time I consider that a signalman of his experience should not have assumed that all was now well without speaking to the signalman at Polmont East and verifying that this was indeed so; if he had made this simple check he would at once have learned what was going on, and I think that he would have put a stop to it.

Remarks and Recommendations

56. At my request the Regional Officers made an investigation into the incidence of track circuit failures at signalboxes in the Polmont area that have equipment similar to that at Polmont East. This investigation involved a thorough and detailed scrutiny and cross-checking of train registers, and the Regional Officers' conclusion, which I accept, was that the irregular methods adopted at Polmont East were not in any way widespread. The only way however in which to make such irregular methods impossible is to make the relays really secure; all relay cabinets in Scottish Region that are similar to that at Polmont East have now been fitted with hasps and padlocks, the keys for which are kept by the Technicians or held in a lock fast place. I hope that, as a result of this case, other Regions also will review the security of their relays.

57. I see nothing sinister in a signalman's knowledge that a track proving relay could be made inoperative by being turned on its side. A young man of the type from which signalmen are now probably best drawn is technically knowledgeable and is likely to take an interest in how his equipment works. Unfortunately however such a young man's sense of responsibility does not always match his technical knowledge and there is therefore an increased need in his case for intelligent supervision. And, in my view, a lack of proper supervision played a big part in this case. Firstly, access to the relay should not have been possible: the relay cabinet was, by the nature of its design, inherently insecure without a hasp and padlock and I think that this should have been noticed. Secondly, the way in which the key was being left about should not have escaped the vigilance of the Sub-Inspector and the Station Master. Thirdly, the promptness with which Allison resorted to manipulating the relay on this occasion suggests that he had done so before and may have made a habit of it: in this connection it is significant that although other signalmen had reported track circuit failures at Polmont East Allison had never done so. Allison's promptness in misbehaviour, Gentleman's readiness to follow his example, Hamilton's obvious condonation of what he knew was going on, Fairgrieve's bogus entry in the Bo'ness train register, Gentleman's claim that the relay cabinet was nearly always unlocked and Allison's claim that he found its door unlatched, and Cumming's advice to Gentleman to put the relay upright again after the accident, all point to a bad state of discipline among the Polmont signalmen. And bad discipline is a sure symptom of poor supervision. Lack of supervision however in no way mitigates the disgracefulness of a signalman's action in deliberately tampering with the block controls when given the chance to do so.

58. The signal telephone at the Polmont East Outer Home signal, which was installed during the 1939-45 war, was of an old type. It was unfortunate that it carried no instructions as to its use and this was at once put right. A review of all signalboxes in Scottish Region has shown that there are only ten in which the old type of telephone equipment similar to that at Polmont East is still in use and where it would be desirable to replace it by concentrators or separate distinctive bells. I understand that action is being taken to replace these equipments as soon as possible and that cases of two ringing buttons at signal post telephones in Scottish Region are to be eliminated.

59. The part played by the "incompleteness" of the "place and maintain" control exercised by TC 547 is a matter for speculation and was in any case indirect. Inquiry into the accident has however brought to light the fact that, over a wide area of the Scottish Region, the "maintain" function of "place and maintain" controls is not operative for blocking back. The British Transport Commission are giving consideration to standardising, for the future, on the provision of "place and maintain" controls that are effective in all positions of the commutator.

I have the honour to be,

Sir,

Your obedient Servant,

J. R. H. ROBERTSON,

Colonel.

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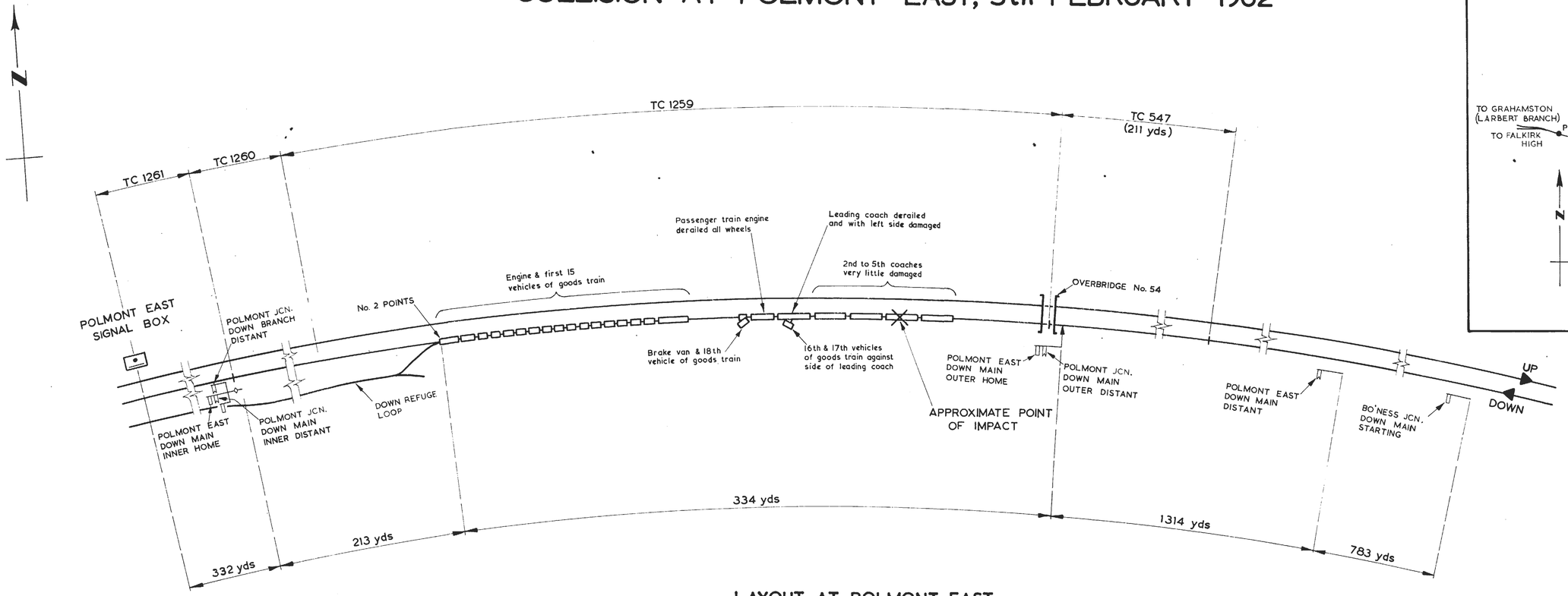
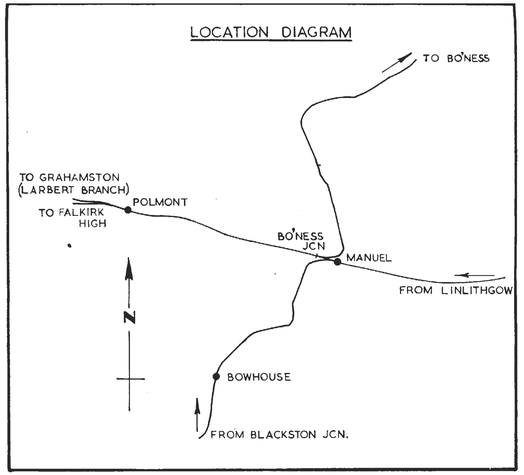
COLLISION AT POLMONT EAST, 5th FEBRUARY 1962



LAYOUT AT POLMONT EAST
Showing position of trains after collision



NOT TO SCALE