



MINISTRY OF TRANSPORT

RAILWAY ACCIDENT

REPORT ON THE DERAILMENT

which occurred on

11th February 1961

between

RUGBY (Central) and LUTTERWORTH
STATIONS

in the

LONDON MIDLAND REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

1961

PRICE 1s. 9d. NET

MINISTRY OF TRANSPORT,
ST. CHRISTOPHER HOUSE,
SOUTHWARK STREET,
LONDON, S.E.1.
10th July, 1961.

SIR,

I have the honour to report for the information of the Minister of Transport in accordance with the Order dated 15th February, 1961, the result of my Inquiry into the derailment and subsequent collision that took place shortly before 3 a.m. on 11th February on the Down and Up lines respectively between Rugby (Central) and Lutterworth stations on the Great Central line in the London Midland Region, British Railways.

The 1.50 a.m. express freight train from Woodford to Mottram, travelling on the Down line, became divided after the derailment of a wagon, and the rear portion came to rest with the leading wagon blocking the Up line. A few minutes later at about 2.48 a.m. the 10.23 p.m. express passenger train from York to Swindon on the Up line collided at speed with the derailed wagon. The engine and tender turned on their sides and the tender turned end for end, becoming separated from the engine. The coupling came away between the tender and the leading vehicle which overran the tender diagonally to the left before it came to rest in the field adjoining the railway. Many of the other vehicles were derailed but there was no telescoping and no destruction of bodywork except to the first vehicle, which fortunately was not a passenger coach.

Two of the 18 passengers in the train were slightly injured. I regret to report, however, that Driver A. L. L. Jones was trapped on the engine and received fatal injuries; his fireman and two other members of the train crew, and the guard of the freight train, suffered from shock.

The collision occurred in open country in the middle of a 7 mile stretch between signal boxes, and some minutes elapsed before news of it reached the Railway Control at about 3.15 a.m., at the same time as the police were informed by a member of the public. Thereafter the emergency services were called and attended the scene with their customary speed, the fire brigade arriving at 3.30 a.m. and ambulances five minutes later. Arrangements were made to take passengers by a hired bus to Rugby and to send them forward later by a special train. This train did not in fact proceed more than a short distance owing to the lack of a suitable driver with knowledge of the route into the Western Region area, and the passengers then had to wait for the normal morning train service.

There was extensive damage to the permanent way as well as to the engine and rolling stock, and it was not possible to clear the site and to complete repairs to the Up line for traffic until midnight of the 12/13th February; the Down line was reopened for traffic a few hours later.

The night was fine and clear and there was a fresh breeze. It was dark at the time of the accident, though later there was a quarter moon which rose at about 3.15 a.m.

DESCRIPTION

The site and signalling

1. The Great Central line runs northward from Rugby (Central) towards Lutterworth seven miles away in the Down direction. At about three-quarters of a mile from Rugby (Central) station and after an easy right-handed curve the route passes over the main London Midland lines and sidings on a viaduct about 350 yards long on an open left-handed curve; it runs then on a high bank for about 330 yards, where the initial derailment took place, $1\frac{1}{2}$ miles from Rugby (Central), until it passes over the Oxford Canal on a 4 span girder bridge about 150 yards long on the straight. This bridge is constructed of through type girders with cross girders supported on the lower flange; the cross girders carry a steel plate decking on which there are cast steel stools which support the longitudinal rail timbers. The line thereafter passes over a number of lesser bridges, again on an easy right-handed curve, into open country where it is rather more in cutting than on bank until Lutterworth station is reached. In the area of the collision, on a straight stretch of line $1\frac{1}{2}$ miles beyond the point of derailment, the formation changes from bank to cutting. The line falls at 1 in 176 for the first $1\frac{1}{2}$ miles from Rugby and then rises at the same gradient for most of the next 4 miles; it then falls towards Lutterworth. The permanent way on both lines consists of 109 lb. FB rails fastened through base plates to wood sleepers with elastic spikes. The speed limit of the line is 75 m.p.h.

2. In the middle of the long block section between Rugby and Lutterworth Intermediate Block Section home and distant 2-aspect colour light signals are provided on both lines. These replace the signals controlled by the former Shawell signal box which was abolished a few years ago. Each set of signals is worked from the signal box on the approach side, and the lines are track circuited from the signal boxes to the overlap points $\frac{1}{2}$ mile beyond the home signals. The signals are returned to the red and yellow aspects respectively when trains reach the overlap track circuits, which begin just beyond each home signal. The signals will not change again to green

until the levers in the boxes concerned have been replaced in the frame and thereafter pulled. Each signal box is equipped above its 40 lever frame with an illuminated diagram which shows the state of the track circuits, occupied or clear, and the aspects of the I.B. signals. Full block controls, including the Welwyn control, are provided; the "Block Release" control locks the lever for the I.B. home signal normal in the frame until the signalman has received line clear from the box ahead; he can, of course, always put the signal to danger at any time by replacing the lever in the frame, though having done so he cannot pull the lever again until he obtains another line clear. Telephones are provided at the I.B. home signals. The relevant distances between boxes, signals, the point of derailment and the site of the collision are shown on the diagram.

The trains

3. The Class D express freight train consisted of a type V.2 engine with 2-6-2 wheel arrangement, and a 6-wheeled tender, and 36 wagons and brake van. As required for this class of train, the vacuum brakes on the first 12 wagons were connected to the engine. The total length of the train was 278 yards.

4. The express passenger train comprised a Western Region, Hall class engine with 4-6-0 wheel arrangement, and a 6-wheeled tender, and eight bogie vehicles followed by five four wheeled vans. The engine weighed 75 tons with the boiler full of water, and the tender loaded weighed 46 tons. The coaches weighed 299 tons. The brake efficiency of the train as a whole was 75% and the total length 217 yards. As is usual with the former G.W.R. engines, the driver's position was on the right.

5. The first three vehicles of the train were non-passenger ones; they were followed by three passenger coaches and two bogie vans. The leading vehicle, the fourth one (the first passenger coach), and the seventh, had steel bodies. The second, third, fifth and sixth had wood bodies, and the last one had a composite body. All had steel underframes. All except two of the vehicles had shock absorbing buffers. The first of the five four wheeled vans was a parcel van, and the other four were covered goods vans of 10 ft. wheelbase. Screw couplings were in use throughout the train.

THE COURSE AND EFFECTS OF THE DERAILMENT AND COLLISION

6. The point of derailment on the Down line, half-way between Rugby (Central) signal box and the site of the collision ($1\frac{1}{4}$ miles from each) was identified by a diagonal mark 18 ft. 2 ins. long on the six-foot rail where a wheel flange had mounted and ridden over the rail to drop on the outside. This was at the end of the transition from a left-handed curve to straight alignment. From this point onwards to the site of the collision there were signs of derailment changing from the six-foot side to the cess side and back again. At the re-railing ramp on the approach to the girder bridge over the Oxford Canal, about 180 yards beyond the point of derailment, there were signs that the wheels had been guided back from the six-foot but had jumped the rails to the cess side. There was extensive damage to the steel stools and transoms of this bridge, and a number of the baseplates on the longitudinal timbers were broken. For the last half mile to the site of the collision there were signs of more than one vehicle having been derailed and having deviated on to the Up line. It was necessary to renew the Down line throughout the length of $1\frac{1}{4}$ miles over which derailed wheels had run, as well as to renew the Up line over a distance of 170 yards at the site of the collision, and to make repairs where one or more derailed wagons from the Down line had swung on to and had damaged the fastenings on the Up line.

7. After the derailment the freight train became divided behind the 25th wagon and the front part travelled without stopping to Lutterworth. The rear portion consisting of 11 wagons and brake van stopped with the leading wagon foul of the Up line where it was hit a few minutes later by the oncoming express train. This wagon was a 12 ton "pallet" van, built in 1956. This is a covered van with one wide sliding door on each side. The body was of steel frames with wood panels built on a steel underframe of 10 ft. wheelbase. The tare weight was 8 tons 17 cwt., and the van was empty except for wooden pallets weighing about 5 cwt. The van was wrecked by the collision, but it was evident from the state of the wheels and axle boxes that it had run derailed for some distance. It was also possible to make some deductions regarding the wheel loadings, which are given in detail later.

8. The four wagons immediately behind the wrecked pallet van were found to be derailed after the collision and were all severely damaged; the leading two had run derailed for some distance, to judge from the condition of the wheels. The next five wagons were in good order and they remained on the rails, but the container on the last wagon was badly damaged, and the offside of the brake van had been torn away.

9. The engine of the Up express train turned on its right-hand side after the collision with the pallet van, but it remained more or less in line, coming to rest completely on its side on the Down line 157 yards ahead of the point of impact. There was a deep vertical dent in the smoke

box door, and the engine bogie, which became detached from the frame, was severely twisted, the right-hand leading bogie wheel having broken completely away from the hub. This wheel was found by the side of the second freight wagon, so I presume that the engine bogie was wrecked in contact with the derailed pallet van, and that the dent in the smoke box was caused by the engine striking the edge of the van. It would seem from the condition of the remaining wagons of the freight train that the engine capsized fairly slowly and that it was not until it was passing the last wagon that it tilted sufficiently for the fire box casing or cab frame to dislodge the container on that wagon and then to carry away the side of the brake van. The tender, which stopped to the left of the engine and level with it, had been swung end for end, and it came to rest on its left side. The tender drag box and draw bar had held firm as the tender was swung round, and the engine drag box had been torn out.

10. The first vehicle overran the tender to the left and came to rest in the adjoining field. It was tilted to the right, and the right hand side of the body and the roof had been ripped open as it scraped past the tender. The second vehicle remained coupled to the first one and followed it to the left, stopping with the leading end opposite to the tender wheels. It too was tilted to the right at an acute angle. The rear of this vehicle still coupled to the third one, had swung across to the Down line.

11. The front of the third vehicle followed the end of the second one on to the Down line, but the rear end remained over the Up line though the bogie was detached. The fourth vehicle, the first passenger one, remained in alignment though derailed, and the fifth and sixth were also completely derailed, as was the leading bogie of the seventh one. When the train came to rest the fifth vehicle was alongside the brake van of the freight train, and the ninth vehicle (the first of the 4-wheelers) was alongside the leading pallet van which had caused the collision. The position of the express train vehicles and of those of the freight train involved in the collision are shown on the sketch.

12. The underframes and bogies of the first three vehicles were severely damaged. The right-hand sides of the three passenger coaches had been heavily scored as they had passed the wrecked freight vans, and a number of windows were broken. The interior fittings of these coaches were not, however, much displaced and, as I have already said, none of the passengers received more than superficial injuries.

REPORT

The accidents

13. Mr. G. A. H. Wood, who lives in a house about 400 yards to the West of the line near the site of the collision, was awakened by a loud noise "like a truck hitting the sleepers". About 3 to 4 minutes later he heard the crash of the collision and dressed and went to the site. He invited the passengers to his home where his wife had prepared refreshment, and then drove his van to the nearest telephone to inform the police. His message at about 3.15 a.m. was the first news of the accident.

14. Driver J. E. Hearne said that he signed on duty at Woodford at 1.15 a.m. to work the 1.50 a.m. Down freight train to Mottram. Its departure was about 25 minutes late but the journey was without incident until the train had run through Rugby (Central) station, which is 14 miles from Woodford. His fireman then drew his attention to a small flame which appeared for a second or two at wheel level some distance down the train on the offside: the flame did not appear again but he assumed it to be caused by a hot axle box. He said that he decided to stop at Lutterworth so that the guard could examine the train, but did not consider it necessary to reduce speed. He had seen the side lights of the brake van when he first looked back, but did not specifically look for them on any of the subsequent occasions when he glanced back along the train during the run into Lutterworth. He did not notice a snatch at any time on the journey.

15. Hearne was aware that the maximum speed for a Class D freight train on the line was 50 m.p.h. He stated that his speed was about 40 m.p.h. during the journey; the engine had no difficulty with the load, and he had partly closed the regulator after passing Rugby to avoid going too fast. He added that the train passed Rugby at 2.38 a.m. by the signal box clock which he saw. This was 23 minutes after leaving Woodford Yard at 2.15 a.m., as against the allotted time of 24 minutes. When he stopped at Lutterworth with his engine opposite the signal box he saw that the clock there was at 2.47 a.m. It should be noted that the time taken from Rugby to a stop at Lutterworth was thus 9 minutes as against the scheduled time of 10 minutes for a train not stopping at either station. This entailed an average speed of about 53 m.p.h. between the two stations until the train began to reduce speed for the stop. Driver Hearne's times are confirmed by the signal box records, and the two clocks concerned were afterwards checked to agree within half a minute.

16. Hearne said that at Lutterworth he sent his fireman down the train to make contact with the guard. He told the signalman in response to a question that the I.B. signals had been at green

when he passed them; the signalman then told him that the Rugby signalman had telephoned to the effect that the track circuit had not cleared. The fireman then returned to tell Hearne that the rear part of the train was missing, and he thereupon went into the signal box to report the occurrence.

17. Driver Hearne had remembered passing the Up passenger express train in the section after his train had passed the I.B. signals, and before my Inquiry he had been accompanied over the route by the Locomotive Inspector in order to identify the place. He was fairly certain that it was in the vicinity of mile post 118; this is, in the Up direction, about 2 miles past Lutterworth and $1\frac{1}{2}$ miles on the approach side of the Up I.B. home signal.

18. Fireman B. Williams of the freight train had little to add to Driver Hearne's evidence. He said that after reporting the flame which he thought to be a hot box he looked back on two further occasions before Lutterworth. When asked why he had not looked for the lights on the brake van he said that when there were box vans on the train it was often hard to see a brake van's side lights. He was not conscious of any variation from usual in the running speed.

19. Goods Guard R. F. Marriott of the freight train confirmed that it left Woodford at 2.15 a.m. with a load of 36 wagons, of which the first twelve were vacuum connected to the engine, and brake van. He was seated on the near side at the ducket window and he recorded the time of passing Rugby (Central) as 2.39 a.m.; he did not notice anything unusual thereafter until his brake van came to a stop. When he looked at his watch he noted the time as 2.43 a.m. He said "it was an ordinary sort of stop but not in the ordinary sort of place"; he therefore went on to the verandah of the van and looked out on both sides before getting his lamp to walk along the train. He then saw through the darkness that wagons were obstructing the line, and immediately afterwards saw the headlamps of the express train approaching on the Up line. He put his lamp to red and ran towards the train, but had only gone a few yards before it passed him to collide at speed with the obstruction. Marriott was unable to say how many wagons were derailed and were obstructing the opposite line. After the collision he met the guard and the fireman of the express train, who went to protect the Down line. He also found a guard travelling as a passenger on that train and arranged for him to follow the fireman, who had been badly shaken in the collision. He then helped in looking after the passengers while the guard of the express train went to the I.B. signal telephone to report the accident.

20. Marriott was sure that he had not heard any unusual noises from the train before his van stopped. He said that there was a small fire in the van and the doors were shut, but it was not unduly warm inside and he was fully alert. He agreed that the derailed pallet van, which was only 11 vehicles away from him, must have caused a considerable noise and reverberation as it was dragged derailed and half suspended across the rail supports on the steel bridge over the Oxford Canal. He said that the brake vans themselves were fairly noisy.

21. I asked Marriott how long his van had been stationary before the express train arrived, and whether he did not feel that he had been slow in finding out what was the matter. He said that he thought only about 4 minutes elapsed before the collision. He had no particular sense of urgency at first, but did not consider that he had wasted time. Marriott was very slow in movement and speech when he came before me to give evidence, but was not deaf.

22. Fireman J. Elkins of the Up passenger express train said that the train had been running under clear signals since leaving Leicester and he thought that the speed was about 60 m.p.h. He was looking out on the left-hand side as the train passed the I.B. signals and he saw, a short distance ahead, the red light held by the guard of the freight train. He turned to warn his driver but saw from his actions that he had already seen it; the collision took place immediately afterwards and the engine seemed to heave over to the left-hand side as he (Elkins) tried to shut the water gauge cocks. The next thing he remembered was being on the side of the capsized tender, which was some way from the engine.

23. Elkins then saw his guard and they both tried to get into the cab of the engine, which was also on its side, as they thought the driver might be there, though they could not see into the cab owing to the escape of steam. The heat was so great that they could not get near. He then took the guard's detonators and ran towards Rugby to protect the rear of the freight train.

24. *Passenger Guard* F. E. F. James of the express train was riding at the front end of the fourth vehicle. He was shaken and bruised, but was able to find his lamp as the train lighting had not failed. After arranging for the fireman to go towards Rugby on the Down line he protected his train in rear and then tried to telephone to Lutterworth box from the Up I.B. home signal telephone. Unfortunately, he did not understand the correct use of the switch associated with the telephone and did not operate it so as to attract the signalman's attention. (This type of telephone has a two-way switch which is lifted to ring the signal box and then depressed to speak).

25. James then went back to the train and found the travelling porter, who had been in the second coach and was badly shocked, and sat with him for a time until he was taken to hospital. Eventually he was taken with the others to Rugby (Central) and later to the Midland station.

where refreshments were arranged. He returned later by the normal train service with the fireman to Swindon, where he collapsed from the delayed effect of the shock of the accident.

26. James's estimate of the speed at the time of collision was between 50 and 60 m.p.h. and he added that the train would not have been accelerating as it had to stop at Rugby (Central).

27. Goods Guard J. H. C. Steele, who was travelling as passenger in the Up express train, estimated that the collision occurred at 2.48 a.m. He thought that the speed of the passenger train had been between 60 and 65 m.p.h. After seeing that the passengers were not seriously hurt he followed the fireman towards Rugby, at the request of Guard Marriott.

28. The signal box timings for the express train from Leicester indicate a gradually increasing speed with an average of 45 m.p.h. between the previous signal box and Lutterworth; this is consistent with the estimated speed of about 60 m.p.h. between Lutterworth and the point of collision.

29. Goods Yard Inspector C. J. Betts was on duty at the coal yard at Rugby. He was advised by Control at 3.25 a.m. of the accident and went to the site on foot, arriving at 3.50 a.m. He made sure that the line had been properly protected and then spoke to the signalman at Lutterworth from the same telephone as the one used by Guard James. He knew the method of working the telephone switch, however, and was able to attract the signalman's attention at once. Inspector Betts then searched the passenger train again to make sure that no persons had been overlooked.

30. Deputy Chief Controller J. M. O. Weeks was on duty in Rugby Control Room. He was told at 2.55 a.m. by both the Lutterworth and Rugby signalmen that the freight train had been divided but did not hear of an accident until the Police telephoned him at about 3.15 a.m., whereupon he arranged for the emergency services to be called and for the bus transport to go to the site. He then put in hand the many arrangements that were to be made for restoring railway service.

31. Signalman R. J. Trotman was on duty at Rugby (Central) signal box. He said that the Down freight train passed at 2.38 a.m., travelling at the usual speed of 45-50 m.p.h. and, on looking at the illuminated diagram at 2.46 a.m., he observed that the overlap track circuit on the Down I.B. home signal was clear, while the approach track circuit showed occupied. He thereupon telephoned the signalman at Lutterworth saying that there might have been a track circuit failure or some vehicles might have been left on the line. A little later the Lutterworth signalman told him that the train had arrived incomplete and he then telephoned the circumstances to Control and added that the Up express train for which he had received Train Entering Section at 2.44 a.m. was overdue. He said that the express usually took 8 minutes through the section and 11 minutes had then passed without the approach track circuits at his Up home signal becoming occupied.

32. When asked what action he had taken to stop the approach of the Up express train when he saw the abnormal indications on his diagram of the Down I.B. track circuits, Trotman said that he took no action except to advise the signalman at Lutterworth of the condition of his track circuits. He did not think of the Up line being affected and believed that he had had a track circuit failure; he wanted, however, to warn the Lutterworth signalman in case the train had become divided so that he would look more carefully for the tail lamp. He claimed that he had experienced a number of track circuit failures during the past 11 months that he had worked at Rugby (Central), and I therefore showed him the record of track circuit failures for the past year which had been prepared for me and pointed out that few, if any, of the 11 recorded cases had occurred in association with train movements; they had been caused by weather conditions, by damage when men were working on the line, and by ashes near the water column. Signalman Trotman admitted that he had not appreciated to the full the implications of the warning which he had noticed from the track circuit indications. He also admitted that he had overlooked sending the Obstruction Danger signal at about 3.18 a.m. when the fireman of the express train arrived in a very distressed condition at his signal box.

33. The right action for Signalman Trotman to have taken when he saw the abnormal indications was to have sent the "Train Divided" bell signal to Lutterworth. The Block Regulations require that trains travelling in the opposite direction must be stopped on receipt of this message, and action by the signalman at Lutterworth to put the Up I.B. home signal at danger might have been taken before the express train reached the signal.

34. Signalman G. H. Pooley at Lutterworth said he recorded that the Up express train passed at 2.44 a.m. and that the Down freight train stopped with the engine opposite the signal box at 2.47 a.m. He confirmed having received the message given him by Trotman at 2.46 a.m. and his evidence showed that he clearly appreciated the implications of the abnormal track circuit indications. He said, however, that he did not feel it incumbent on himself to take emergency action to put back the Up I.B. home signal to danger. He did, however, restore the Down home signals to danger in order to stop the freight train. He said that after the fireman had discovered that part of the train had been left behind and had reported it, it was 2.51 a.m. and the Up express train had passed the I.B. signals. He then told Trotman that the freight train was divided and subsequently telephoned Control.

35. I asked Pooley whether he had not received sufficient information from Trotman to enable him to act on his own initiative in stopping the Up express train, and he replied that it was not right to act on verbal information in such matters and that he should have been given the proper "Train Divided" bell signal if he was required to take emergency action.

36. The important times of the train movements, as deduced from the evidence, are as follows:—

- (a) The Up express passenger train passed Lutterworth at 2.44 a.m. according to both signal box records. If it was travelling at about 60 m.p.h., as was suggested, it would have passed mile post 117 at 2.45½ a.m., mile post 118 at 2.46½ a.m., and the Up I.B. home signal at 119 miles 1022 yards at 2.47½ a.m., and would have collided with the derailed wagons at 120 miles 1100 yards at 2.48½ a.m. This time tallies closely with that of 2.48 a.m. estimated by Goods Guard Steele.
- (b) The Down freight train, travelling at about 53 m.p.h. based on box to box timings, passed mileage 118½, at which point the last wagon of the incomplete train cleared the overlap track circuit, about 4½ minutes after passing Rugby (Central) at 2.38 a.m., say at 2.42½ a.m. This was 3½ minutes before the signalman noticed the abnormal indication above his frame. The train must then have passed mile post 118 at about 2.43½ a.m., and mile post 117 at 2.45 a.m.
- (c) The rear part of the freight train, with probably 3 wagons derailed at the time, must have stopped fairly quickly after the division took place. The time taken by it to travel the 2½ miles from Rugby (Central) to the scene of the collision would have been about 3 to 3½ minutes, and it must have come to a stand at about 2.41 a.m. or 2.41½ a.m. This was at least 6½ minutes before the collision took place.
- (d) The timings of the two trains indicate that they crossed in the vicinity of M.P. 117 rather than M.P. 118 as stated by Driver Hearne. If his recollection was correct the express train would have had to have passed Lutterworth 2½ minutes earlier than recorded. It was evident from an examination of the passing times of the train at the previous signal boxes on its journey from Leicester, and from the confirmation given by the Rugby signalman's booked times, that this was not the case, and that the recorded passing time of 2.44 a.m. at Lutterworth is substantially accurate.

Causes of the derailment

37. Detailed measurements were taken of the track on the approach side of the point of derailment to ascertain whether it might have caused, or have contributed to the derailment. The gauge, level and run-out of cant on the curve transition leading to the point of derailment were very good indeed. There were certain irregularities in the alignment of the transition but these were comparatively minor and were not near the point of derailment; they could not be considered as contributory to the accident.

38. The evidence of Carriage and Wagon Examiner A. A. Collett was to the effect that he examined the freight train at Woodford Yard before its departure. He spent half-an-hour on the examination, which gave him sufficient time to see that the train was in good running order. He remembered the group of pallet vans, of which the derailed van was one, but he had no defect report to make on it or on the rest of the train.

39. The pallet van at the head of the rear part of the freight train (the 26th vehicle), which was the first one to become derailed, took the force of the collision and was badly battered. It was, however, possible to obtain useful information from a careful examination of the parts. The wagon had lost both axle boxes from the front axle, but these were found near the through girder bridge between the point of derailment and the site of the collision, and all the components were also found within this length. There were no signs on the journals or on the pieces of the bearings of their having run hot. The rear springs were not damaged, although the leading ones were badly strained; it was nevertheless possible to measure the camber of all of them. It was found to be 2½" on both the nearside springs, and 2¾" on the offside ones. It was also possible to straighten the eyebolts by which the body is suspended at the scroll irons from the springs, and to measure their lengths; the maximum variation was in the bolts for the offside trailing springs which were 11/32" shorter than the bolts for the nearside springs and 9/32" shorter than the offside leading bolts. This variation meant that the off leading and near trailing wheels had been lightly loaded, though not by an excessive amount. The theoretical variation of weight on the rail at the lightly loaded and heavily loaded wheels was 2.04 and 2.5 tons respectively, allowing a weight of ½ ton only for the load of empty pallets. The disparity in loading must in fact have been appreciably greater owing to the friction between leaves of the short stiff springs which has considerable effect when a wagon is without a load.

40. The pallet van was one of a group of seven such vans (the 23rd to 29th vehicles) running between Bristol and Wadsley Bridge which had been incorporated in the train as a unit and which

were vacuum connected together. (The vacuum brake was not of course working on these vans). The vacuum hose at the rear of the 25th van had been torn away, as had the hose connections on the 27th and 29th vans. The screw coupling of the 25th van, which had been in use between it and the 26th van, was found to be fully screwed up after the accident, and this suggests that there was no undue play between the vehicles.

41. The wheel weights on the 25th van were measured after the accident and were found to be 2.1 tons on the near trailing and off leading wheels, and 2.7 tons on each of the other diagonal pair.

42. The speed of the freight train has already been given in paragraph 15 in the assessment of 53 m.p.h. based on Driver Hearne's evidence. Though this was a little more than the authorized speed for the train, it was within the limit of 60 m.p.h. laid down for 10 ft. wheelbase vehicles, at that time.

43. None of the evidence outlined above constitutes a clear reason for the derailment, and it has been necessary, therefore, to examine the record of this type of vehicle. The 12-ton pallet van with 10 ft. wheelbase is similar in design of frame and wheel springing to other modern vans of this size except that the van body is well braced with angle iron, which may make the frame more resistant to torsion. There have been a number of derailments in the past few years of empty pallet vans in trains which were travelling at an appreciable speed, generally in excess of 50 m.p.h., for which no definite causes have been found. In some the derailment has been ascribed to excessive speed, and in others to a maladjustment of the bearing spring eyebolts. Investigations have recently been carried out into the effect of variations of free spring camber and of lengths of eyebolts on wheel loadings, and it has been found that $\frac{1}{4}$ " variation in camber can cause a load variation of 15 cwt., and $\frac{1}{4}$ " in the adjustment of the eyebolt can affect the wheel loading by as much as 10 cwt. At the time of the derailment consideration was being given by the British Transport Commission to the re-design of the springing and to the imposition of a speed restriction on pallet vans of this design.

CONCLUSIONS

44. It is clear that the derailment began at the 26th vehicle of the freight train, a 12-ton pallet van with 10 ft. wheelbase. I am of the opinion that there was no obvious fault in the pallet van which could have been detected at the train examination at Woodford Yard, and I am satisfied that the track was in good order. The speed of the freight train when the derailment occurred was more than the maximum of 50 m.p.h. laid down for this class of train over this line, though not very much, and it is evident that the wheel loadings on the 26th wagon were unequal, though not excessively so. I can only assume that the derailment occurred because the design of the pallet van was not adequate for the speed at which it was travelling. A number of factors may each have contributed their part to the overriding of the rail by the off leading flange of the pallet van, such as the oscillation set up by the speed combined with minor irregularities of the track and the uneven wheel loading of the van in front, the light loading of the wheel that first became derailed, and the inflexibility of the frame of this type of braced vehicle combined with the short stiff springs.

45. It is clear that Driver Hearne was exceeding the speed limit for his train when the derailment took place, but it was by only a small margin and he had no means of judging it accurately. I do not, therefore, criticize him for the speed at which he was travelling, but I do consider that he failed to take proper care when his fireman drew his attention to the trouble at wheel level down the train. It would obviously have been prudent to have reduced speed considerably and to have paid much closer attention to what he thought to be a hot box. Had he done these things he might well have felt the drag of the derailed vehicles or the surge when the train became divided, and he might have been able at least to display a danger signal to the opposite line.

46. I am surprised at Guard Marriott's unresponsiveness and slowness. It is difficult to understand how he could have failed to hear the clatter as the derailed wagon was dragged over the through girder bridge, and he certainly took his time in finding out the trouble when his van had come to a stop in what he recognized to be an unusual place. Had he been a little less lethargic during the 6 $\frac{1}{2}$ minutes before the collision took place he might well have advanced far enough towards the oncoming express train to warn the driver by showing his red lamp in time for the brakes to have been fully applied and the speed abated before the collision took place. I am sure that the consequences would then have been much less serious.

47. The enginesmen of the express train were alert, and it is evident that the late Driver Jones applied the brake promptly when the danger signal was shown.

48. I do not blame Signalman Trotman of Rugby (Central) box for not noticing the abnormal indications on the illuminated diagram sooner. Signalmen are not expected to watch the diagram the whole time, and he had other duties to perform. He was certainly at fault, however, when he did see the indication, in not sending the proper emergency bell signal. Had he sent the "Train Divided" signal promptly, the Up I.B. home signal might have been put to danger before the train passed it, though the margin of time (between, say, 2.46 $\frac{1}{2}$ a.m. and approximately 2.47 $\frac{1}{4}$ a.m.) would have been small. I consider that Trotman was not justified in assuming that the abnormal

indications on his diagram were due to a track circuit failure. Such an assumption was in fact contrary to his own interest, but he may have felt that he would have looked foolish if he had sent the "Train Divided" bell signal, and the freight train had then arrived intact at Lutterworth.

49. Signalman Pooley of Lutterworth was no doubt justified by rule in not trying to stop the express train after Trotman had told him on the telephone of the abnormal track circuit indications. Had he shown the appropriate initiative on this occasion it would, I am sure, have redounded to his credit.

REMARKS

50. As I have said, the behaviour of pallet vans, which are habitually marshalled in fast running freight trains, has caused the British Transport Commission concern owing to the number of derailments of empty vans at speed, and a speed restriction of 40 m.p.h. has been imposed on all pallet vans while improvements are being made to the springing. These include, as an immediate modification which is now being applied, an increase in spring flexibility by adding to the number of rubber sandwich compression springs on the eyebolts under the scroll irons. In addition to this, a more rigorous standard of inspection and closer limits of wear have been laid down so as to ensure less side play in the wagons. Research is also being carried out into the changes which are necessary in the design of the springing as a whole to obtain better running at speed with this type of wagon, with which there is so great a difference between the loaded and empty weight.

51. The way in which the first accident gave rise to the second is an example of the circumstances in which flares could be valuable. I cannot say that the availability of flares would have prevented this collision, in view of the extreme slowness of the freight train guard, but it is easy to visualize how effective a flare could have been on this occasion to send an immediate warning to the oncoming express train. The use of this kind of equipment is being examined by the British Transport Commission, and tests were made on 11th January, 1961 with two types of flare to compare their effectiveness. I hope that a decision to take flares into use will be possible soon.

52. Finally, I think it appropriate to draw attention to a point made by the Union representative at my Inquiry. The guard and fireman of the express train were allowed to travel back unattended to Swindon after being severely shocked by the accident. Though both men naturally wished to travel back to their homes, it would have been preferable for them to have been given medical supervision and rest before making the journey.

I have the honour to be,

Sir,

Your obedient Servant,

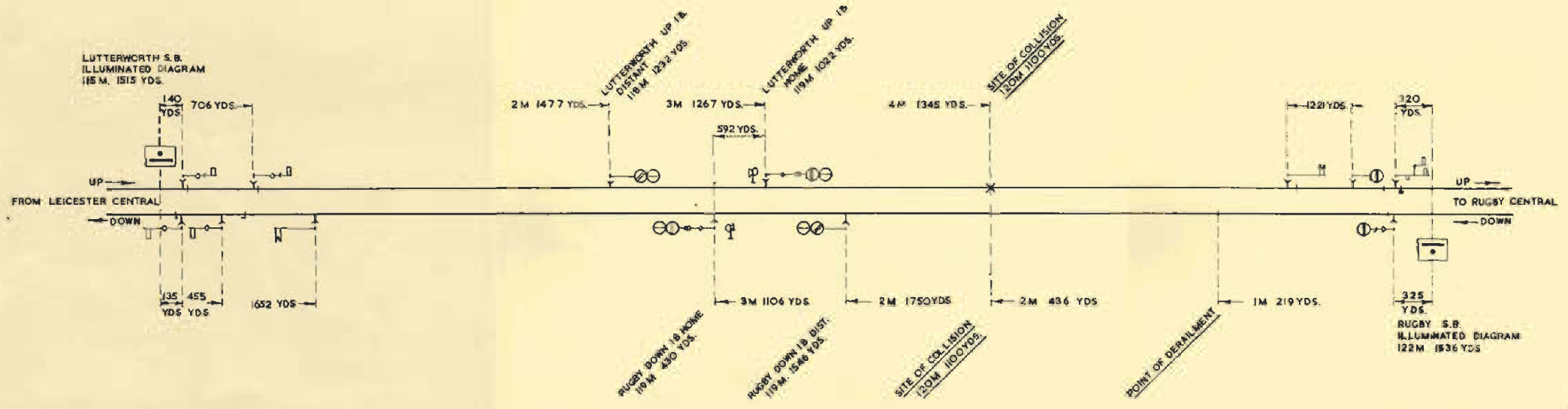
W. P. REED,

Colonel.

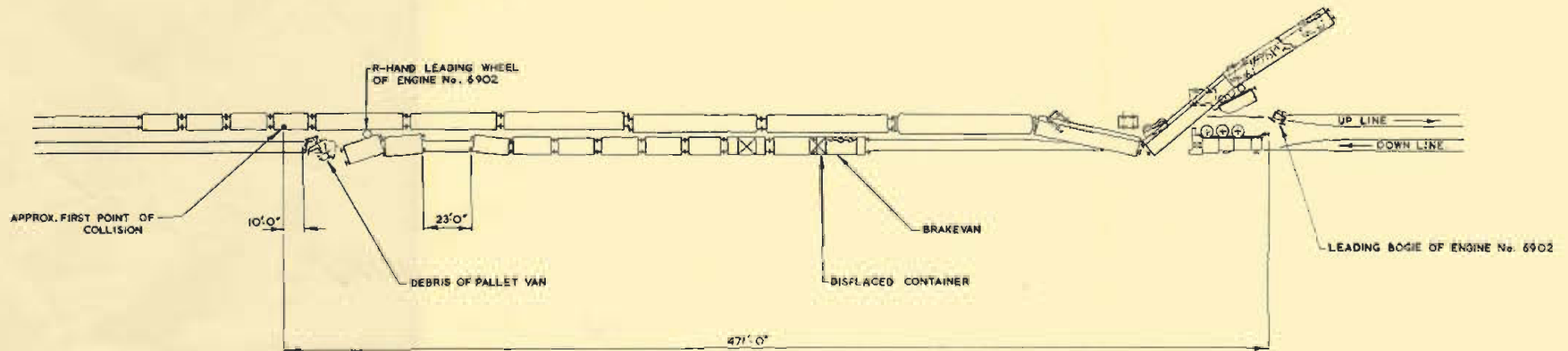
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