DEPARTMENT OF THE ENVIRONMENT

RAILWAY ACCIDENT

Report on the Collision that occurred on 26th October 1975 at Lunan Bay, between Montrose and Arbroath

> IN THE SCOTTISH REGION BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

© Crown copyright 1976 First published 1976

ISBN 0 11 550410 9

RAILWAY INSPECTORATE, DEPARTMENT OF THE ENVIRONMENT, 2 MARSHAM STREET, LONDON SW1. 9th August 1976.

Sir,

I have the honour to report for the information of the Secretary of State, in accordance with the Order dated 27th October 1975, the result of my Inquiry into the collision between a light locomotive and a passenger train that occurred on 26th October 1975 at Lunan Bay, between Montrose and Arbroath, in the Scottish Region of British Railways.

At about 11.24 on Sunday 26th October 1975 the locomotive of an Up East Coast express passenger train, the 10.15 Aberdeen to London (King's Cross), failed and the train came to a stand in the section between Usan (just south of Montrose) and Arbroath. The guard went back to protect his train and to summon assistance. Some 670 yards to the rear of the train he came to a lineside telephone near the site of the former station at Lunan Bay and, after placing detonators on the line, he used this to speak to the signalman at Arbroath. In doing so he mistakenly reported that he was speaking from Letham Grange, which is about $5\frac{3}{4}$ miles to the south of Lunan Bay. Arrangements were made for an assisting locomotive to be sent from the north and the guard was instructed to remain by the telephone. The conversations between the guard and the Arbroath signalman were overheard by the signalman at Usan who was listening in on the omnibus circuit telephone.

The assisting locomotive entered the section at Usan at 12.27, its driver having been instructed to pass the section signal at Danger and told that the failed train was standing near Letham Grange. Thereafter the locomotive was driven at speeds somewhat higher than the maximum permitted for a locomotive running light on the line concerned. Approaching Lunan Bay the secondman saw the guard standing near the lineside telephone at about the same moment that the locomotive exploded the detonators. The driver made an immediate emergency brake application but on the falling gradient this was not sufficient to stop the locomotive and it struck the rear coach of the passenger train at a speed estimated to be about 25 mile/h. The time was 12.32.

On impact the locomotive embedded itself in and underneath the body of the rearmost coach. Both bogies of this coach were derailed, severed from the coach and forced forward into contact with the trailing bogie of the coach next ahead. The whole train was pushed forward some 40 ft by the impact. I regret to report that 38 passengers were injured and one, a young married woman, was fatally injured. In addition, two dining car attendants were scalded by spilt coffee, the driver of the train received lacerations to the face and scalp, and the secondman of the assisting locomotive, who jumped from the locomotive seconds before the collision, suffered serious injuries to the face and head.

The emergency services were quickly called, the first call being made by a nearby resident who had seen the collision. Police, Fire and Ambulance services attended, the first ambulance being on the site by 12.47. Medical aid was also given at the site by a doctor who was a passenger on the train and by two other doctors who by good fortune were in the vicinity. All the injured had been removed to hospital by approximately 14.00, 39 being taken to Stracathro and 3 to Arbroath Infirmary. Of these, 22 were treated and discharged the same day and, by 14th November 1975, when I held the public Inquiry, only the injured secondman was still in hospital.

All the uninjured passengers were detrained at Lunan Bay and were taken by bus to Arbroath or, as some wished, back to Montrose to return to Aberdeen. From Arbroath passengers were taken to Dundee where they were able to continue their journeys by rail. Arrangements were also made for taxis to convey passengers to Dundee for forward services as they were discharged from hospital.

Clearance of the obstructed lines continued throughout the afternoon and evening. The Down line was made available with restricted clearances at 20.15 and the Up line was clear by 04.00 the following morning. Temporary speed restrictions were removed and normal working was resumed at 09.25 on Monday 27th October.

At the time of the accident the weather was fine with excellent visibility.

DESCRIPTION

The Site

1. The site of the former Lunan Bay Station is about $4\frac{3}{4}$ miles south of Montrose on the main Aberdeen to London East Coast Main Line. At this point the line consists of two tracks and runs in a shallow cutting from north-east to south-west in the Up direction, towards London. Lunan Bay Station was closed in 1930 and only parts of the station buildings remain. Just to the north, on the Down side of the line, steps in the side of the cutting lead to a wooden cabinet mounted about 7 ft above rail level and containing the circuit telephone. At the time of the accident this cabinet was marked only by a black St. Andrew's cross on a white background. The telephone was close to the site of the former Lunan Bay Signal Box which had been closed and removed in 1964. From alongside the telephone cabinet there are clear views of the line to the north and south and also of Lunan Bay itself, the coast being only some 300 yards from the line at this point. Looking north, an approaching train can first be seen at a distance of 650 yards.

2. The sequence of signal boxes and other relevant locations is as follows. Mileages are from Dundee.

	Montrose South Signal Box	30 :	miles	s 804 y	yards
Ч.Ч.,	Usan Signal Box	28	,,	1064	**
ية ر ويناني	Lunan Bay viaduct	26	,,	79	22
19 - 17 	Lunan Bay telephone box	25	,,	1452	22
	Point of collision	25	,,	783	2
	Inverkeilor Signal Box	23	,,	249	and the the area's constrained the
	Letham Grange telephone box	20	,,	0	en 22 en la sector de la constante de la sector de la constante de la constante de la constante de la constante La constante de la constante de
ar ar an ta	Arbroath Signal Box	16	>>	1320	S P add a strand static of

At the time of the accident, Inverkeilor Signal Box was switched out and the block section was from Usan to Arbroath.

3. The maximum permissible line speed at Lunan Bay is 70 mile/h. There is a permanent speed restriction of 60 mile/h over curves between 27 miles 88 yards and 26 miles 1254 yards. At and approaching the site of the collision the Up line was laid with 113 lb/yard flat bottom continuously welded rail secured to concrete sleepers with Pandrol clips.

4. Approaching Lunan Bay viaduct from the north the line is on a 55 chains left-hand curve as far as the start of the viaduct. Thereafter it runs straight in a shallow cutting past the Lunan Bay telephone box and the site of the former station, continuing under a road bridge as far as 25 miles 924 yards. From this point the line curves left at 71 chains radius, passing under a second road bridge to the point of impact at 25 miles 783 yards.

5. Approaching Lunan Bay telephone box the line falls at 1 in 170 as far as 25 miles 1263 yards where the gradient steepens to 1 in 87 falling as far as and beyond the point of collision.

6. Details of the line and the surrounding topography are shown on Drawing No. 1 at the back of the report.

The Signalling and Telephones

7. The line between Montrose and Arbroath is worked under the Regulations for Train Signalling on Double Lines by the Absolute Block System. On the Up line the stop signals at each signal box are of the semaphore type whilst the distant signals are two aspect colour lights. The line is not equipped with AWS.

8. The signal boxes at Usan, Inverkeilor, and Arbroath, and the lineside telephones at Lunan Bay and Letham Grange are linked by an omnibus telephone circuit. Calls can be made from either of the two lineside telephones to any of the signal boxes by use of a ringing code, a copy of which is posted inside each telephone cabinet, but the lineside telephones do not have their own individual code: if someone telephones a signalman from one of the lineside telephones the signalman will usually tell him to wait by the telephone and 'listen in' if a reply is required. When a call is received by a signalman from one of the lineside telephones he has no way of telling which telephone is being used and must rely on the caller identifying the place from where he is speaking.

The Trains

9. The passenger train was 1E17, the 10.15 Aberdeen to London (King's Cross). It consisted of Class 47 diesel locomotive No. 47 418 and eleven air braked passenger coaches. The last six coaches in the train were all of Mark IID stock, the rearmost coach being a Brake Open Second. The total weight of the train was 490 tons.

10. The assisting locomotive was Class 40 diesel locomotive No. 40 111. It weighed 133 tons and its theoretical brake force was 51 tons. Its permitted maximum speed was 90 mile/h.

The Course of the Collision and the Damage Caused

11. The rearmost vehicle in the passenger train, a Mark IID Brake Open Second, was marshalled with the brake compartment trailing. This compartment therefore took the main force of the collision when the Class 40 locomotive struck it at some 25 mile/h. The whole rear end of the coach was lifted and ripped open and the locomotive penetrated over half the coach's length before it came to rest. Both the coach's bogies were severed from the coach body and were driven forward into contact with the trailing bogie of the coach ahead, destroying all the underframe equipment that had been between the bogies. In the centre of the rearmost coach the steel flooring was buckled forward and upwards almost into contact with the ceiling, destroying or displacing the passenger seating. Although the train's brakes were applied at the moment of collision the whole train was driven forward some 40 ft by the impact.

12. The next to last coach in the train was considerably damaged, especially at the trailing end, and ahead of it all the remaining nine coaches and the locomotive sustained damage to a greater or lesser degree. Towards the front of the train this was mainly confined to the buckeye couplings, but even in the centre of the train washbasins were broken and partitions damaged.

13. The colliding locomotive received extensive damage to the nose-end compartment and front cab and numerous brake and heater pipes were broken or loosened. There was little or no damage to the permanent way or lineside equipment.

RULES AND REGULATIONS

14. When the passenger train failed in the section between Usan and Arbroath the only line obstructed was the line on which the train was standing i.e., the Up line. In these circumstances the train crew were required to act in accordance with Section M.3.4 of the British Railways Rule Book. This section read as follows at the time of the accident:

3.4. When the only line obstructed is that on which the train is standing

3.4.1. When the Driver (Secondman in the case of a double-manned cab) and the Guard are satisfied that no other line(s) is affected, they must confer and if assistance is required, agree how this can best be obtained. They must also agree the quickest means by which the Signalman can be advised of the circumstances.

Once agreement has been reached by the Trainmen as to the method of assistance, they must not allow their train to be moved until that assistance has arrived or alternative arrangements have been agreed by all concerned.

3.4.2. The Guard must then go back and carry out detonator protection. If in going back, the Guard comes to a signal box or to a telephone giving communication with a signal box, he must place three detonators, 20 yards apart, on the line and advise the Signalman of the circumstances. Unless a reply can be promptly obtained or the Signalman instructs otherwise, the Guard must then proceed to the full protection distance.

If before reaching the full distance, he sees a train approaching, he must immediately place three detonators on the line as far from the obstruction as possible.

3.4.3. The Driver (Secondman in the case of a double-manned cab), after conferring with the Guard, must go forward and place three detonators, 20 yards apart, on the line 300 yards ahead of the disabled train and remain there, exhibiting a hand Danger signal, unless it has been agreed that he should continue forward to advise the Signalman of the circumstances.

15. The crew of the assisting locomotive were required to act in accordance with Section M.5 of the Rule Book. This section read as follows at the time of the accident:

5. Duties of Trainmen—Assistance provided from the Rear

5.1. Driver of assisting train to be advised by Signalman.

The Driver of the assisting train or locomotive will be advised of the circumstances by the Signalman and instructed to pass the signal protecting the obstruction at Danger. Where possible, the Driver will be advised the approximate location of the disabled train.

- 5.2. Assisting train proceeding to disabled train.
 - 5.2.1. The Driver of the assisting train or locomotive which is admitted into a section occupied by a disabled train or disabled part of a train must run at such a speed as will enable him to stop short of any obstruction. As he proceeds, the Driver must keep a sharp look-out for the Guard of the disabled train.
 - 5.2.2. If there is a tunnel in the obstructed section the Driver must not enter such tunnel unless the Guard of the disabled train has come back and met the assisting train, or it has been ascertained that the tunnel is clear and that the Guard is not in the tunnel.
 - 5.2.3. During fog or falling snow, the assisting train will be detained at the signal box/stop signal in rear of the disabled train until the Guard has arrived thereat. The Guard must advise the Signalman of his arrival.
 - The Guard must ride with the Driver of the assisting train to indicate the position of 5.2.4. the disabled train.
 - 5.2.5. The Driver of the assisting train must bring his train to a stand on exploding the detonator $\frac{1}{4}$ mile from the disabled train and then proceed cautiously to the rear of the disabled train. During fog or falling snow, the Driver must again bring his train to a stand on exploding the detonator 100 yards from the disabled train and the Guard must then proceed on foot, guiding the Driver by handsignal.

5.3. (Not relevant).

16. In addition, the provisions of the General Appendix to the Working Timetables and books of Rules and Regulations also applied to the assisting locomotive. These lay down the maximum speeds at which light locomotives are permitted to travel, unless otherwise specially authorised, over lines with a given line speed. In the case of the line between Usan and Arbroath, with its line speed of 70 mile/h, the maximum permitted speed of the light locomotive was shown as 55 mile/h.

17. The rules to be followed by the signalman at the box (Usan) giving entry to the obstructed section of line are contained in Section M.8 of the Rule Book. The relevant paragraphs read as follows at the time of the accident:

8.1. Action to be taken when advice of a mishap is received

8.1.1. After carrying out the necessary protection arrangements, the Signalman must immediately advise the Traffic Control and the Station Manager in order to obtain any assistance required and to regulate traffic. He must use the quickest means available to call medical and civil assistance where there is any likelihood that these will be required.

8.1.2. When a Signalman receives a telephone advice from a Trainman that a line(s) is obstructed and that the Trainman is carrying out detonator protection, the Signalman must, providing he is satisfied he can provide adequate protection to the obstructed line(s), instruct the Trainman that it is not necessary for him to proceed to the full protection distance.

EVIDENCE

18. The driver of the 10.15 Aberdeen to London train was Driver J. M. Milne, based at Dundee. He had been a driver since 1947 and had long experience of the line between Montrose and Arbroath. On the day of the accident he booked on duty at 02.59 and, after working a newspaper train from Dundee to Aberdeen, he took over locomotive 47 418 at Ferryhill Depot at about 08.30. He gave it a normal examination and noted that there was nothing outstanding in the Defects Book. After coupling the locomotive to the 10.15 train a satisfactory brake test was made in co-operation with the guard.

19. The train left Aberdeen on time and the journey south was quite normal as far as Lunan Bay. Just after passing the site of the former station the main air reservoir gauge suddenly went down to zero, the brakes applied throughout the train, and the train stopped. Milne examined the locomotive but was unable to locate the fault so he sent his secondman back to inform the guard that assistance would be required. He knew that there was a lineside telephone not far to the north and that the guard would be able to contact the signalman from it. When the secondman returned Milne sent him forward to protect the train in front. After going forward and putting down detonators the secondman returned and sat with him in the locomotive cab: Milne agreed that, according to Rule M.3.4.3, the secondman should have remained 300 yards ahead of the train but he had made no comment when the secondman returned to the locomotive.

20. Some time later the guard arrived and said that an assisting locomotive was coming from the north: he then left to return to the lineside telephone. Milne and the secondman waited in the locomotive until, without any warning, there was a violent shock and the locomotive was moved forward. Milne was thrown forward, injuring his head and face, and was removed to hospital before he could speak to his guard.

21. Driver Milne's secondman was Secondman B. Tosh, also based at Dundee. He confirmed his driver's evidence of the events leading up to the failure of the locomotive at Lunan Bay. After trying without success to locate the fault, Driver Milne had instructed him to go back and tell the guard that assistance would be required. Tosh met the guard, whom he had not worked with before, coming forward and passed on the message. He also indicated that there was a lineside telephone a short distance back towards the north, but he did not mention the name or location of the telephone to the guard. He then returned to the front of the train and went forward to place detonators 300 yards to the front of the train. He knew that the Rules required him to stay by the detonators, exhibiting a hand Danger signal, but he had not done this. After returning to the locomotive he learned that assistance was coming from the north and thereafter remained at the locomotive until the accident happened.

22. The guard of the passenger train was *Conductor Guard G. Brown*, based at Dundee. He had started his railway career in 1928 and had served since then continuously, apart from a break of four years from 1931. He had been appointed a Goods Guard in 1948 and a Passenger Guard in 1972. He had worked for most of his career over the lines between Edinburgh and Aberdeen and had last signed his route card for the Dundee-Aberdeen line about a month before the accident. He told me that he remembered the old station at Lunan Bay, and he remembered the signal box there being closed in 1964.

23. On the day of the accident he booked on duty at 05.25, having finished duty the previous day at 13.15. He had spent the remainder of the Saturday at home and had had a proper night's sleep before leaving for work on the Sunday. He was properly rested and, he told me, had no particular worries or distractions. For the previous three years or so he had been under treatment by his family doctor and was taking three pills each day for Angina: the Railway Medical Officer knew of his condition and the treatment he was receiving.

24. After working a passenger train from Dundee to Aberdeen he examined the 10.15 Aberdeen to London train which he was rostered to work as far as Dundee. All appeared to be in order and after the locomotive was coupled to the train he made a satisfactory brake test. Of the locomotive crew he knew Driver Milne well but had not worked previously with Secondman Tosh. The journey south was uneventful, with stops at Stonehaven and Montrose where the train was about one minute late on the booked timings. From Montrose, Brown travelled in the brake compartment in the rear vehicle of the train. About ten minutes after leaving Montrose the brakes suddenly applied and the train came to a halt. The train air pipe pressure dropped to zero on the gauge. Brown alighted and made his way forward until he met the secondman who told him that a fault had developed in the braking system, that the locomotive was a failure, and that assistance was required. Nothing was discussed about the direction from which assistance might be coming and Brown indicated that he would telephone the signalman from the lineside telephone back along the line.

25. On arrival at the lineside telephone Guard Brown put down three detonators on the Up line and then called the signalman at Arbroath. He called this box rather than Usan because, with an Up train, the Arbroath signalman would be expecting the train to arrive at his box and would be most concerned about the delay. He got through to the signalman without delay and reported what had happened and the need for an assisting locomotive. As far as he could remember he had stated that the train had failed "on the Up line past the second bridge at Lunan", but he could not be certain and he admitted that he could have made a mistake and unwittingly said "Letham Grange" when he meant to say "Lunan Bay". The Arbroath signalman instructed him to remain by the telephone whilst he made arrangements for an assisting locomotive. At some stage he had also spoken to the signalman at Usan and he believed that he had given him the same information as he had passed to Arbroath.

26. Guard Brown agreed that he could not possibly have confused the location of the Lunan Bay telephone with that at Letham Grange—the sites were quite dissimilar. He knew the line extremely well, he knew that the train had failed close to Lunan Bay and, if he had passed the wrong information to the signalmen, this had been due to a slip of the tongue and nothing else.

27. Some time later the Arbroath signalman told him that an assisting locomotive would be coming from Newtonhill, that is from the north, and that he was to remain by the telephone. Shortly afterwards Brown telephoned the Usan signalman and told him that he would have to return to the train to inform the driver. The signalman agreed and Brown went back and spoke to Driver Milne before returning once more to the Lunan Bay telephone. He remained by the telephone until he saw a locomotive approaching from the north: when he first saw it it was about half a mile away, on the far side of the Lunan Bay viaduct, and appeared to be travelling fast. He started to move down the steps to the lineside, since he was expecting the locomotive to stop and pick him up, but when he reached the lineside the locomotive was very close and had not apparently reduced speed. Brown waved his red flag and, as the locomotive exploded the three detonators and, after travelling a further short distance, Brown heard its brakes apply. It continued on towards the train and seconds later Brown, who by then had started off back along the track, heard the sound of the collision. During all the time that he had walked back and forth along the line Brown admitted that he had not thought to put on the yellow high visibility vest with which he was issued.

28. On his way back to the train Brown met a dining car attendant who told him what had happened. He therefore returned to the telephone, replaced the detonators, and called the Arbroath signalman and advised him to block both lines. Shortly afterwards the driver of the assisting locomotive approached the lineside telephone and Brown asked him why he had gone past at 60 m/h or more and not stopped. The driver had replied "before you go any further I had been informed that it was Letham Grange". At this point, Brown told me, he realised that he might have given the wrong location to the signalman and he said to the driver "Oh God, have I made a mistake?".

29. District Relief Signalman D. G. Duke was the signalman at Arbroath. He had been a signalman since 1957. On the day of the accident he started duty in Arbroath Signal Box at 08.00 and, at 11.16, he accepted 1E17, the 10.15 ex Aberdeen, from Usan. At 11.19 he received 'Train Entering Section' from Usan and immediately offered the train to the next signal box, Carnoustie, where it was accepted. At about 11.27 he cleared his Up line signals and closed the level crossing gates. By 11.35 there was no sign of the train and road traffic was building up at the level crossing. He therefore telephoned Usan Signal Box and conferred with the signalman there, who confirmed that the train had entered the section apparently running normally. Duke then replaced the Up Distant signal to Caution, and after a suitable wait put the Up line stop signals to Danger and reopened the level crossing gates.

30. At 11.48 the circuit telephone bell rang three long rings, the code for Arbroath, and Duke answered. The caller identified himself as the guard of the 10.15 ex Aberdeen and said that the locomotive had failed with a broken air pipe just south of Letham Grange. He added that the fault could not be isolated and that an assisting locomotive would be needed. Duke asked about protection of the train and the guard confirmed that the detonators were down. Duke therefore told him to remain by the telephone whilst he spoke to Control.

31. Duke spoke to Control, who indicated that an assisting locomotive would have to come from the north. He passed this message on to the guard, who had been 'listening in' awaiting the reply, but almost immediately Control telephoned to ask whether it was in order for assistance to come from the rear in view of the uncertain nature of the fault in the braking system: it was suggested that the guard should go and consult the train driver on this point. Duke therefore instructed the guard to return to the train, question the driver, and report back.

32. Some five to ten minutes later Duke received a call on the circuit telephone from Traffic Inspector Kerr, who said that he was speaking from Letham Grange. The Inspector asked for the exact location of the train since he could see nothing to the south of the Letham Grange telephone and Duke told him that the guard had said "just south of Letham Grange". Inspector Kerr said that he would have a further search.

33. A few minutes later the guard telephoned and reported that he had spoken to the driver and that there would be no difficulty about having the assisting locomotive at the rear of the train. Before passing this message to Control Duke asked the guard whether he had seen Traffic Inspector Kerr but the guard said that he had not. I asked Signalman Duke whether at this stage he had not thought it strange that the guard and the Inspector had not met and that the Inspector had apparently been unable to locate the failed train. Duke told me that, at the time, it had not occurred to him that there was anything odd: he pointed out

that Inspector Kerr had been travelling by road and that, after telephoning, the Inspector would have made his way back to the road where he had left his van and could well have been out of sight by the time the guard was supposed to have returned to the telephone.

34. At 12.27 Duke received the bell code from Usan indicating that the assisting locomotive was entering the section. He passed this information to the guard, who was still at the telephone. A short time afterwards—just how short Duke could not be sure but probably not more than five minutes—the circuit telephone rang and Inspector Kerr reported that he had been to Letham Mill and still could find no trace of the train. Since it was obvious that Inspector Kerr was still speaking, as he had been all along, from the Letham Grange telephone, Duke realised that the guard could not have been using that telephone. He therefore said to Mr. Kerr, "I believe we might have crossed lines: you had better get up to Lunan Bay".

35. Very soon afterwards, at 12.38, the guard telephoned and said that the assisting locomotive had passed him at speed and had run into the back of the passenger train. Duke asked him about the emergency services and the guard said that they had been called. At 12.51 the guard telephoned again and said that he had made a mistake when he had said that he was at Letham Grange and that he had been at Lunan Bay all along.

36. Signalman Duke confirmed that the timings he had quoted were as he had recorded them in the Train Register. He could not be sure whether or not he had tried to alert the guard once he became aware that the guard must have been speaking from Lunan Bay and not Letham Grange. He agreed that, if he had managed to warn the guard that the driver of the assisting locomotive had probably received false information, the guard might have been in a better position to stop the locomotive.

37. Signalman W. Nicoll was on duty in Usan Signal Box. He accepted the 10.15 Aberdeen to London train from Montrose South at 10.59 and at 11.17 he received 'Train Entering Section' for it. After acknowledging, he offered the train forward to Arbroath and it was accepted. The train passed his box at 11.20 apparently running normally. The normal running time for a passenger train between Usan and Arbroath is about 12 minutes and when some 15 minutes had elapsed without his receiving 'Train out of Section' from Arbroath he conferred with the signalman there. At about 11.50 someone telephoned the Arbroath signalman on the circuit telephone and Nicoll listened in to the conversation. He heard the caller identify himself as the guard of the passenger train and say that the locomotive had failed slightly to the south of Letham Grange. This was questioned by the Arbroath signalman and the guard repeated the location.

38. Arrangements were made for the assisting locomotive to come from the north and it arrived at Usan at 12.25. The driver and the secondman both came up to the signal box and Nicoll told them that the passenger train was located just to the south of Letham Grange. He instructed them to pass the section signal at Danger, to proceed with caution, and to expect 3 detonators on the line on the approach to the failed train. The crew left the box and Nicoll booked the locomotive as entering the section at 12.28.

39. About ten minutes later the guard of the passenger train telephoned and reported that the assisting locomotive had collided with the rear of the train. He went on to say "I have made a mistake: I meant Lunan Bay". This conversation was overheard by the Arbroath signalman, who had also answered the telephone when the guard called. Signalman Nicoll took the necessary action and sometime later he spoke to Inspector Kerr on the telephone. Prior to this he had not overheard any of the conversations between Mr. Kerr and Signalman Duke.

40. Area Inspector G. Kerr was at home in Arbroath when, at about 12.10, he was advised by Control that the locomotive working the 10.15 ex Aberdeen had failed at Letham Grange. He was asked to go to the train to confirm that assistance could be given from the rear since a locomotive was already on its way from the north. He therefore took his van and went to the road bridge that crosses the railway near Letham Grange and from which there is a good view of the line. There was no sign of a train so he telephoned the Arbroath signalman from the lineside telephone. It was suggested that the train might be at Letham Mill, which is between Letham Grange and Arbroath, so he made his way there but again could see no sign of the failed train. He therefore went back to Letham Grange and telephoned Signalman Duke at Arbroath, who told him that wrong information had been given about the location of the train and that the assisting locomotive had collided with the passenger train at Lunan Bay. Kerr thought that the time was then about 12.50. He was sure that he had only spoken to Signalman Duke twice from the Letham Grange telephone, and that on the second occasion the accident had already happened.

41. From Letham Grange, Inspector Kerr made his way to Lunan Bay and gave what assistance he could. He spoke to Guard Brown, who was still by the Lunan Bay telephone, and Brown told him that he had confused Lunan Bay and Letham Grange and had given the wrong location to the signalman.

42. The driver of the assisting locomotive was *Driver J. Smith*, based at Ferryhill (Aberdeen). He had worked over the Dundee-Aberdeen line for about 28 years and knew the Montrose to Arbroath section extremely well, including the exact location of the two lineside telephones. On the day of the accident he started duty at 10.15, having had a rest day on the Saturday. He was rostered to leave the shed at 10.30 and run light engine to Newtonhill (between Aberdeen and Stonehaven) to work a ballast train. Locomotive 40 111 was already prepared, and on joining it Smith noted that the brake selector switch was in the vacuum/ passenger position which is the correct position for running light engine. On arrival at Newtonhill the locomotive was coupled to the ballast train but Smith was then told he was to go forward 'light engine' to assist the 10.15 ex-Aberdeen passenger train which had failed between Montrose and Arbroath: the precise location was not stated. With his secondman he therefore took the locomotive to Usan.

43. At Usan he went into the signal box and the signalman told him that he might not be required. After a telephone call however the signalman said that they would be going in to assist. Smith was told to pass the starting signal at Danger, to proceed to Letham Grange and there to pick up the guard of the passenger train who would be standing by the lineside telephone. He was not given any other information as to the location of the train but, he told me, he expected it to be somewhere to the south of the Letham Grange telephone.

44. After entering the section Smith increased speed to about 50 mile/h and was running at about this speed as he reached the top of the rising gradients between Usan and Lunan Bay. At this point he shut off power and allowed the locomotive to coast down the falling gradient. Approaching the Lunan Bay viaduct the speedometer needle was roughly in the 12 o'clock position, indicating a speed of about 60 mile/h. Just past the viaduct the secondman called out "that's the guard!" and almost at once the locomotive exploded the detonators. Smith looked sideways and caught a glimpse of the guard standing by the telephone, or possibly on the steps leading to the lineside, holding a red flag. He immediately made a fully emergency brake application, using the direct air brake. The brakes responded at once and with the dry rail the braking seemed effective. Very soon however they could see the back of the passenger train ahead and it seemed unlikely that they would be able to stop before reaching it. The secondman said that he was going to jump and Smith said "I don't think you should". The secondman nevertheless jumped, going out through the driver's door onto the lineside. Smith stayed at the controls until the last moment, when he moved back and held on to the engine room door. The locomotive was still travelling at something like 25 mile/h when it struck the rear of the passenger train.

45. After the collision Smith went back to the guard, who was still by the lineside telephone. As he approached, the guard said "I thought you would have stopped by the telephone". Smith said "I was told to stop and pick you up at Letham Grange" to which the guard replied "This is Letham Grange". When Smith pointed out that Letham Grange was the other side of Inverkeilor, the guard went white and said "Well, I've made a terrible mistake".

46. In answer to questions, Driver Smith said that he was aware at the time that his speed, running light engine, should not have exceeded 55 mile/h and that his speed had been marginally above this. He also knew that under Rule M.5.2.1 he was required to drive at such a speed as would enable him to stop short of any obstruction but, he claimed, with such a clear indication from the signalman of the location of the failed train he felt justified in proceeding at speed through the first part of the section.

47. Locomotive 40 111 was examined on site at about 16.50 by *Traction Inspector J. P. Adam.* He noted that the brake selector switch was correctly in the vacuum/passenger position and the position of the controls was consistent with an emergency brake application having been made, with the power off. The brake blocks appeared to be in good condition and correctly located in relation to the wheels.

48. The locomotive received a further detailed examination on the following day at Montrose and other tests were subsequently carried out at Haymarket Depot, Edinburgh. The examination and tests were supervised by Mr. J. Bryceland, the Maintenance Standards Assistant in the Chief Mechanical and Electrical Engineer's Department, Glasgow. He found that the locomotive's braking system was in proper working order and should have produced a braking effect well up to specification for the class of locomotive. The response time for a full application of the brakes after emergency use of the straight air brake in the No. 2 end cab (the leading end at the time of the collision) was measured as 3 seconds. The specification calls for a response time of between 3 and 5 seconds.

49. The speedometer in the No. 2 end was tested both during a trial run with the locomotive and in the Glasgow Workshops. It was found to be reading between 2 and 3 mile/h high in the speed range from 30 to 60 mile/h, but it stuck at 60 mile/h and would not indicate above this figure. This was found to be due to metallic dust inside the gauge and Mr. Bryceland was of the opinion that this had been dislodged during the collision. He thought that if the defect had existed before the collision it would have been reported by a driver.

50. Mr. Bryceland also described the results of test runs made with another Class 40 locomotive, No. 40 099, on 7th November 1975. These tests showed that an emergency application of the straight air brake, made as the locomotive passed the lineside telephone at Lunan Bay at a speed of 57 mile/h, brought the locomotive to a stand some 24 yards before the actual point of collision. Theoretical calculations showed that, on the falling gradients, the braking distances were greatly influenced by relatively small increases in speed at the point of brake application. A speed of 60 mile/h at the lineside telephone, for example, would result in the locomotive still travelling at 25 mile/h at the point of collision. This agreed with the evidence given by Driver Smith.

51. A graph showing the results of the braking tests, together with the theoretical performance of a Class 40 locomotive, is shown on Drawing No. 2 at the back of the report. The results shown are confirmed by a trial run that I made in locomotive 40 009 on 13th November 1975. On this occasion the driver took no action until detonators were exploded opposite the lineside telephone: he then made an immediate emergency application of the air brake and, at the point where the collision had occurred, the speed was reduced to just above 30 mile/h from an initial speed of 62 mile/h.

52. Finally, Mr. Bryceland described the nature of the fault on the Class 47 locomotive hauling the passenger train that had led to the train becoming disabled. It was found that an adaptor in the drain tank on the after coolant tank of the main air reservoir had loosened and caused all the main reservoir air on the locomotive to be discharged to atmosphere. This had the effect of applying the brakes throughout the train,

and they would have remained on until the moment of collision. The faulty adaptor was located underneath the locomotive and could not have been seen by the locomotive crew during their preparation of the locomotive before the journey. Mr. Bryceland said that the failure was a very rare one.

CONCLUSION

53. Two main factors contributed to this unfortunate accident. The first was the incorrect information given to the signalmen, and relayed by them to the driver of the assisting locomotive, by Guard Brown. There is no doubt whatsoever that he told the signalmen that his train had failed just to the south of Letham Grange when in fact it was just south of Lunan Bay, some $5\frac{3}{4}$ miles to the north and closer to Usan. It is not possible to be sure how Guard Brown came to make this mistake. He was an experienced guard and had spent many years working over the lines between Montrose and Arbroath. The sites of the lineside telephones at Lunan Bay and Letham Grange are quite dissimilar and I cannot believe that he really confused the two locations even though he apparently said to Driver Smith "This is Letham Grange" when the latter challenged him after the accident. I believe that his error was a slip of the tongue: he meant to say "Lunan Bay" and said "Letham Grange" instead without realising it. There was, at the time, no name or mileage on the cabinet housing the lineside telephone to indicate the location, and I believe his error, although reprehensible, was one that anyone could have made. It is unlikely that his physical condition played any part in his error. He was examined on 24th November 1975 by the Railway Medical Officer who concluded that his state of health, including the medication he was taking for a mild heart condition, would not have contributed in any way to his actions at Lunan Bay.

54. The second main factor was the excessive speed of the assisting locomotive. Driver Smith was informed at Usan, before entering the occupied section, that the failed train was at a stand to the south of Letham Grange. At the same time, as an experienced driver, he knew that under Rule M.5.2.1 he was required to drive at such a speed as to enable him to stop short of any obstruction, and also that on the line concerned he was not in any case permitted to exceed 55 mile/h whilst running as a light engine. In the event he chose to drive at speeds up to and exceeding the maximum he was allowed even on a clear line and was thus unable to stop his locomotive when he exploded the detonators and saw the guard with his red flag at Lunan Bay. There were of course mitigating circumstances. He had no reason to suspect that there would be any obstruction on the line during the first seven or eight miles of his journey south from Usan: and Guard Brown, by failing to wear his high visibility vest and to display his red flag immediately on the approach of the locomotive, gave Smith little chance of anticipating the danger into which he was running. Nevertheless, the Rules are clear and unambiguous and he should have been regulating his speed, especially in view of the falling gradients, so as to be able to stop at any obstruction. If he had done so, or even had he kept his speed to no more than the 55 mile/h that he was permitted, the accident need not have happened. He cannot therefore escape at least an equal share of the responsibility for the accident.

55. The signalmen and others involved cannot fairly be criticised. There is a slight discrepancy between the evidence given by Signalman Duke and by Inspector Kerr. If the timings given by Duke are correct, and I think it likely that they are, it would appear that he might have realised that there had been a mistake in the location of the train some few minutes *before* the accident and might then have tried to alert Guard Brown. But Inspector Kerr was convinced that, when he telephoned Duke on his return to Letham Grange, Duke already knew that there had been an accident. Whichever version is correct it would have been remarkable if Signalman Duke had realised the full implication of the wrong information in the short time available.

Remarks

56. Subsequent to the public hearing, I discussed the relevant Rules with the Chief Operations Manager, British Railways Board, and his staff. It was agreed that the circumstances of the accident were most unusual, and unlikely to be repeated, and I accepted that the provisions of Rule M.3.4, dealing with the protection of a disabled train when only its own line is obstructed, were basically sound. I considered however that it was desirable to specify a minimum distance in rear of a failed train at which detonators should be placed: as it stood, a guard could come upon a lineside telephone only a few yards from the back of his train and it would then be left to the signalman to instruct the guard to protect at a greater distance. This was accepted and it was agreed that the minimum distance should be 300 yards to align with the minimum distance specified in the Rules for protection in front of a disabled train. The following sentence was added to clause M.3.4.2 (and for consistency to clauses M.3.2.3 and M.3.3) with effect from 1st May 1976:

"If the Signalman instructs the Guard that it is unnecessary for him to proceed to the full protection distance, but the telephone from which the Guard contacts the Signalman is less than 300 yards from the disabled train, the detonators must be placed 300 yards from the train".

57. I also considered that a guard, when telephoning a signalman in accordance with Rules M.3.2.3, M.3.3, or M.3.4.2, should be required to identify the telephone from which he is calling and that the signalman should be required to record this information. I am glad to report that instructions to this effect were incorporated in additions to the General Appendix and to the Signalman's General Instructions, taking effect from 24th July 1976.

58. Rule M.5.1 was also examined. This requires a signalman, when instructing a Driver to pass a signal at Danger and to enter an obstructed section, to advise the Driver of the approximate location of the

disabled train. In the accident under Inquiry, where wrong information as to the location of the train had been given to the signalmen, the passing of this (wrong) information was a factor in the accident in that it led the driver of the assisting locomotive to ignore the requirements of the following rule, M.5.2.1. I think it would be quite unrealistic to require a signalman to withhold information as to the location of a failed train when he instructs the driver of an assisting locomotive and I therefore see no reason why Rule M.5.1 should be altered.

59. I also discussed the marking of lineside telephones. There are several different types of telephone that might be used for the purposes of Rule M.3, including signal post telephones, telephones at ground frames, level crossings etc., in addition to the lineside telephones of the kind found at Lunan Bay. Some of these, such as those at signal posts, are clearly marked with an identifying location or number: at others, the telephone arrangements are such that the signalman is in no doubt as to the point from which the incoming call originates. In these circumstances I agreed with the Railway Officers that all telephones from which calls could be made to a signalman without the signalman knowing, at all times, the location of the telephone being used should be clearly marked with their location and/or their mileage. Instructions have been issued to the Regions to review all their lineside telephones and to label them as required in accordance with these criteria.

I have the honour to be,

Sir,

Your obedient Servant,

C. F. Rose, Major.

The Permanent Secretary, Department of the Environment.

> Printed in Scotland by Her Majesty's Stationery Office at HMSO Press, Edinburgh Dd 497032 K7 10/76 (13726)



SCALE: $\frac{1}{2}$ inch = 55 yards

THEORETICAL BRAKING CURVES FOR CLASS 40 LOCO INVOLVED IN JULIUIUS AN LOUIS AND L

•

.

¹/₉₃ FALLING GRADIENT

.

	MAXIMUM	LINE SPEED	70	MPH		
	MAXIMUM	PERMITTED	SPE	ED FOR LIG	HTLOCO 55	MPH
26	5 ¹ 4				VIADUCT	26

TO MONTROSE



