

# CURRENT COMMENTS

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## Train Describers.

### New Main Line Equipment Installed by London & North Eastern Railway.

OF recent improvements carried out by the London and North Eastern Railway the widening of the section between Gidea Park and Shenfield on the main line from London to Colchester is of particular interest to the electrical world since the signalling reorganisation was accompanied by the installation of new train describing equipment of a type introduced by the Siemens and General Electric Railway Signal Company for dealing with traffic on busy main line sections having numerous crossovers.

In Vol. 3, No. 3 of this Journal (July, 1933) appeared a comprehensive description of the equipment installed by the London, Midland and Scottish Railway for describing traffic into and out of St. Enoch Station, Glasgow, and successful application in this area has exemplified the manner in which this equipment meets the variety of conditions obtaining at a large terminus. The conditions to be met on a through section of line differ considerably from those at a terminal point and the equipment supplied to the London and North Eastern Railway assumes added interest in that, since the principles employed are fundamentally the same, it demonstrates the flexibility of the system.

Fig. 1 gives a geographical layout which includes the portion of the line to which train describers have been applied. The section from Romford to Gidea Park had already been widened and the recent improvements result in there now being, from Shenfield, four roads in the direction of Liverpool Street. Under the new signalling scheme the area is track-circuited throughout and provided with colour light signals. Considerable economies have been effected since the number of signal cabins has been reduced. The arrangements result in the section having a much increased capacity, provision now being made for a three-minute headway of trains. There may thus be several trains under the control of a cabin at one time and it is essential that the identity of each be made known to the signalmen accurately and quickly. Handling of normal traffic would be inefficient under the new conditions if old methods of describing were resorted to whilst it would be practically impossible to deal with the heavy summer and holiday traffic. In consequence, modernisation was completed by the installation of new train describing equipment serving the section between Shenfield and Romford, a distance of about eight miles.

Descriptions are set up by keys and displayed by lamps and comprise indication of the type of train and, as necessary, the destination or track occupied, typical examples being "Express Passenger Main", "Express Passenger South-end", "Goods Class A Main", "Shenfield Local"



Fig. 1.—Geographical Layout.

The track layout and location of all describing instruments is shown in Fig. 2. It will be seen that separate instruments are provided for through and local services on both down and up lines. By operating the appropriate key a description is set up on a terminal transmitter and transmission forward of impulses in a code assigned to the description set up is effected automatically by the progress of the train over the track circuits. At the intermediate cabins at Gidea Park and Brentwood the impulses are received and cause the appropriate description to be displayed. Retransmission to the next cabin is again automatically effected by the progress of the train. When the train leaves the describing area its description is automatically cleared down. Thus, after the initial setting up of a description, the operation is entirely automatic and this is a prominent feature of the system. In the Glasgow scheme previously described, transmission forward is not automatic but follows the operation of a transmit key after setting up a description.

To deal with trains crossing from one line to another the receiving panels of the

retransmitters are sectionalised, the track up to a cross-over is termed "in section", and the track to the next cross-over "arrived", sets of receiving lamps being fitted on the panels and designated "in section" or "arrived" as required. In this way descriptions are progressed on the describing instruments as each cross-over is reached. For example, a train entering the down local road automatically transmits its description, as set up, to the "in section" receiving column of the down local retransmitter ahead. If the train now crosses to the through road its description is transferred to the "arrived" column on the down through instrument, or, if it continues on the same road, its description is transferred to the next "arrived" column on the local instrument. As the train proceeds, its description is advanced to a further "arrived" column if there is another cross-over and subsequently, as it enters the section ahead, its description is cleared and retransmitted forward to the next cabin. These operations are repeated in this cabin and finally, when the train leaves the describing area, its description is cleared from the system. The foregoing outlines the operation for a train passing through the describing area on either the through or

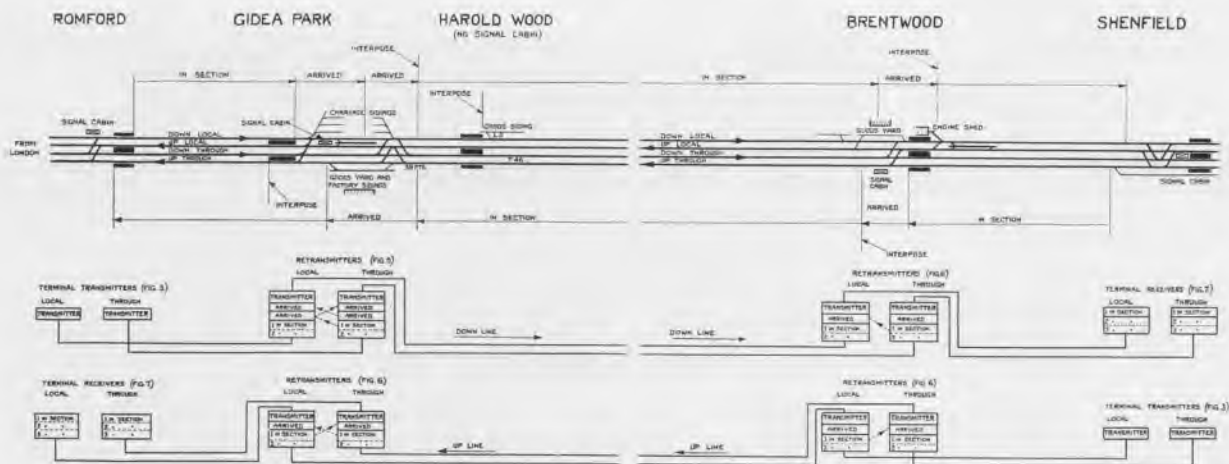


Fig. 2.—Plan of Track and location diagram of Train Describing Instruments.

local lines but, of course, a train may pass into a siding after entering the area. In this case the description is automatically cleared when the siding is reached. Similarly, a train may enter the tracks from a siding at one of the intermediate signal cabins. Its description may be interposed by operating the appropriate key on the retransmitter, impulses then being sent forward as the train progresses.

*Transmitters.*

Fig. 3 illustrates the through transmitter at Romford and this is a typical example of the terminal transmitters in this installation. On learning the class of train approaching his section the signaller depresses the set-up

key corresponding to the description of the train. This operation causes a code of impulses to be stored in the apparatus and lights the set-up check lamp adjacent to the key depressed. When the train enters the section the code of impulses is automatically sent forward, the set-up lamp is extinguished and the lamp above the label glows to give a visual indication of the description as the last train sent. Depression of the appropriate set-up key is all that is required of the signaller and thus the sending operation requires a very minimum of time and practically eliminates possibility of error. Should, however, an incorrect description be set up and sent, it may be cancelled by operating the cancel key provided on the transmitter. When the key is depressed an audible warning and visual indication are given at the receiving end. The signaller there acknowledges receipt by depressing his cancel key whereupon cancellation is completed and an indication given in both cabins.



Fig. 3.—Terminal Transmitter.



*Retransmitters.*

The down local re-transmitter at Gidea Park is illustrated in Fig. 4 whilst Fig. 5 shows the up local retransmitter in the same cabin. These also are typical of this pattern of instrument. Each is fitted with set up keys for interposing. The down local describer is provided with sets of receiving lamps to deal with a route having two cross-overs, and the up local describer with sets of lamps for one crossover, descriptions as received passing progressively from one set to another as the train progresses. A brief consideration of typical traffic moves will clearly show the manner in which the retransmitters operate.

On being advised of an approaching train from the direction of London, the Romford signalman sets up its description on the appropriate transmitter. This description remains set up until the Romford starting signal lever is reversed, whereupon it is automatically transmitted forward to Gidea Park where it is stored and in turn displayed in the "in section" column of the retransmitter associated with the instrument at Romford.

Reference to Fig. 6, which is a detailed layout of the Gidea Park area, will show that a through line train may take one of the following routes on leaving Gidea Park Station :—



Fig. 4.—Down Local Retransmitter at Gidea Park.

- (1) With signal 24 off, continue on the through road to splitting signals 25-15. When this route is taken the description is displayed in the row of lamps labelled "arrived signal 25".
- (2) With signal 38 off, cross over to the local road and proceed to signal 19. In this case the description is transferred from the through line retransmitter to the local line retransmitter (Fig. 4) where it is displayed on the lamp set labelled "arrived signal 19".
- (3) With signals 30 or 28 off, terminate in the centre or carriage sidings. The description is then automatically cleared from the system.

If it be assumed that the train had taken route (2) its description will be displayed in the "arrived signal 19" set on the local instrument.



Fig. 5.—Up Local Retransmitter at Gidea Park.

description on the re-transmitter at Gidea Park is cleared from the “arrived” set and displayed as “last train sent” and the impulse code is automatically transmitted to Brentwood.

Traffic moves on the up line control the displays on the up re-transmitters in a similar manner

The train can now proceed as follows —

- (4) With signals 19 and 20 off, continue on the local line to signal 21 Its description is then displayed in the lamp set labelled “arrived signal 21”
- (5) With signals 19 and 26 off, cross over to the through line again until signal 27 is reached. The description is then transferred back to the through line retransmitter and displayed in the “arrived signal 27” lamp set.

Immediately a train on the local line passes signal 21 or, on the through line, signal 27, its

*Interposing.*

Reference has been made to the possibility of trains entering the tracks at intermediate points. The description of any such train is set-up by operating an interpose key on the appropriate retransmitter This illuminates a corresponding check lamp immediately above the code labels and the description is automatically transmitted as the train goes forward.

*Advanced Retransmitting.*

The retransmitter for the up through line at Gidea Park is fitted with an advanced retransmitting feature to cope with special

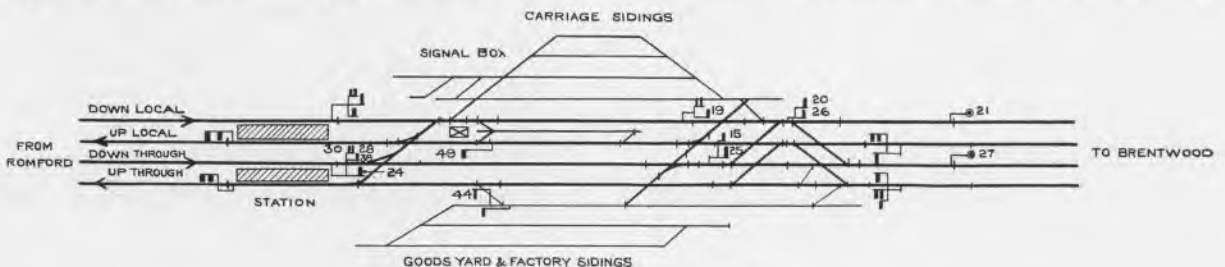


Fig. 6.—Track layout at Gidea Park.

traffic conditions. Normal retransmission of impulses from Gidea Park to Romford is effected when a train passes signals 44 or 49 but, owing to the short distance between these two cabins, the signalman at Romford receives insufficient warning of the approach of a fast train. Consequently arrangements are made for the description of a train on the through line to be retransmitted to Romford before the train passes Harold Wood station. The description is displayed on the through or local line instrument at Romford whilst displayed as "train in section" at Gidea Park but it is not cleared from Gidea Park until the train actually arrives at the cabin. This arrangement therefore permits trains to be described to more than one cabin ahead and provides yet another example of the ease with which such requirements are readily satisfied by this train describing equipment.

#### *Terminal Receiver*

The up through receiver at Romford is illustrated in Fig. 7. Similar instruments are employed on the local line at Romford and the local and through lines at Shenfield. Three sets of lamps serve to display descriptions of the first three trains in section, subsequent descriptions being stored in the apparatus. When the first description is cleared by the train passing over the clearing track the second description reappears as the first, the third as the second and the first of the descriptions stored is displayed as the third train in section.

To complete the outline of the operation mention may be made of the measures taken to guard against misunderstanding arising out of failure, for any reason, on the part of a



Fig. 7.—Terminal Receiver.

signalman to send the description of a train entering the section ahead of his cabin. This contingency is provided for by counting all trains as they pass one of the advance tracks and if a description is not available for any particular train a specially reserved code of impulses is automatically sent forward and causes a lamp labelled "not described" to glow on the instrument ahead. On receipt of this indication the signalman institutes the necessary enquiries.

#### *Line Wires.*

In this installation simplicity, ease of maintenance and the greatest measure of overall economy have been achieved by employing one wire per track and one common return, that is, a total of five wires.

#### *System of Impulsing.*

Signalling between instruments is effected on a principle whereby a train of impulses is sent for each description. The receiving apparatus responds and causes appropriate lamps to glow on the receiver panels. The method of transmitting impulses provides an automatic and infallible check on every indication. Each code sent from a transmitting instrument is completely checked back by repetition from the instrument ahead, indication being withheld if for any reason the code received back differs from



Fig. 8.—Typical Control Apparatus Cabinet.

that sent out. If the check back apparatus should indicate incorrect operation, an audible alarm is given and a fault lamp is illuminated. The alarms cover indication of any other fault occurring on the describing system.

#### *Control Apparatus.*

The control apparatus, consisting of uniselectors and relays, is mounted in cabinets, one cabinet being provided at each of the Romford and Shenfield cabins and two at both Gidea Park and Brentwood. Fig. 8 illustrates a typical cabinet. The relays and uniselectors are mounted on hinged gates and all outgoing connections are terminated on the back panels of the cabinets. Relays are fitted with duplicate contacts and the pro-

vision of covers and the careful design of the cabinets prevents the ingress of dust. Fuses in the battery feed circuits are fitted in a separate case mounted on the top of each cabinet, thus facilitating the replacement of fuses without disturbing the control apparatus.

A storage battery of 20 or 40 ampere hours capacity is provided in each cabin to supply the control apparatus at a nominal 50 volts. The indicating lamps are of the 12 volts, 4 watt, metal filament type and are fed through transformers from the A.C. mains. Duplicate mains supplies are available at Shenfield and Brentwood, but not at Gidea

Park and Romford, hence at these two latter cabins stand-by batteries are automatically switched into circuit if the supply should fail.

The installation is outstanding by virtue of the simple and efficient method employed for automatically dealing with the many varied traffic moves on this busy section of line and is representative of the equipment which may be provided in many dense areas to assist signalmen in the efficient handling of traffic.

The whole of the equipment was manufactured for the contractors, the Siemens and General Electric Railway Signal Co., at The G.E.C. Telephone Works and Union Works, Wembley

