DEPARTMENT OF TRANSPORT

RAILWAY ACCIDENT

Report on the Collision that occurred on 16th February 1977 at Darlington

IN THE
EASTERN REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

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RAILWAY INSPECTORATE,
DEPARTMENT OF TRANSPORT,
2 MARSHAM STREET,
LONDON SW1
13*th July* 1978.

SIR,

I have the honour to report for the information of the Secretary of State, in accordance with the Order dated 24th February 1977, the result of my Inquiry into the collision between an express passenger train and an empty two-car diesel multiple-unit train that occurred on 16th February 1977 at Darlington in the Eastern Region of British Railways.

At approximately 11.30 the diesel locomotive hauled 08.00 King's Cross to Edinburgh express passenger train failed to make its booked stop at Platform No. 4 at Darlington because the coaching stock brakes could not be operated from the locomotive; the train negotiated the station at high speed and passed a signal at Danger. At the north end of the station it came into converging collision with, and derailed, the rear car of the empty train which was entering Platform No. 6 from the north. The express train ran on along the Bishop Auckland single track branch line, from which the empty train had come, and was brought to a stand by the use of the passenger communication apparatus.

The lines were protected and the emergency services were quickly at the scene but fortunately none of the 250 passengers on the express train suffered injury although its guard was slightly bruised. The train was drawn back to Darlington Station and the passengers transferred to a following train. After re-railing of the empty stock train was completed at 17.40 Platforms Nos 1, 4, and 5 were returned to traffic at 18.10 although Platform No. 6 remained out of use due to track damage until 11.55 the following day. At the time of the accident the weather was dull with intermittent rain.

DESCRIPTION

The Site and Signalling

1. Darlington Station lies on a loop to the west side of the East Coast Main Line 232 miles from London and 44 miles to the north of York. It is an island station, consisting of Nos 1 Up and 4 Down Through Platform lines, together with Nos 2 and 3 Bay Platforms at the south end and Nos 5 and 6 Bay Platforms at the north end of the station. The station lies generally north and south, the Up direction being towards York. Relevant details of the signalling layout with gradient and location diagrams are at the back of the report.

2. Between York and Darlington the line is almost straight, the only major curvature being in the last 5 miles. The only intermediate stations are at Thirsk and Northallerton and the only junction, apart from those with additional running lines, is at the latter station where the lines to Teesside diverge. In the Down direction the line is level for the first 12 miles from York and then rises gently with easy gradients not steeper than 1 in 500 over the next 27 miles to reach a summit at the former Eryholme Signal Box 38 miles 1,628 yards from York. From this point the line falls at 1 in 391/342 for over 2½ miles to the 41½ milepost where it rises again at gradients of 1 in 438/426 to Darlington Station. The line continues to rise thence to the place at which the train eventually came to a stand.

3. Trains are signalled under the Track Circuit Block Regulations using 3-aspect searchlight type colour-light signals with a fourth independent yellow aspect. Approaching Darlington from the south the line speed is 100 mile/h and the last automatic signal on the Down Main line is D923, followed 1,600 yards further on by the first controlled signal, D921. This controls a facing junction with the Down Goods line. A further 1,409 yards on is another controlled signal, D917, which carries a route indicator and controls entry to the various platform lines. Some 600 yards beyond this signal on the Down side of the line is Darlington Signal Box which is equipped with an entrance-exit panel. From this point a 35 mile/h speed restriction applies through the connections and towards and over No. 4 Platform line. This is reduced to 20 mile/h over the line adjacent to the platform face and beyond, until it is increased to 30 mile/h from the junction of the lines serving Platforms Nos. 4 and 6, at which the collision occurred, as far as Parkgate Junction, the point where the Bishop Auckland line diverges, where the line speed is again reduced to 20 mile/h over the branch and up to the point at which the train came to rest.

The Trains

4. The express passenger train (1S16) consisted of 11 bogie vehicles hauled by English Electric Deltic locomotive No. 55 008, weighing 101 tonnes. The train consisted of Mark IId and f stock, with the exception

of the leading vehicle, a gangwayed brake van (BG) and the Buffet/Kitchen and Restaurant Cars which were Mark I vehicles all fitted with modern bogies. All the coaching stock is equipped with the standard British Railways Two-Pipe Automatic Air Brake and has a maximum permitted speed of 100 mile/h. The theoretical train brake force was 85·4 per cent of the total weight of 474 tonnes. The locomotive brake force alone was 83 per cent of its weight, or 17·7 per cent of the total weight of the train and locomotive. The length of the train overall was 796 feet. The empty diesel multiple-unit train (DMU) consisted of Driving Trailer Open Composite Lavatory (leading) No. E56065 gangwayed to Motor Open Brake Second E50213 weighing 32 tonnes and equipped with two 150 hp diesel engines driving the wheels through a mechanical transmission. Its total length was 121 feet.

The Two-Pipe Automatic Air Brake

5. This utilises a brake pipe and a main reservoir pipe, which are continuous throughout the fitted portion of a train. Each vehicle has a distributor and auxiliary reservoir. The brakes on a vehicle are held in release but ready for use when the brake pipe and the distributor control reservoir are charged to 70 lbs/sq. in. from the driver's brake valve and the auxiliary reservoir is charged to between 70 and 100 lbs/sq. in. The auxiliary reservoir pressure is normally maintained from the main reservoir pipe which is nominally charged to 100 lbs/sq. in. direct from the locomotive's main reservoir system via a reducing valve. The brake system can be operated even if the main reservoir pipe is not charged with air, as the auxiliary reservoir on each vehicle is then charged to 70 lbs/sq. in. from the driver's brake valve via the brake pipe through the distributor.

6. The brakes are applied by reducing the brake pipe pressure, which operates the distributors so as to pass air from the auxiliary reservoirs to the brake cylinders up to a pressure corresponding to the brake pipe pressure reduction. The brake cylinder pressure is automatically maintained at the appropriate pressure by the distributor. The brakes are released by re-charging the brake pipe, the brake cylinder pressure being reduced in proportion to the rise in brake pipe pressure, with full release of the brakes being obtained when the brake pipe is re-charged to 70 lbs/sq. in. The pipes between the vehicles are coupled together using strong rubber hoses with cast metal 'palms' or coupling heads painted red for the brake pipe and yellow for the main reservoir pipe. After an earlier accident at Darlington on 11th December 1968 it was found that it was possible, because of the design of the coupling heads, to cross-couple the pipes. These were subsequently redesigned so that it is no longer possible to do this. Where the flexible hose-pipes enter rigid piping attached to the vehicle or locomotive frame, a cock is provided to isolate the pipe. These cocks are painted in colours corresponding to the pipe on which they are mounted. In order to shut off the brake pipe the cock must be closed in a single sharp movement, any slow movement results in the loss of air from the brake pipe through a small bleed hole built into the cock with the consequent application of the brakes. The instrument panels in the locomotive cabs include pressure gauges showing the air pressure in the main reservoir, the brake pipe, and the locomotive's brake cylinders. The guard's compartment of a passenger brake van is fitted with a 'Duplex' pressure gauge, showing the brake pipe pressure on a black needle and the main reservoir pipe pressure on a red needle, together with a brake pipe valve with which the brakes may be applied in an emergency. The operation of the passenger communication apparatus by pulling a chain inside a vehicle, opens a valve exhausting the brake-pipe to atmosphere at a controlled rate. The pressure reduction in the brake pipe then applies the brakes in the same manner as a normal brake application.

The Course of the Collision and the Damage Caused

7. The driver of 1S16, in company with a motive power inspector, had joined the train at Doncaster. The train and locomotive had responded normally to the controls between Doncaster and York including braking at speed restrictions and for the stop at York after which there had been no need to apply the brakes until commencing to apply them for the Darlington stop. However this application had little or no effect and, despite an emergency brake application and the release of the driver's safety device (DSD), the train passed through the station at a high speed, estimated as 55 mile/h, retarded only by the locomotive brakes. At the north end of the station it passed Signal D883 at Danger and came into converging collision with the rear car of the DMU, derailing it and turning it onto its side. Because of the collision and damage the locomotive then lost main air pressure and the train ran on unbraked for some 1,600 yards, passing a further signal at Danger before stopping on the Bishop Auckland single line shortly before reaching Darlington North Road Station, when the passenger communication apparatus was operated and applied the brakes on the coaching stock. As a result of the collision the front brake and reservoir pipes of the locomotive were damaged, a buffer was knocked off, a brake cylinder was damaged, and the leading right-hand bodywork was damaged. The rear car of the DMU was badly damaged both as a result of the collision and from having been turned on its side. While the collision was being investigated the main reservoir pipe between the locomotive and the BG was found to be disconnected and the brake pipe cock on the leading end of the BG was found to be closed thus effectively isolating the train brakes from the locomotive. Further damage was also found to the underside of the diesel locomotive that could not be attributed to the effects of the collision and details of this are given in the evidence and on a plan at the back of the report.

As to the running of the Train

8. The driver of 1S16 was *Driver A. Hewitt* who told me that he had driven trains on this route for about 6 years and had driven that same train on the day before. He confirmed that the train had reacted completely normally to all the controls until nearing Darlington and that he had not had occasion to use the brakes for any reason after the stop at York. Approaching Darlington he made the first brake application just after passing Signal D923 when the train was travelling at about 85 mile/h. Between that point and Signal D917 he made two emergency brake applications releasing the brakes fully after each one because there was no response although the brake gauge in his cab was showing the correct bogie air pressure. When he replaced the brake handle into the running position he noticed that the pressure gauge was rising more quickly than it ought to have done for 11 vehicles. As they were passing Signal D917 he used the locomotive straight air brake fully and Inspector Ross, who had come over to his side of the cab, attempted a further brake application using the continuous brake.

9. The train was travelling at about 75 mile/h passing Signal D917 and he estimated that on entering the platform speed had been reduced to about 60 mile/h. He was sounding the warning horn continuously and cancelled the AWS, but could not remember whether or not he released the DSD. He noticed Signal D883 at the end of the platform at Danger, saw the empty train, and realised that a collision was imminent and braced himself. After the collision he noticed that all air pressure on the locomotive had been lost and assumed, when the train came to a stand on the Bishop Auckland branch line, that it had done so because the passenger communication apparatus had been used. He used a signal post telephone to contact the signalman who assured him that protection had been carried out and he then arranged to search for any passengers who might have suffered injury. After telephoning, his attention was drawn by Inspector Ross to the fact that the red cock on the brake pipe was closed and that there was a plastic sack, of the type used for permanent way components, hanging over one of the axles of the first bogie of the BG. He told me that during the journey between York and Darlington he saw 4 patrolmen walking their lengths. They were all over on the Slow line and he saw no men actually working on the track. He was not aware of any abnormal noises during the journey nor of any items lying on the track of the Down Fast line.

10. *Inspector J. D. Ross* who joined the train at Doncaster with Driver Hewitt said that the train was 5 minutes late departing and that, as was his practice, he examined the brake pipes between the locomotive and the BG and also the electrical train heating connections. On this occasion he confirmed that all connections were correctly made and that the cocks were in the correct position. He described the journey between Doncaster and the stop at York as perfectly normal, the locomotive responding to all applications of the continuous brake for speed restrictions and the stop. The train passed Northallerton at the right time and he noticed the driver applying the brake at Signal D923 and then making an emergency application. He could feel that there was little or no response and went across to the driver's side of the cab suggesting that the straight air brake should be applied fully. Suspecting that the poor weather conditions might possibly have resulted in all the wheels of the train locking, he slowly reduced the brake application on the continuous brake in an attempt to start the train wheels rotating again, but this action and re-application after releasing the brake produced no response although he noticed that the brake cylinder pressure on the locomotive's bogies was being indicated as 70 lbs/in.

11. In the vicinity of Signal D917 he returned to his seat and commenced to sound the horn continuously. Approaching the signal box and the 35 mile/h speed restriction the speedometer was indicating a speed of 65 mile/h but they negotiated the curve fairly smoothly. After the collision he confirmed that main air pressure was rapidly lost and that the air pressure in the locomotive's leading bogie brake cylinders was gradually dropping. After the train had stopped he went to the rear of the locomotive and found that the brake pipe cock on the BG was in the closed position and the reservoir air pipes between the locomotive and the BG were parted. Suspecting that the locomotive reservoir pipe might have swung up and struck the handle of the brake pipe cock he simulated what he thought had happened and decided that, although the metal palm on the end of the pipe cleared the cock by about half an inch in the closed position, the pipe could have struck it in the open position and closed it. Underneath the BG he noticed a plastic sack hanging down and also a piece of plate which he suspected was a traction motor cover although it was very clean and usually these were dirty. He drew the attention of the officials and a photographer to the position of the brake pipe cock, the separation of the reservoir pipes, and to the objects hanging beneath the BG.

12. On duty in Darlington Signal Box was *Relief Signalman D. J. H. Harding* who told me that prior to 1S16 he signalled a parcels train, 4EO5, which passed through normally although it was put onto the Slow line at Croft. He set a route for 1S16 into Platform 4 as it approached his section of the line and, because it seemed different as it passed the signal box, he looked out of the window and saw that it was travelling much faster than usual. He could not recollect the locomotive horn being sounded and saw no signs of heavy braking. He realised that it would collide with the empty DMU and replaced the signals to Danger for a further train approaching from Bishop Auckland. He spoke to the Driver of 1S16 on the

telephone and confirmed that the track-circuit indications on the line adjacent to 1S16 were showing occupied on the signalling panel because the driver had applied a track-circuit operating clip. He told me that before the passage of 1S16 the signalling equipment was operating normally but that after the train had passed Eryholme, Track Circuit 98 failed to clear and this retained Signal D38, an automatic signal, at Danger. There was also a signal-post telephone failure in that area.

13. In charge of 1S16 was *Guard C. Tunnah* who explained that the duty involved travelling from Edinburgh to King's Cross one day, lodging the night in London, and returning to Edinburgh the following day. He estimated that he had been on duty between York and Edinburgh for between 7 and 10 weeks since the previous summer and said that he knew the route between King's Cross and Darlington well. He confirmed that a proper brake test had been carried out when the train was at King's Cross before its departure. During the journey from York to Darlington, apart from visiting the lavatory, he remained in his guard's compartment at the rear of the train, where the brake valve and hand brake are located, until, about 10 to 15 minutes before the train was due to arrive at Darlington, as it passed Croft, he went into the van to register and sort the 12 parcels that he estimated were there. During the journey he did not look out of the window or see any signals. He also had charge of a dog in the van which was barking and he spent some time talking to it trying to keep it quiet. He claimed that he expected braking for the stop at Darlington to commence 5 or 10 minutes before they were due to stop there, but that the time depended on the driver, some of them braking well before.

14. He claimed that about 1½ to 2 minutes before the train reached Darlington Station he realised that the brakes had not been applied but that the train had almost reached Darlington Signal Box before he realised that it was going too fast and claimed that as he attempted to reach the emergency brake the movement of the train negotiating the curves at high speed flung him to the floor where he thought he lay for about 2 minutes. He made a second attempt to reach the brake handle and, because the train was travelling over some points, he was thrown about again, caught his thumb in the cage, and was thrown to the floor for a second time. Just as he was making a third attempt to apply the brake the gauge fell to zero and the train stopped in a place which he did not recognise. He went to the front of the train and met the driver and inspector who pointed out the brake cock in the closed position. He then put down detonators and a track-circuit operating clip to protect the opposite line and went to protect the rear of his train. He spoke on a signalpost telephone to the signalman telling him that track-circuit operating clips had been put down. He went through the train to see if there were any casualties and asked a doctor to go and see the driver as he considered that he had been shocked by the accident.

15. *Assistant Area Manager C. R. Johnston* was in his office on Platform No. 1 at Darlington Station when he heard a locomotive horn sounding as a train was entering the station and realised, as 1S16 passed along Platform 4, that something was wrong. After establishing that no-one was injured in the derailed DMU he went to North Road Station where he found the train standing. He saw Guard Tunnah walking from the rear of the train where he had been carrying out protection and thought he looked very tired but did not speak to him then. Later he asked Guard Tunnah why he had not applied the train brakes. Tunnah had replied that he had heard the horn of another train, was getting the parcels ready for Darlington, and was dealing with a howling dog.

16. *Steward J. E. M. Campbell* was one of the dining car staff on 1S16 and told me that after departure from York he went through the train with another steward booking for lunch. Just after passing the half-way mark between London and Edinburgh, in the fourth coach from the locomotive they heard, and both commented on, some bangs under the coach which they thought were ballast. This was about 10 to 12 minutes after they had left York. He said that he had heard the noises made by dynamo belts coming off and children throwing stones at the train and described the noise that they had heard as an every-day sort of thing and, hazarding a guess, said that he thought it was only one item which was banging about underneath the train. As the train took the connections into Darlington at high speed he was back in the pantry and the Chief Steward had come through and operated the passenger communication apparatus before they had time to do so themselves.

As to the Investigations After the Collision

17. *Mr. D. Reeves* the *Traction Engineer (Maintenance) Newcastle Division* told me that on his way to look at the train after the accident he walked along the track over which 1S16 had passed, at about 13.30. He stopped the locomotive of 1S16 being drawn back to Darlington and made a quick examination noting that the brake blocks had been subject to severe braking over a considerable distance, that they were all complete, and that they were not below scrapping size. A DMU axle-box was wedged at the leading end between the bogie and the locomotive frame and was removed in order to move the locomotive. He was told by Inspector Ross about the traction motor cover lodged under the BG. He inspected 55 008 over a pit at Darlington Depot finding marks from front to back under the locomotive indicating that it had run over something substantial. No. 5 traction motor cover was missing but there were many marks forward of the motor that

could not have been made by the cover coming loose and passing beneath the locomotive. At this stage he was not sure whether the marks had been caused before, or in, the collision. At the scene of the collision he searched for any large objects which might have caused the marks on the locomotive but all the debris had been placed to the side of the track. A permanent way man told him that all the large items had been found on the east side of the track and that only very small pieces had been found in the four-foot. Mr. Reeves then searched for signs of an item being rolled along between the underside of a locomotive and the track but found only very small marks. While looking at the coaching stock of the train he noticed the very clean traction motor cover and arranged for a search of the track to be made between York and Darlington for objects over which the locomotive could have passed and which could have caused the marks. He had already heard that the Restaurant Car Crew had heard ballast noises near York and that there had been an incident at Eryholme. He found out that a new traction motor cover had been fitted on the previous Sunday and went back to 55 008 to make a detailed examination of the marks.

18. He thought it possible that the traction motor cover might have fallen off the locomotive, disconnecting the brake pipes, and possibly even closing the brakepipe cock, as it passed beneath. However the severe indentations forward of this cover in the direction of travel of the locomotive indicated to him that some other object must have been involved. He made a detailed survey and plan of all the marks on the underside of the locomotive which were predominantly on the left-hand side in the direction of travel although there were some on the right-hand side. The cover had a severe indentation, which he thought could only have been made with it in place, in the middle of what would have been its lowest part when in position. This had led him to the conclusion that the cover had been knocked off by an object over which the locomotive had run during the course of its journey north of Doncaster. He also concluded that the same object had probably uncoupled the reservoir pipe, and that the end of a pipe swinging, or the traction motor cover, had closed the brake-pipe cock somewhere after the train had left York.

19. The following day he had the locomotive and leading BG re-coupled and found that the locomotive reservoir pipe could strike the brakepipe cock on the leading BG and close it. He observed two faint red marks on the end of the metal coupling of the locomotive reservoirpipe. He established that the reservoir pipe of the BG could be bent round, but only with difficulty, into such a position that it could close the brakepipe cock, but felt that it was unlikely that this pipe had closed the brakepipe cock. He agreed that he had considered the possibility that the traction motor cover had been incorrectly fitted on the Sunday but the damage to it and the position of the adjusting screws and safety bolt combined with the marks forward of the motor under the locomotive were such that he felt it must have been knocked off the locomotive rather than falling off. He also tried to manipulate the traction motor cover into such a position that it could close the brakepipe cock but the movement required and the fact that it would then have had to fall down to the other side of the train and lodge where it was found, led him to the conclusion that this was not the object that had closed the cock. On the underside of the BG he found at least one severe indentation on a bogie behind the place where the traction motor cover had been found indicating that another object must have passed beyond the traction motor cover. He later heard that near Eryholme a cable to a track circuit had been cut at a point between 8 and 12 inches from the cess rail which would have been virtually beneath the traction motor cover in position on the motor or hanging down from it.

20. He told me that he visited Eryholme and confirmed that the fault in the signal-post telephone was due to a bad joint. He made a search of the surrounding area but found nothing that the locomotive could have run over to cause the trouble. After searching the scene of the collision very carefully he came to the conclusion that the marks beneath the locomotive had not been caused either during, or immediately after, the collision. From the marks beneath the locomotive, including a puncture of an aluminium water tank, a deep indented mark on a traction motor casting, and the bending of safety loops, he deduced that the object over which the locomotive had run must have been a substantial piece of metal probably of a circular section weighing about 14 lbs. He found that the brake-pipe cock which had been closed, was slacker than average and free to move and that the marks on the metal coupling of the locomotive reservoir pipe could only have been made if the cock had been open when the pipe swung up. The uncoupling of the reservoir pipes between the locomotive and leading vehicle did not require a lot of effort provided they were moved vertically upwards although if they had been charged to normal pressure he thought that it might have required rather more effort. He could not find any marks on the reservoir pipes of them having been struck by an object which could have disconnected them but this could have been because the pipes were made of rubber. He discounted the possibility of any of the major marks under the locomotive being the result of flying ballast although there were some small ones which could have been caused in that way; the majority were definitely caused by metal to metal contact.

21. He thought that the possible sequence of events was that the traction motor cover was dislodged by the object over which the train ran, which object then uncoupled the reservoir pipes between the locomotive and the BG, and marked the underside of the locomotive and the leading BG. The traction motor cover had then hung down cutting the track circuit connection and was bent into a U-shape, falling off, passing beneath

the train, and becoming lodged on the leading BG. When it was in this position it was too high to do any damage to the track circuit cable. At some stage the flailing reservoir pipe had struck and closed the brake-pipe cock. He could not recall a case where a missing traction motor cover had previously been established as the cause of a serious incident although it was not unknown for traction motor covers to fall off this class of locomotive.

22. *Mr. V. M. Archer*, the *Outdoor Carriage and Wagon Assistant, Newcastle Division* was also called to the scene of the collision. He inspected the coaching stock with a locomotive coupled to it providing air for the braking system and found that the pressures recorded on the gauges were correct. When the brakes were applied all the brake blocks correctly contacted the wheels. Looking at the BG he noticed that where the handle joined the barrel of the brake-pipe cock there was a mark where a small amount of red paint had been chipped off the steel. Beneath the vehicle there were several marks between the front and the leading end of the rear bogie. This bogie had a new ¼ inch deep 'V', which could only have been made by a metal object, on the headstock on the left-hand side in the direction of travel, there were several marks on the bogie frames, and a traction motor cover was jammed in the under-frame of the vehicle to the left-hand side in the direction of travel. About 8 feet further back, hung on a bolt on the centre line, was a plastic sack which was empty and had a hole about 6 inches long in it, but the neck was tied tight with a wire. The underside of the second vehicle had also been struck but the marks were much lighter and he assumed that they could have been ballast marks. The third and fourth vehicles bore marks which he was sure had been made by ballast. Because he formed the impression that something had been run over and rolled beneath the train he went to look at the track in the area of Eryholme after hearing a rumour that there had been a signal failure there. That evening and the next morning he walked along much of the track over which the train had travelled and found that the AWS magnets had been struck but he did not think that this could have happened when the passenger train passed over them. His tests of the brakes of 1S16 showed that they were in all respects in good working order and that the train could have run with the reservoir pipe disconnected and the brakepipe cock closed for some distance, because in his tests the brakepipe pressure did not start to leak off for an hour. He agreed that it was not difficult to disconnect the reservoir pipes, even when there was air pressure in them, provided it was done properly by pushing upwards from beneath. He thought that the traction motor cover would have blown out to the side of the train and not have lodged beneath it if it had risen as high as would have been necessary for it to uncouple the reservoir pipes.

23. *Track Chargeman T. W. Norton* was working at the north end of Darlington Station when 1S16 collided with the DMU. After making certain that no-one was injured he examined the track over which the passenger train had run from the middle of the station in Platform 4 to the Bishop Auckland branch line; it had stood the excessive speed well. About 2 hours after the collision he collected all the debris together and placed it to one side of the track. He confirmed that all the large items which he had found had come from either the locomotive or the DMU and that the only objects that he had found in the four-foot had been a few small pieces of aluminium. He was quite sure that there was nothing foreign amongst the items that he had gathered together.

24. *Permanent Way Section Supervisor W. R. Magson* told me that to the south of Darlington he was responsible for 16½ miles of the track. After examining the damage caused in the collision and hearing of the possibility that an object lying on the track had been involved, he travelled by DMU to Northallerton with the driver, examining the track as best he could. There he questioned his two patrolmen who had walked the track that morning between the 28½ and 34 mile posts, but they had seen nothing out of the ordinary. He travelled back to Darlington at the front of a DMU and again examined the track. The following morning he walked from the 37¼ mile post to the 28½ mile post. During all these searches he told me that he did not find anything unusual or out of place. Although men had been due to work on the Down Main line, because of the weather on the day of the accident they had not done so and the only people who had walked on the track had been the two patrolmen.

25. The two men who examined locomotive No. 55 008 on 13th February 1977 were *Assistant Maintenance Supervisor (Quality Control) K. Ball* and *Fitter P. Candlish* based at Gateshead Depot. Both men heard the full description given by Mr. Reeves of the damage he had found beneath the locomotive and confirmed that neither of them had found any marks which in any way resembled those described by Mr. Reeves. Both men had worked regularly on this class of locomotive and the procedure for replacing the missing traction motor cover was described by them. Mr. Ball, who had been working on this class of locomotive for some 9 years, said that he could recall only 2 or 3 occasions previously when a traction motor cover had been found missing. Fitter Candlish described the way in which he had fitted the new traction motor cover and assured me that it had been properly fitted and adjusted and that he did not believe that it could have fallen off of its own accord.

26. In the early hours of 16th February 1977 *Fitter E. A. Bennett* examined locomotive No. 55 008 at King's Cross depot. He described how he had examined the underside of one end of the locomotive because

it was already over a pit and how he had then had the locomotive moved so that he could examine the underside of the other end. There were lights in the pit and he had a lamp and having heard the marks beneath the locomotive described by Mr. Reeves he said that he found nothing underneath it of that nature on the morning of the accident. He told me that he did not have to carry out any remedial work as a result of his examination and he was quite certain that after the examination he had left nothing lodged on the underside of the locomotive or at its front. He told me that he had worked at King's Cross for 5 years and had never found a traction motor cover loose although he had found them missing very occasionally.

27. *Senior Technician (Signal and Telecommunications) J. Underwood* told me that he was responsible for the signalling equipment in an area around Darlington and that the holes in the AWS magnet covers mentioned by witnesses had been made accidentally a number of years ago and as the damage did not affect their performance they had not been repaired. No-one in his department was out on the track on the morning of the accident and when the Signalman reported that Track Circuit 98 had failed he went to Eryholme and found that the wire connection to the cess rail had been severed at the relay end close to the site of the former signal box. It was a fairly clean cut, the cable was not crushed, and it was as if it had been struck and cut and then pulled off the connection. There was no other damage to his equipment in the area and during the time which he spent near the track he found no marks, or any object, which could have been connected with the severing of the track circuit connection.

28. The *Assistant Area Civil Engineers for Darlington and York, Mr. M. J. Smith* and *Mr. K. Lea,* described the searching of their areas and the questioning of their staff which had been carried out subsequent to the collision. They both confirmed that the patrolmen responsible for the track between York and Darlington had found nothing abnormal or out of place during their patrols which had all been carried out before the passage of 1S16. Both area engineers confirmed that their staff had been questioned to check if anything had been left on the track that might have lain in the path of 1S16 and that tools and equipment had also been checked to prove that nothing was missing. Additionally detailed searches had been made of the track around places where incidents or noises had been reported at Eryholme, Skelton Signal Box, and the sign board at the half-way mark between London and Edinburgh. Searches were also made for some 60 feet out into the fields on either side of the line but again nothing that could possibly be connected with the accident had been found. Both Officers assured me that they had done everything in their power to find any object that might have been connected with the accident and to confirm that their departments were not responsible for leaving any item close to or between the rails which might have caused the accident. They agreed that the plastic sack found beneath the BG appeared to have been opened by cutting with a shovel in the usual way and that, if the sack and contents had been left unopened in the path of 1S16 and had been struck and torn open, the contents, even though scattered, would have been detected, if they had been heavy and numerous enough to cause the damage described, during the thorough searches that had taken place.

Additional Evidence

As to This and Subsequent Incidents

29. As a result of the incident two passengers on the train advised the guard that they had heard a noise beneath the train as if it had struck something somewhere south of Darlington. I wrote to both gentlemen and they provided me with detailed explanations of what they had heard. One travelled in the second coach on the right-hand side of the carriage and the other in either the second or third coach of the train. They described hearing the noise "just before going under a railway bridge probably some 5 or 6 miles south of Darlington and approximately 5 minutes before reaching that station" and "approximately 3 to 4 miles south of Darlington". Both said that their recollection of the events which they described in their letters was good and that they had not experienced anything similar before. One of them described the noise as "a rattle as if a number of objects were striking the coach" and "travelling over something hard following which what appeared to be a shower of objects were thrown up". The other described it as "appearing to be of something disintegrating beneath the carriage and being thrown between track and underside of the carriage". One of the passengers claimed that he saw objects rising outside the coach to the level of the window but could not make out what they were. Both said that they offered the information to the guard because it was an out of the ordinary noise and in the light of subsequent events they considered that there might be some connection. I am most grateful for the full and detailed answers to my questions which they gave in their letters.

30. On 3rd August 1977, another Wednesday some six months after the accident, the 07.45 King's Cross to Edinburgh train (1S12) struck an object on the Down Main line between York and Darlington at approximately the 40 mile post which disconnected and damaged the brakepipes between the second and third, and between the fifth and sixth vehicles on the train bringing it to a stand. After temporary repairs the train was hauled slowly to Darlington where further repairs were carried out. On arrival at Newcastle it was found that the locomotive train heating boiler water tank had been punctured and the locomotive had to be

changed. After leaving Newcastle the train again suffered further brake difficulties due to a defective reservoir pipe on one carriage.

31. As a result Mr. Reeves examined the underside of the locomotive (55 010) and made a careful survey of the damage caused. A pull rod safety bracket had been hit and bent back until it was touching a wheel, a traction motor cover bolt had a fresh mark on it, and there were 2 heavy blows to the underside of the water tank on the centre line the second of which had punctured both the protecting plate and the water tank. He described the marks as being consistent with the locomotive striking an object which was probably square or rectangular in shape and between 3 and 4 feet long with an appreciable weight. Because of the position of the first mark on the locomotive front and the driver's comments Mr. Reeves thought that the object might have been dropped from the first over-bridge north of Eryholme, where a bang had been heard and where the brake application had been initiated.

32. As a result of these reports the track in the area of Eryholme was searched and, on the same day as the incident, heavy marks were found on the rails and sleepers of the Down Main line in the area of Dalton Road Bridge (No. 85) at 39 miles 1,639 yards. Nothing else could be found but subsequently a further search was made on the bank sides of the area which led to the discovery of portions of a 9½ inch length of FB rail which had been split into two halves along its web.

33. The conclusion drawn by the Railway Officers who investigated this second incident is that on 19th January 1977 after track work on the Down Main line at 39 miles 1,600 yards a 9½ inch length of FB rail was left in the cess. On 3rd August 1977 this piece of rail was deliberately placed on the Down Main line balanced on top of the right-hand running rail and with its web in contact with it. This was done at some time between 10.05 and the passage of 1S12 at 10.45. The flange of the leading wheel of the locomotive hauling 1S12 fractured the off-cut into two halves and projected them forwards and downwards. The foot section flew across to the Up Side embankment; the rail head section bounced beneath the train and was rolled along between the train and the track for over 120 yards before being projected onto the Down Side embankment. In its passage it caused the damage beneath the locomotive and the disconnections of and damage to the brake pipes between the coaches. In view of the close location of this second incident (possibly within about a mile) to that of 16th February 1977 which led to the Public Inquiry the Railway Officers provided me with full details of the second incident. They say, and I agree with them, that it is almost certain that this second incident resulted from a deliberate act of vandalism and was an attempt to derail the train. The British Transport Police have been informed of the situation and their investigations are continuing.

34. In a further relevant incident which occurred near Diss in the Eastern Region of British Railways on 23rd November 1977, a steam heating pipe between a locomotive and the leading carriage of the train which it was hauling became detached from the swan-neck of the carriage and in flailing about between the locomotive and the track, closed the brakepipe cock at the leading end of the leading vehicle thereby again isolating the train brakes from those on the locomotive and leaving the driver of the train with only the brake force of the locomotive. The train failed to make its booked stop at Diss Station over-running by a distance of some ¾-mile.

Conclusion

35. Because of the similarity of the damage to the undersides of the trains involved in the two incidents near Darlington, the close proximity of one to another, and the effect on the brake pipes and brakes of the trains, I can only conclude that the initial accident was caused by the deliberate action of some person or persons placing an object or objects on the track in front of 1S16 with the intention either of derailing it or causing damage; and that a second attempt was made on 3rd August 1977 as a result of which the items responsible for the damage were on this occasion found.

Remarks and Recommendations

36. If Guard Tunnah had been paying attention to the running of his train and keeping a lookout as he was required to do, his route knowledge should have been sufficient for him to realise that the driver was not able to control the train. I think it is reasonable to have expected him to have applied the brakes using the guards valve and thereby to have at least mitigated the effects of the brake failure. I do not believe he was as alert as he should have been despite the distractions.

37. Whilst the effect on the brakes of a train, operated on the single or double-pipe air brake system, of the brake pipe being disconnected is to bring the train to a stand, the danger that may result from the isolation of the train brakes from their control on the locomotive is considerable. Accordingly I recommend that action be taken to modify the brakepipe cocks on locomotives and rolling stock so that, in addition to the action necessary to rotate the cock handle to isolate the brakes, a second action to release the handle for

operation is necessary. I have discussed the matter with the Officers of British Railways and they say that such a modification is feasible and arrangements have been made for cocks with this feature to be introduced at the earliest possible date on new builds of traction and rolling stock, and consideration is being given to the extent to which existing stock should be modified.

38. In 1976 one coach of an electric multiple unit train was derailed when it ran into concrete track reference 'monuments' placed on the rails by vandals after having been removed to facilitate engineering work and in 1977 two coaches of an express passenger train were derailed, fortunately at low speed, at catch points into which vandals had placed concrete troughing units. I know that Railway Officers make strenuous efforts to have surplus materials removed after engineering work but that shortage of manpower sometimes delays this work. I recommend, however, that these efforts should be intensified, particularly in respect of surplus items that are easily moved by one person.

I have the honour to be,

Sir,

Your obedient Servant,

A. G. B. KING,

Major

The Permanent Secretary,

Department of Transport.

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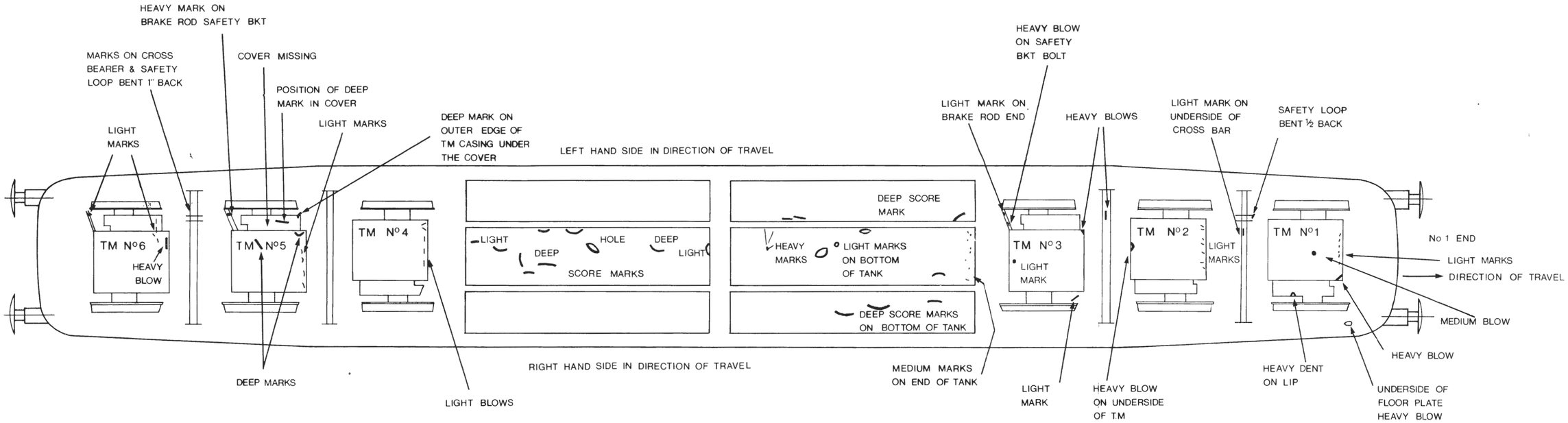
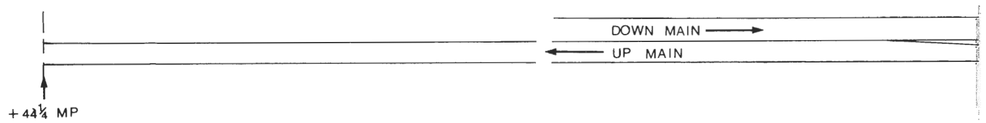
MARKS FOUND ON THE UNDERSIDE OF LOCOMOTIVE No. 55008 AFTER THE ACCIDENT AT DARLINGTON 16 FEBRUARY 1977



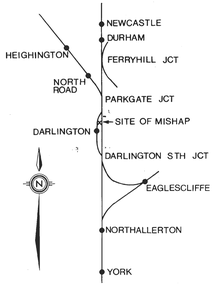
TM ≡ TRACTION MOTOR NOT TO SCALE

00387 Dd0586195 9/78 MFP



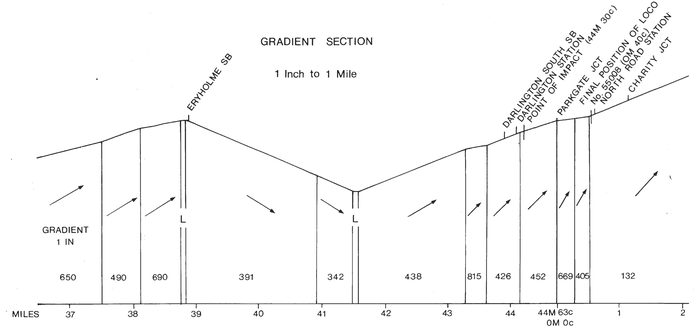
COLLISION AT DARLINGTON EASTERN REGION BRITISH RAILWAYS 16th FEBRUARY 1977

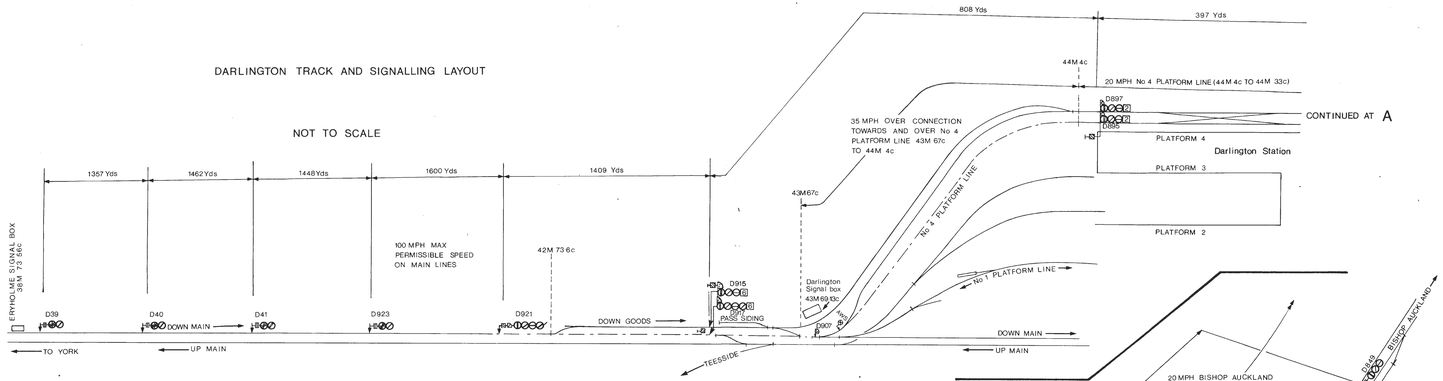
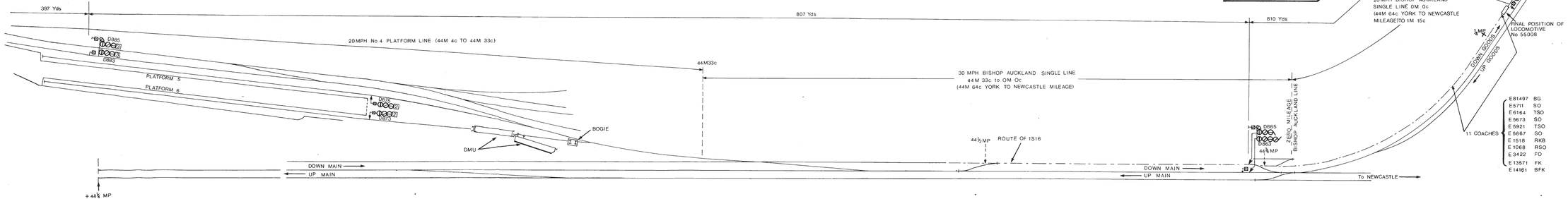
LOCATION PLAN



GRADIENT SECTION

1 Inch to 1 Mile



DARLINGTON TRACK AND SIGNALLING LAYOUT

NOT TO SCALE