MINISTRY OF TRANSPORT

RAILWAY ACCIDENT

Report on the Derailment that occurred on 12th February 1964 at Bethnal Green

IN THE
EASTERN REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE

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1965

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

22nd October 1964.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order dated 13th February 1964, the result of my Inquiry into the derailment of an electric empty coaching stock train at about 11.1 a.m. on Wednesday, 12th February 1964, at Bethnal Green station in the Eastern Region, British Railways.

The 10.42 a.m. multiple unit 9-coach empty train from Chingford to Ilford via Liverpool Street, travelling at about 15 m.p.h., became derailed as it ran into the station when the facing points connecting the Up Fast to the Up Suburban line changed position under the fourth coach. The trailing bogie of this coach and the remainder of the train took the route towards the suburban line after the front part of the train had travelled over the points along the Fast line. The centre three vehicles of the train were derailed and the middle one of these, the fifth coach, collided broadside with the adjoining columns of two electrification gantry structures in line which, between them, span the two 4-track routes from Hackney Downs and Stratford respectively which converge at this point. The structures were brought down, blocking all lines to cause a complete stoppage of train services to and from Liverpool Street station. The relevant power circuit breakers opened immediately and were left open by the Electrical Control staff as they realised that there had been a short circuit. No one was injured.

The points that moved were the ones at which the derailment on the 17th June 1962 took place, on which Colonel J. R. H. Robertson reported on the 21st December 1962, and the same overhead structure was brought down. On that occasion the route was set to the suburban line and the trailing bogie of the second coach rode over the point dragging the front of the next coach after it; on this occasion the points were moved under the train through ill-advised manipulation of the electrical contactor equipment of a point control relay in the Relay Room of the signalbox by a technician of the Signal and Telecommunications Department.

Train services were re-arranged to start from and terminate at Stratford and Hackney Downs, with a special motor coach service between Liverpool Street and the latter station. The Up and Down Electric lines were re-opened for non-electric services shortly after 1 p.m. and a diesel shuttle service was run over them between Liverpool Street and Stratford, to which passengers were also able to travel by Underground. Electric services were restored on the electrified lines early the following morning and all lines were opened for traffic by 4.30 p.m. on the 14th February after temporary overhead structures had been installed.

The day was fine and clear.

DESCRIPTION

The Site and Signalling

1. Bethnal Green is the junction, about one mile from Liverpool Street, where the 4-track route from Enfield and Chingford, joins the main 4-track route from Essex to form the six tracks to Liverpool Street station. Cambridge Heath is the next station to Bethnal Green on the route to Chingford, and Stratford is the next one on the route eastwards.

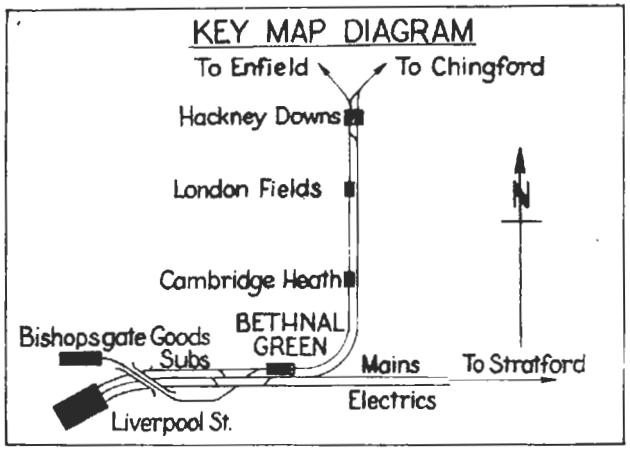
2. The designations of the lines on the two routes and the general layout of the junction are shown on the sketch on page 2. The path of the train was from the Up Fast to the Up Main line and Points No. 61C which in their normal position lead from the Up Fast to the Up Suburban line, were the ones that moved under the train. They are about 200 ft. from the centre of the signalbox. The crossing of which these points form a part, is worked by three electric point motors, 61A Down Main facing points, 61B switch diamonds, and 61C Up Fast facing points. The motors move the points from normal to reverse and vice versa in approximately two seconds.

3. The signals in the area are 4-aspect colour lights, the one immediately protecting points 61C on the Up Fast line being BG 3. It has a banner repeater 193 yards on the approach side and the signal before that is an automatic one, UF 2C, 403 yards from BG 3.

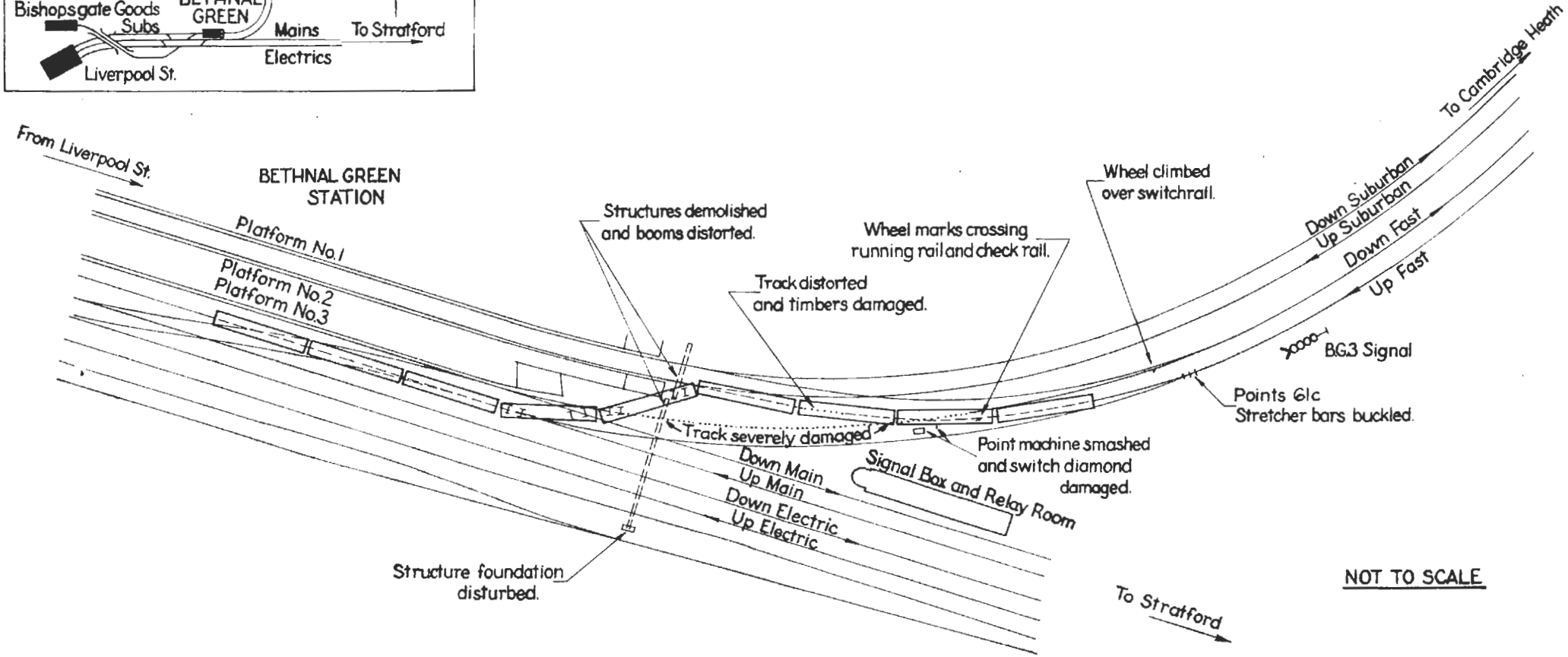
4. The power signalbox is in the V between the two routes. It contains one of the earlier of the route setting systems (brought into use in February 1949) with a relay room at ground floor level and the operating room above, at the London end.

5. The point control relays are of a type that has long since been superseded by others of more compact and fully enclosed design, but I understand that they have given good service for many years and are by no means life expired. They control the electricity supply to the point motors and they comprise a somewhat bulky armature and windings with exposed contactor gear above. A drawing is at the end of the Report. The two sets of contacts, for normal and reverse operation, are operated by individual slides which are moved vertically upwards by separate armatures to close the contacts. A rocking lever above the slides prevents both being in the Up position together. Just before lifting its slide the arm of the energised armature rocks a cross lever which at mid-stroke trips out a latch on the other slide. This slide is thus made free to fall just before the rocking lever is pushed over by the rising slide above the energised armature. The movement of the relay is completed by the latch slipping into the notch of the raised slide, thus latching it up.

KEY MAP DIAGRAM



EASTERN REGION
DERAILMENT AT BETHNAL GREEN STATION
12th. FEBRUARY, 1964



6. In addition to the contacts on the slides that control the point motor circuits, there are contacts that complete the detection circuit, thus ensuring that the contactor and point machine are in correspondence. The detection circuit is not completed until the latch is engaged, and it must be completed for the signal to show a "Proceed" aspect.

7. The latches can sometimes stick in the engaged position thus locking the relay, and the manipulation of the latch to free it is one of the actions taken by the signal maintenance staff men when tracing faults. Such manipulation is intended only to disengage the latch of one slide to allow the other one to lift if the armature coil is properly energised, but it is not difficult to lift an armature by hand thus making the contacts on the slide above it.

8. The relays and their associated equipment are on shelves in the relay room, those with exposed contactors being protected by locked glass fronted screens.

Instructions

9. The relevant British Transport Commission Instructions to Staff engaged on Maintenance of Signalling Apparatus, (Revised April 1961) are as follows:—

16. *Testing of Signalling Apparatus*

16-2. When testing the operation of signalling apparatus the Technician must observe the provisions of Rule 77, particularly the appointment of Handsignalmen when necessary and he must have a clear understanding with both Signalmen and Handsignalmen as to the nature of the work involved.

17. *Alterations (Unauthorised)*

17-3. Unless special instructions are issued to the contrary, signalling apparatus must never be manipulated to cause it to work by any means other than by the designed arrangement.

44. *Irregular Operation of Electrical Apparatus*

Electrical apparatus or the connections thereto must not at any time be manipulated so as to cause it to work by any means other than by the designed circuit arrangement.

Rules

10. Rules 77 and 81 of the Rule Book are relevant. Rule 77 is a long Rule concerning the arrangements to be made when fixing, removing, or repairing signals or apparatus for working signals and points. It details the circumstances in which the signal maintainer must sign in the Signalbox Register or Occurrence Book for the equipment, and when handsignalmen are to be employed. Rule 81 is also a long rule amplifying the procedure in Rule 77 and dealing with other aspects of safety when signals and points become defective. Clause (c) of the rule refers again to the need for appointing handsignalmen if the interlocking is out of order.

The Train

11. The electric train comprised three 3-coach sets each with the motor coach in the middle, of steel construction and built in 1959. Buckeye couplings were in use throughout. The length of the train was 199 yards and its weight 359 tons. The brake force of the air brake system was approximately 80% of the weight.

The Damage

12. The fifth coach, which was swept broadside against the gantry columns, was fairly severely damaged and the frame was bent but there was minor damage only to the 4th and 6th coaches, the remainder of the train being in good order. It was difficult to restore the collapsed overhead equipment quickly since the gantries that spanned so many tracks were of considerable size and there was little space in this rather congested area, where the line is on a viaduct, for erecting temporary columns for the structures. As will be noted however from my opening remarks the Region restored full electric running in a little over two days. Damage to the track was not significant, but the switch diamonds were bent and had to be replaced as well as a number of sleepers which were broken, and the point machine for the diamonds was destroyed.

Summary of Evidence

13. The evidence of *Driver W. T. E. Hooper* of the electric train was that he stopped momentarily at Signal UF 2C at Red, and as he started again the repeater for Signal BG 3 cleared. He passed this signal, which was showing a double yellow aspect, at about 15 m.p.h. and then felt a jolt followed by another one. He released the deadman's handle to apply the brakes, secured the train, and went back to meet the guard who then protected the train in rear. Hooper agreed that he should have made contact with the signalman to arrange for isolation and for protection of the other lines, but the accident had happened in front of the signalbox and Hooper assumed that the signalman would have already taken the proper action.

14. *Guard W. A. J. Beck* protected the train in rear and confirmed with the guard of another train on the adjoining Up Suburban line that he was protecting that line.

15. The mistake which gave rise to the accident was admitted by *Technician G. Eastwood* of the Signal and Telecommunications Department. He said that the Permanent Way Staff had arranged to fettle the points that morning and, as is customary, he had been asked by Ganger S. M. Cooper to be present while this work was in progress, so that he could ensure that the packing of the track had not upset the point operating mechanism or controls. Eastwood went to Points 61C with his Assistant, *C. H. McKenzie*, at about 10.0 a.m. when Cooper and his men began fettling. Shortly before 11.0 a.m., when the work was done, Eastwood told McKenzie to call the signalman from the signalpost telephone and to ask him to swing the points to test that they moved correctly. (In such a test the signalman always notes whether the detection indication shows, otherwise the signal for the route will not clear.) Eastwood was told that the signalman could reverse the points satisfactorily but could not restore them to normal. He left McKenzie at the telephone and went to the box, which was quite close to the site, into the relay room and to the rack holding the point control relay. He removed the glass screen and manipulated the relay, intending, so he said, simply to free the reverse latch, but he inadvertently lifted the normal side up by hand. This made all the necessary connections in the contactor above it to connect the electric supply to the point motor for normal operation, and thus caused the points to change. He realised what he had done and manipulated the relay back to reverse, but the train was over the points and the rear part of it was deflected before Eastwood replaced the relay armature to the reverse position.

16. Eastwood said that he had no knowledge of the train's approach and inferred that he had no reason to expect it since he regarded the points as out of order after they had failed for normal operation. He explained to me that the first result of making free the latch of a point control relay was to break the detection and put the protecting signal to Danger. The latches of these relays could quite often be the cause of a fault by holding the armature in one position when the relay was energised to move it to the other. It was customary for him to free the latch when asked to investigate a fault and he said when the relevant Rules and Instructions were quoted to him "When we have a failure reported to us we take it we have possession of those points". He did not regard such manipulation as a disarrangement or disconnection, as referred to in the Instructions, but simply as a part of his testing routine. He said that there was a working agreement with signalmen that once they had reported a fault they did not clear a route over the points concerned until the technician told them that they could do so. He agreed that a relief signalman, such as the one on duty at the time, might not be fully conversant with this method of working. He assumed from what McKenzie conveyed to him from the signalpost telephone that the signalman had found that the points had failed and that he would not pass any trains until the fault had been rectified.

17. *Technician C. H. McKenzie* had little to add to Eastwood's evidence except that he was told by the signalman that he was about to pass a train over the route with Points 61 reversed; this was after Eastwood had gone to the box and was out of sight round the far corner of it.

18. *Relief Signalman C. S. Wade* who had been working at Bethnal Green regularly for the previous five weeks confirmed that he was asked by McKenzie to swing the points and that he operated the point switch from reverse to normal, failed to get the detection, and so told McKenzie. He then decided to take the empty coaching stock train over the Main line (with the points reversed and properly detected) and also told this to McKenzie. He was satisfied that the route was in order for this direction and had no idea that any interference with the interlocking was contemplated. His procedure on this occasion was no different from the procedure he had adopted before in similar circumstances. After the accident he sent the Obstruction Danger message to the neighbouring signalboxes.

29. I asked *Station Master H. T. C. Champness* of Bethnal Green, *Signal Inspector S. M. Hall* and *Chief Signal Inspector E. W. Harwood* about the habit of working which Eastwood had described. None showed surprise about what Eastwood had intended to do. Mr. Champness had not at any time discussed with signalmen about the nature and extent of testing that the technician might undertake in the relay room without prior consultation with the signalman, and thought that an understanding between the two was sufficient in a matter such as this. Inspector Hall under whom Eastwood had worked for the past three years said that before manipulating a latch it would be customary for the appropriate fuse to be withdrawn, and for this a possession was necessary. He maintained however that Eastwood had never made such a manipulation in his presence.

20. Chief Inspector Harwood who had been present while all the evidence was taken said that what Eastwood intended to do was normal procedure. His words were:

> "It is a normal procedure for these men to unlatch these relays when they stick in either the reverse or normal position. There is no harm in it whatsoever because they are then allowing the electrical equipment to do its job. I might add that before they do that, they do check the interlocking relay, and the lock relay, which gives them indication of what the signalman is requiring the points to do."

He amplified these remarks to the effect that Eastwood was called to a failure and should not first of all have gone to the contactor rack to take off the cover above the point relay. He should have looked at the lock relay close by, to see whether the signalman wanted the points normal or reverse, and then have removed the point relay cover to see if this relay was in correspondence. If it was out of correspondence he could then have unlatched it to allow the relay to operate. Mr. Harwood added that Eastwood could have done this without taking possession of the points.

21. I therefore asked Mr. Langley, the Assistant Signal and Telecommunications Engineer (General) for his views. They were, as follows:

> "I would like to say, first of all, that Eastwood had not been called to a failure, he had asked the Signalman to operate the points. He had this message back from McKenzie that they would not restore to normal and he thereupon assumed there was a failure, whereas he should have proceeded to the signalbox and had a proper agreement with the signalman as to whether there was a failure or not and then a proper understanding as to what should be done."

Conclusions and Remarks

22. The immediate cause of this accident was clear and, as I have said, it was due to ill-advised manipulation of the point control relay from reverse to normal, causing the points to move as the train was passing over them. This manipulation was possible because the technician had exposed the relay in a manner to which he was accustomed, and which was accepted by his superiors, for the purpose of manipulating the latch. I find it difficult to accept that he manipulated the normal armature unintentionally instead of freeing the reverse latch, and think it more likely that he assumed that he had possession of the points and did it intentionally, before realising that his action could be dangerous. Whatever may have been in his mind, his action in making the relay accessible in order to manipulate it, without first taking possession of the points, was, in my opinion, flirting with danger. The custom has developed, no doubt, in praiseworthy effort to reduce delays but it is obviously unsound and should be checked.

23. I discussed what happened with Mr. R. A. Green, Chief Signal and Telecommunications Engineer, Eastern Region, and he informed me that orders were issued immediately after the accident to enforce strict observance of Instruction 16-2. He has also agreed, because of the possibility of staff considering minor adjustment such as was talked about at my Inquiry not to fall within the Instruction, to prohibit the manipulation of this type of relay for any purpose without a formal possession, with signatures in the Occurrence Book at the signalbox.

24. I am glad to report that Mr. Green also advised me that work is in hand to replace this particular type of relay, which is in use only at Liverpool Street, Bethnal Green, King's Cross, Doncaster and Shenfield, by a modern form which will be totally enclosed and sealed, in conformity with all other types of signalling relays. The work will take a few years to complete but it is being dealt with as expeditiously as possible.

I have the honour to be,

Sir,

Your obedient Servant,

W. P. REED,

Colonel.

The Secretary,
Ministry of Transport.

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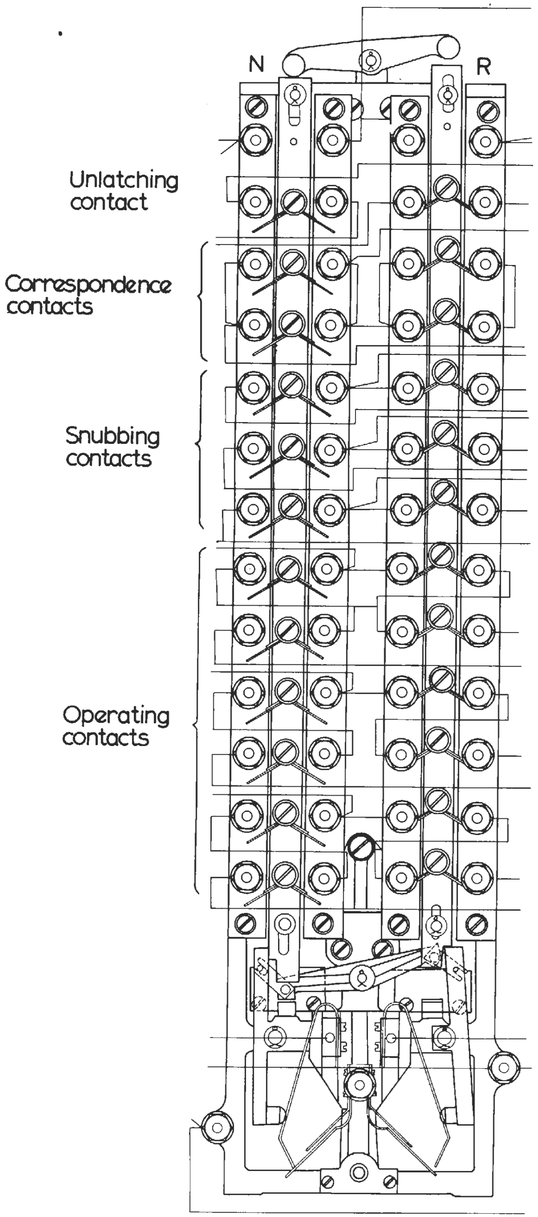
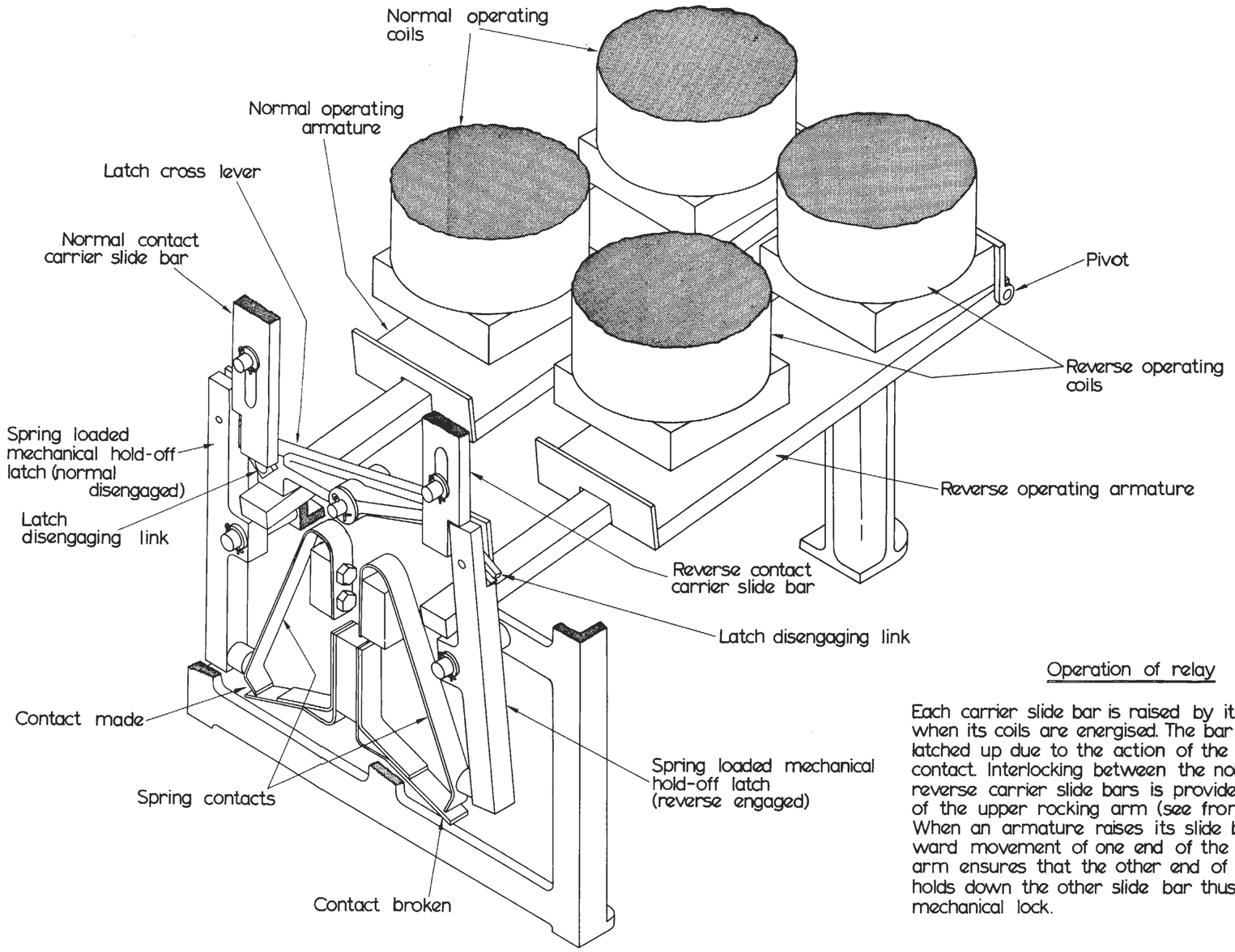
Wt. 3307 K.8

DOUBLE COIL D.C. INTERLOCKED & LATCHED RELAY AS USED IN BETHNAL GREEN SIGNAL BOX



FRONT VIEW



RELAY OPERATING MECHANISM

Operation of relay

Each carrier slide bar is raised by its armature when its coils are energised. The bar becomes latched up due to the action of the spring contact. Interlocking between the normal & reverse carrier slide bars is provided by means of the upper rocking arm (see front view). When an armature raises its slide bar the upward movement of one end of the upper rocking arm ensures that the other end of the arm holds down the other slide bar thus giving a mechanical lock.