

## A Keypoint in an Intensive Service



**I**T may be difficult to believe, but there is in London a signal box with only 35 levers which, during the rush hours at least, takes the full time of two men. It is at Borough Market on the Eastern Section of the Southern Region, and it controls all the trains passing between Charing Cross and Cannon Street and the western end of London Bridge. High up on the viaduct, and approached by a spidery staircase from the street, it looks down on Southwark Cathedral. (The author knows of only one parallel case of a small box which needs two men. This is the "panel" type box at Newcastle, Manors.)

The layout of Borough Market Junction is shown on the accompanying diagram. The frame is an all-electric power frame, installed in 1928 and built by the Westinghouse Brake & Saxby Signal Company. The first 14 levers control the down side, the 15th is spare, and levers 16 to 35 control the up side. One signaller works the down side, the other the up.

They consult whenever an <sup>up</sup> train has to be put into Cannon Street through 17 or 26 points, which in the rush hours is very often. Otherwise they work independently.

Working between Borough Market and London Bridge boxes is carried out entirely by means of a double bank of "clock type" train describers, of which each of the seven roads has two. One shows the type of train, the other its origin or destination, "electric passenger" and "Mid-Kent," for example. (These instruments were invented by Charles V. Walker, F.R.S.; for 40 years in charge of the Telegraph Department of the old South Eastern Railway and a pioneer of block working. See *The Railway Magazine*, August, 1941, page 345.) Working to Cannon Street and Metropolitan Junction boxes, in the other direction, is by means of a single bank of describers, showing origin and destination, and bell. Special bell codes are used, such as 1-3 for electric passenger and 3-1 for steam

## A Keypoint in an Intensive Service



Interior of the Southern Region Signal Box at Borough Market Junction near London Bridge Station



Looking towards Borough Market Junction Signal Box from the Charing Cross line



passenger. (There is no code of four bells for an express. This, on the Southern Region, means "entering section" for a branch-line train.) Bells also work to London Bridge, but they are used only for emergency signals such as "obstruction danger."

As the illustration of the interior of the box shows, the describers, worked by London Bridge for up trains, are on the wall to the right behind the frame. Next to them is the illuminated diagram, and then come the bells and the lights repeating the down platform indicators at London Bridge. Beneath them are the three down describers worked from Cannon Street and Metropolitan Junction. On a shelf just above the frame are the three up describers, by which trains are described on to Cannon Street and Metropolitan Junction. Then come the bell keys to the same boxes. On the left are the controls of the three down platform indicators at London Bridge. The double bank of describers whereby down trains are passed on to London Bridge are on the wall convenient to the left hand of the down side signalman.

There is complete track-circuit control of both points and signals, and all train movements are shown on the diagram. Normally the track indication lamps are alight, but when a track is occupied its lamp goes out. All signals are four aspect, and the aspects are repeated immediately above each lever. In the same way lights showing N and R for "normal" and "reversed" show above each point lever. They light up when the points have moved into the position intended and are properly bolted and detected as home.

There are three slot levers controlling the London Bridge up inner home signals giving access to roads 4, 5, and 6. This is because points 21 and 22 are only just beyond the relevant Borough Market home signals, but the slots for 4 and 6 roads can be pulled off simultaneously.

Interlocking is electric. The point levers can be pulled straight to the full normal or reverse position; there is no check or indication lock, but until the points are proved home and the indication lamps have lighted up, any signal levers concerned will remain locked. Point levers are also locked by the tracks in which the points are situated. Thus 20 points are locked by tracks 11 and 14. 17 points cannot be restored to normal

until a train has cleared tracks 13 and 3. This last holds the junction, as 17 reversed locks 3 and 11 normal.

Signals are automatically put to red when the tracks ahead are occupied. When a signal lever is restored, it is locked until the track ahead clears. A signal will not come off again unless the track ahead is clear, and the lever has been restored, and once more reversed. The slot levers must equally be restored and reversed, to give London Bridge a second release. This can only be done when the platform track is clear, and Borough Market's home signal at the platform end has its lever put to normal. Signals worked in this way are known as "controlled" signals, and the object of the arrangement is to prevent undesired movements. If a signal were to change from red directly the tracks ahead became clear again, it might lead to another train moving up before it was desirable for it to do so, for traffic reasons. Similarly, at facing points a train might be led to take a wrong route by mistake.

Approach locking of points is effected by backlocks on all the signal levers. The backlock allows the signal lever to be put back half-way, so that the signal can be put to red in case of an emergency, but it cannot be fully restored so as to free conflicting point levers. Thus signal 4 is backlocked as soon as a train enters track 6. It remains backlocked until the first pair of wheels enters track E1. By this time track 7 is holding points 7 and 8.

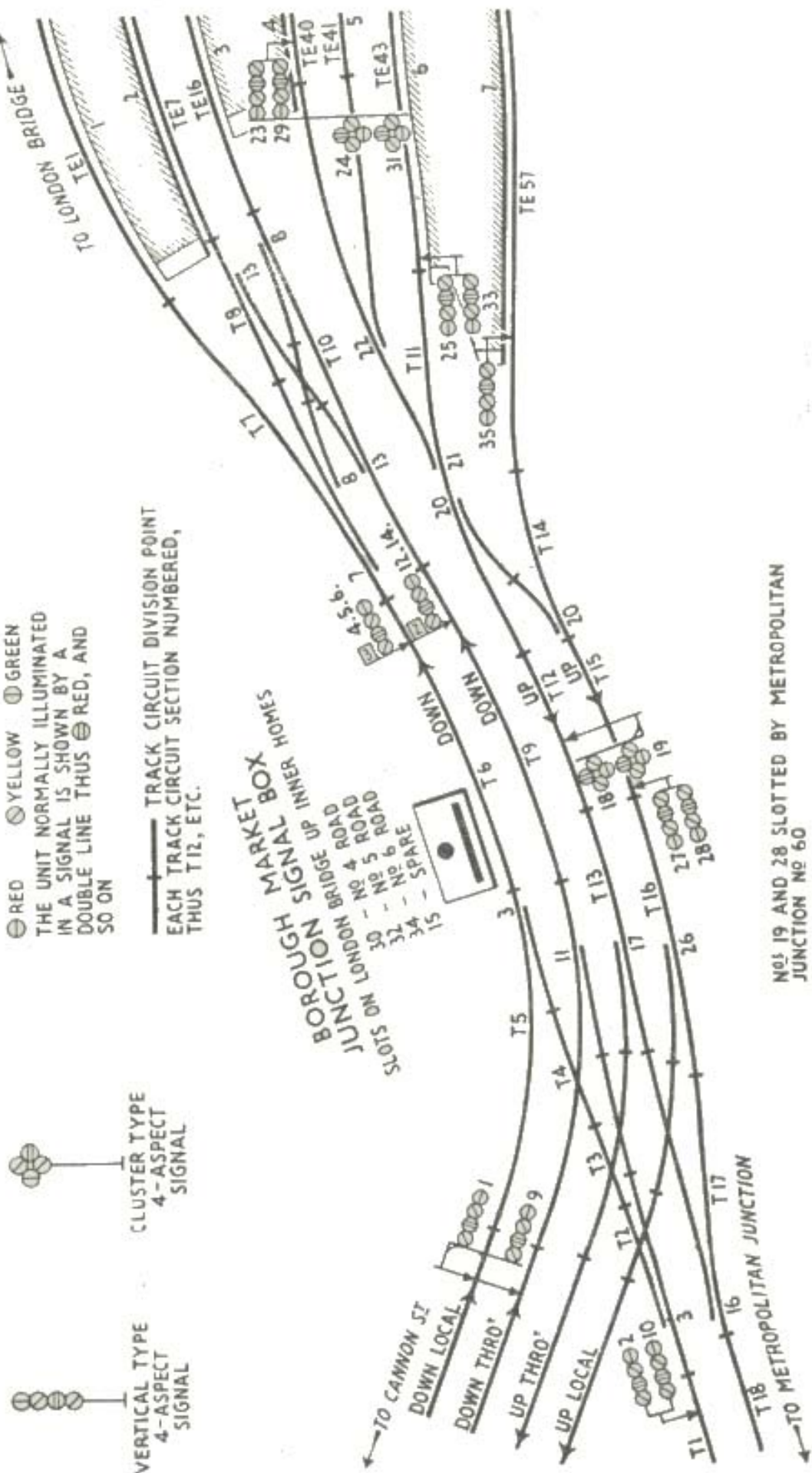
On the up side backlocking is carried a stage further. Signals 18 and 19 are backlocked by track 12, and are not freed until the last pair of wheels has cleared track 13. By this time points 17 are held, and remain held until track 3 or track 17 has been cleared.

The leading feature of the traffic working at this box is the narrow margins and overlaps separating the movements. The most spectacular is that a down train coming from Charing Cross can come right up to signals 2 and 10, while an up train is going into Cannon Street, only 20 yd. ahead. On the up side, a train can be standing at Metropolitan Junction home signal with its last axle only just clear of track 17, and then a second train can be brought up to signals 19 or 28, only 40 yd. behind. Similarly, down trains can be brought up to starting signals 4, 5, 6,



# A Keypoint in an Intensive Service

Borough Market Junction, Southern Region



or 12, 14, while the platform ahead is occupied. To ensure low speed over the crossings, signals 4, 6, and 12 will remain at red, even though the lever is pulled, until tracks 6 or 9 are occupied. This means that the driver must get a yellow indication at the home signals 1, 2, 9, or 10. To obviate this check, a Charing Cross train for platform 2 is usually routed through points 3 and signal 2.

The traffic working is fascinating. The rule is not to begin a move until you have to, but once you have begun it, to complete it as soon as you can. There is also scope for "round the corner" working, to save precious seconds. For example, let us assume that London Bridge describes a Cannon Street train into platform 6. Borough Market waits for the slot to show "on," for track E43 to show occupied, and for the "ready to start" light to come up at the foot of the diagram. The up side signalman then pulls 25 and gives the train a start. Directly it occupies track 12, he replaces 25, and puts back and again pulls slot 34. As the train moves forward towards signal 18, he asks his colleague if he can have points 17. If he says that points 3 are over for a down movement from Charing Cross, the train is allowed to come to a stand at 18.

Meanwhile a Charing Cross train has come into platform 4, and is ready to start, so the instant the first train has cleared track 11, points 21 and 20 are reversed and signal 29 cleared, giving the train a ride round the corner. As it leaves it is offered to Metropolitan Junction by describer and bell, and the signalman waits for the clearing of the Junction's slot on 28 (the sole purpose of this slot is to prevent Metropolitan Junction from having more trains than it can handle). When the slot lamp lights up on the diagram, 28 is pulled, and replaced when track 16 is clear and the backlock released.

Meanwhile, the down Charing Cross

train is passing over 3 points, so the procedure is to bell and describe the first up train on to Cannon Street. When track 5 is clear, the other signalman will put 3 points back, on which 17 and 18 are at once pulled over. Cannon Street has already pulled off (with luck), so 18 signal shows green.

If now a train of empties for Blackfriars is described up road 7, the rule is not to pull off 35 until Metropolitan Junction's slot on 28 is taken off. Otherwise if the man there refuses it, as he may if Blackfriars cannot take the train, the result will be to block movements badly at Borough Market. This is the one case where a train is not given a start before the complete road is ready for it.

And so it goes on hour after hour. The down man also is doing some round the corner work of his own, getting a Charing Cross train into 2 platform over 13 points, while a train from Cannon Street is standing on track 6, waiting for platform 1. At 8.0 p.m. the "odds and ends" begin, freight trains, empty stock, pilots, and so on, and they need a different technique. The occasional steam express wants special watching, and when describing it the needle is often sent three times round the clock, as a special warning.

Such is the work performed at Borough Market Junction, which in the rush hour is one of the busiest boxes in the country. Between 5 and 6 p.m. it handles 41 up and 48 down trains. For this description, the author's thanks are due to many, including H.O. Inspector Peckson, and Mr. Turpin, the Stationmaster at Cannon Street, within whose "parish" Borough Market lies. But above all are they due to the signalmen in the box, for the way in which they explained everything to him. And the public owes these men more than it knows for the way in which this intensive traffic is handled expeditiously on the narrowest of margins.