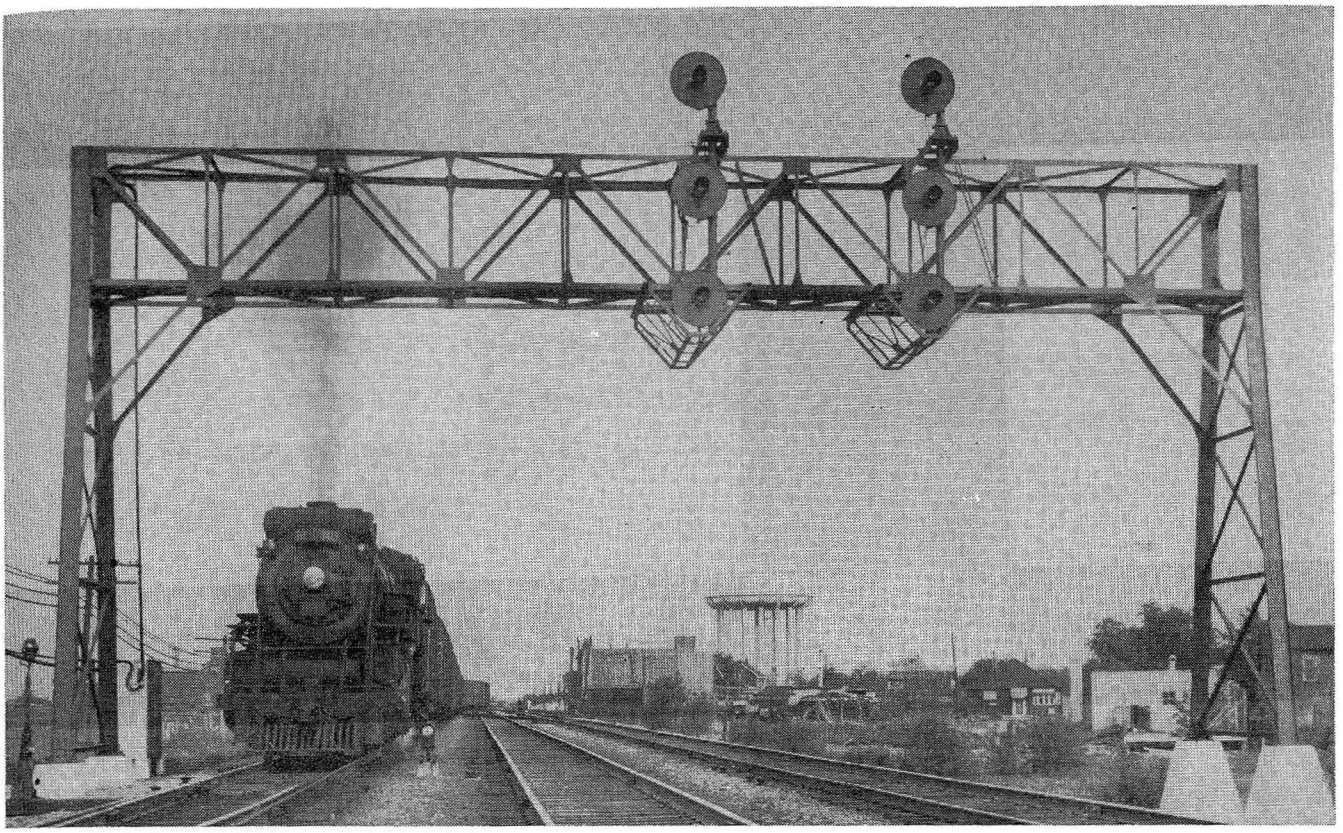


The new interlocking expedites the road trains when leaving the yard

One Control Machine for Interlocked Yard Area

Interlockings at two yard entrances, 13,500 ft. apart, are controlled by one modern panel-type machine, automatic block signaling being in service between the two interlockings

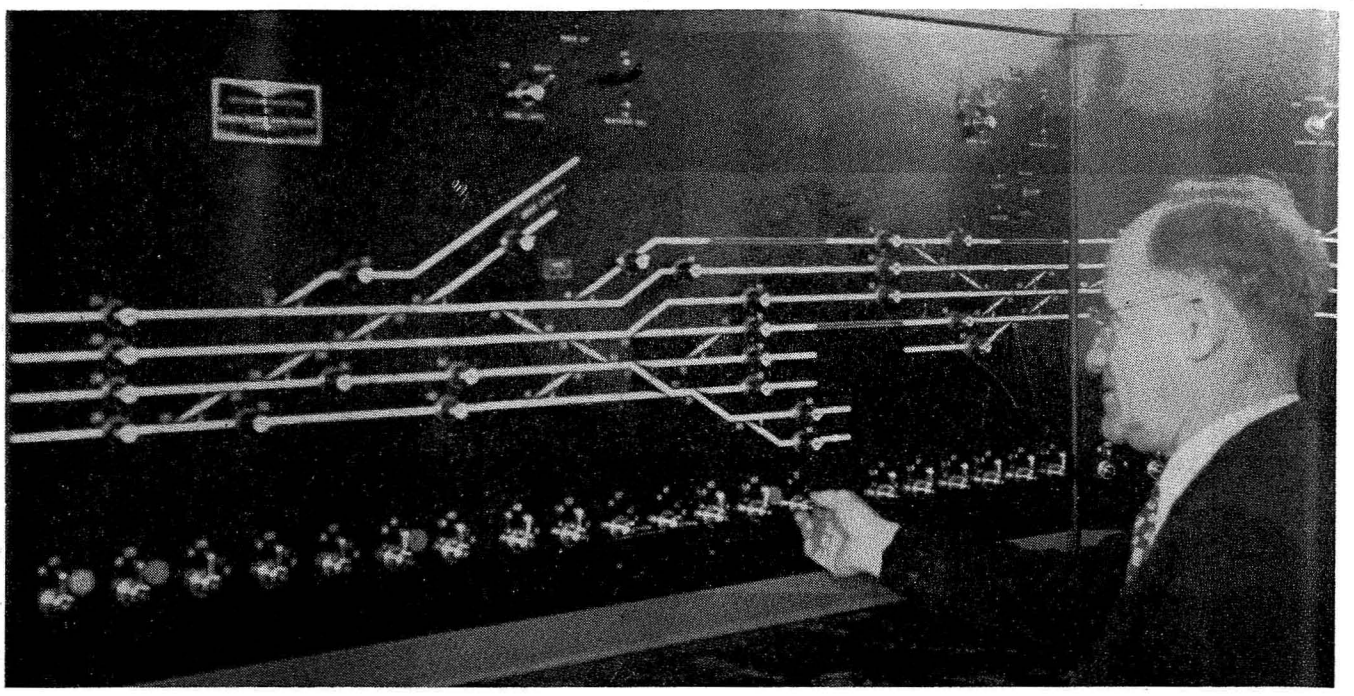
AT TORONTO, ONT., the Canadian National has installed two extensive electric interlockings, controlled from one machine, to govern trains when entering or leaving both ends of a yard, as well as through train movements on the main tracks parallel to this yard. This Mimico yard is located about 6 mi. west of Toronto Union Station, on the line to Hamilton, Ont.

Mimco is the principal freight yard of the Canadian National in the Toronto area. About 105 road trains enter and 105 road trains depart from this yard daily. Cuts of cars are taken from this yard by terminal crews for delivery to industries, warehouses, etc., and to bring back outbound loaded cars to this yard.

In the track layout at the west end of the yard, there is a junction between the Canadian National and a double-track main line of the Canadian Pacific which extends north and east to a Canadian Pacific freight yard. Freight trains of the Canadian Pacific use the Canadian National tracks between this junction and Hamilton, about 14 such trains passing through Mimico interlocking daily.

Each day about 36 passenger trains are operated on the main tracks through this Mimico area. This total includes not only Canadian National trains, but also passenger trains of the Canadian Pacific and Toronto, Hamilton & Buffalo, which use Canadian National tracks between the Toronto Union Station and Hamilton. Thus, a total of 100 to 150 train and transfer movements are made through this Mimico interlocking area daily.

Previous to the changes, the yard had 60 tracks with a capacity of 2,878 cars. The new yard has 86 tracks with a capacity of 4,713 cars, about 6,000 being handled daily. The old west entrance to the yard (handled by switch tenders) was 1,400 ft. east of the interlocking plant at the junction of the CPR and the CNR. The new west entrance has been incor-



This machine controls both the West End interlocking and the East End interlocking

porated into the new west end interlocking, thereby eliminating the switch tenders.

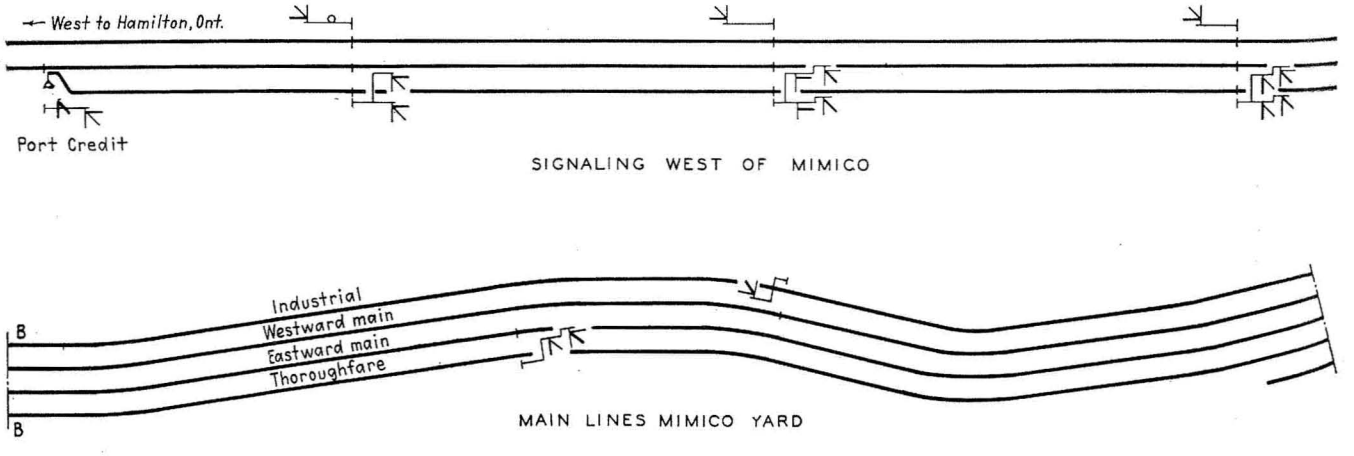
The track layout at the west end includes not only switches and crossovers connecting to the west end of the yard, but also the junction with the Canadian Pacific freight line. This west end layout, with a somewhat different track arrangement, was previously operated by a mechanical interlocking. The old plant was worn beyond the stage of repair, and, therefore, when planning to revise the track layout, the most logical solution was to install a new interlocking; and the all-electric type was chosen.

All of the principal Canadian railroads have adopted a Uniform Code of Operating Rules, which include signal aspects and indications based on "speed" signaling, rather than "route" signaling. This Mimico project is the first large interlocking constructed by the Canadian National to include the new aspects.

One of the new aspects is flashing-yellow which indicates "Proceed, preparing to stop at next signal—slow speed within interlocking limits—medium speed must then not be exceeded until a more favorable indication has been accepted." On signals with two or more operative arms, "light-out" protection is in service so that if a lamp filament fails the remaining signal heads will not display an aspect more favorable than that intended.

The home signal limits at West End is 1,750 ft. long and includes 4 power switches, 7 power crossovers, 1 spring switch and 16 home signals, 12 of which are single-unit dwarfs and 4 are high signals. Two of the high signals have 2 operating "arms" and 1 fixed "arm," and the other 2 high signals have 1 operating "arm" and 2 fixed "arms."

At the east end of this Mimico yard, the switches and crossovers connecting to the main tracks were previously operated by hand-throw stands, operated by switch tenders, protected by an automatic signal which was cleared by switch tender after switches were positioned for the route. In order to improve safety, expedite operations, and reduce operating expenses, a decision was made to install power switches and signals at this East End layout. As now in service, the interlocking at this location is 1,630 ft. long and includes 1 power switch, 8 power crossovers and 11 home signals, 8 of which are dwarfs and 3 are high signals. About 2,250 ft. east of East End there is a single switch leading from a main track to a fruit yard. A power switch, two dwarfs and a high



Track and signal diagram of the entire territory including the West End

signal were installed at this turnout.

By using modern all-relay circuits and Syncrostep, this project was planned so that the power switches and signals throughout this area at West End, East End and at the fruit siding, are now controlled by a panel-type machine in a new tower at West End.

The distance from the westward home signal at West End to the eastward home signal at East End is 10,300 ft. Four tracks extend through this area. The two tracks in the center are the Westward Main Line and the Eastward Main Line. On the north of the main tracks is a track, known as the "Industrial," from which numerous spurs lead to warehouses, factories, etc. Switch engines use this industrial track to serve these industries without blocking the main line. On the south of the main lines, there is a so-called "Thoroughfare" track which is used by light engines or cuts of cars in going from one end of the track to the other. The yard leads connect to this thoroughfare track.

From the East End layout, four main tracks extend eastward toward Toronto Union Station. The two in the center are the Westward Main Line and the Eastward Main Line, which are used primarily by passenger trains, but can be used by freight trains. The track on the north is the Westward Freight track, and the one on the south is the Eastward Freight track.

From the west end of the West End layout, a double-track main line extends west toward Hamilton; and, also, on the south side of the main tracks, there is a third track for 4.1 mi. from West End out to Port Credit. This third track is used primarily to "hold out" the incoming eastbound road freight trains if the yard tracks are not empty for them to pull in on. The hand-throw switch at Port Credit is equipped with an electric lock.

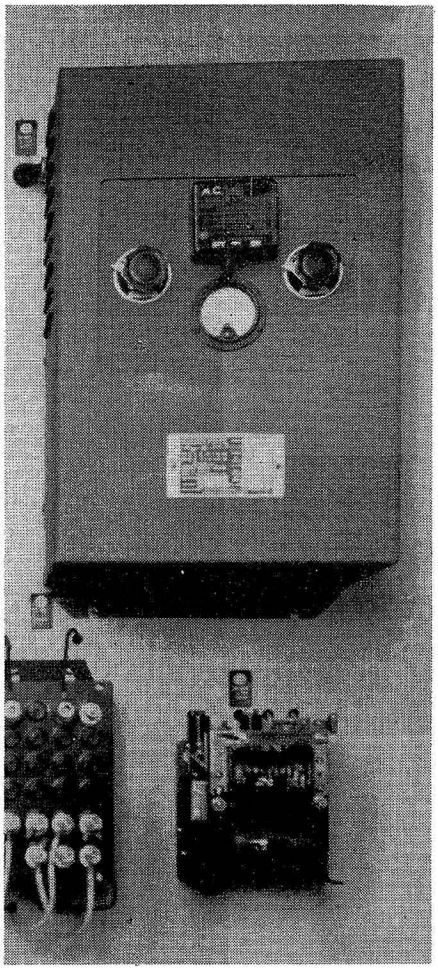
Panel-Type Control Machine

The entire electric interlocking area is controlled by a modern panel-type control machine, on the second floor of a new brick tower located north of the main track at West End. On this machine, as shown in the picture, the center panel is 26⅝ in. high and 54 in. long, with a wing section 18 in. long at each end.

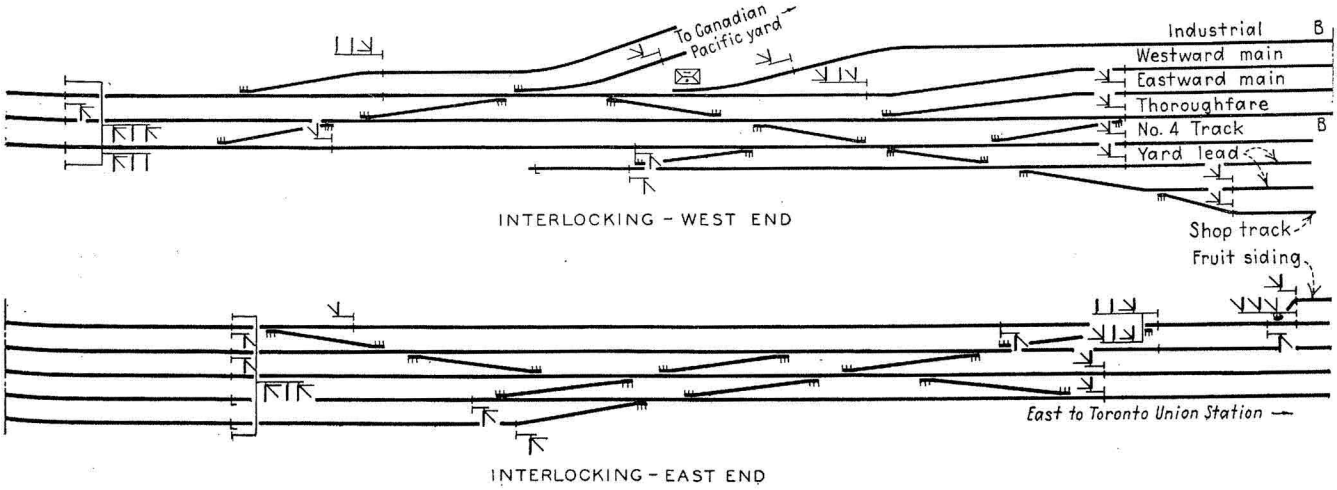
Below the track diagram is a row of 24 levers, each of which is for the control of a corresponding switch or crossover. Each lever is vertical, to control its switch to the normal position, or the lever is thrown 90 deg. to the right to reverse its switch. A small white lamp in the face of the barrel of the lever is lighted while the switch is operating. If this light stays on, this indicates that some obstruction has prevented the switch from operating to the position corresponding with that of the lever. Mounted in the face of the panel below each switch lever there is a small red lens which is lighted when electric locking is in effect to prevent operation of the switch even if the leverman inadvertently throws the lever. In such an instance, the switch will not operate, due to the fact that the leverman threw the lever. In order to regain control of the switch, the lever must first be returned to the position where it was before—i.e., to correspond with that of the switch. Sectional route release locking is provided, and the red light going out indicates to the leverman that the associated switch is free and may be manipulated.

On the track diagram, each track is represented by a white line 3/16 in. wide. Movable sections (switch repeater indicators) are operated when switches are lined up, so that the route is indicated by a continuous white line 3/16 in. wide. On these lines representing tracks, there is a knob at the place corresponding to the location of each home signal. A dark arrow in the face of each knob points in the direction in which the corresponding signal governs.

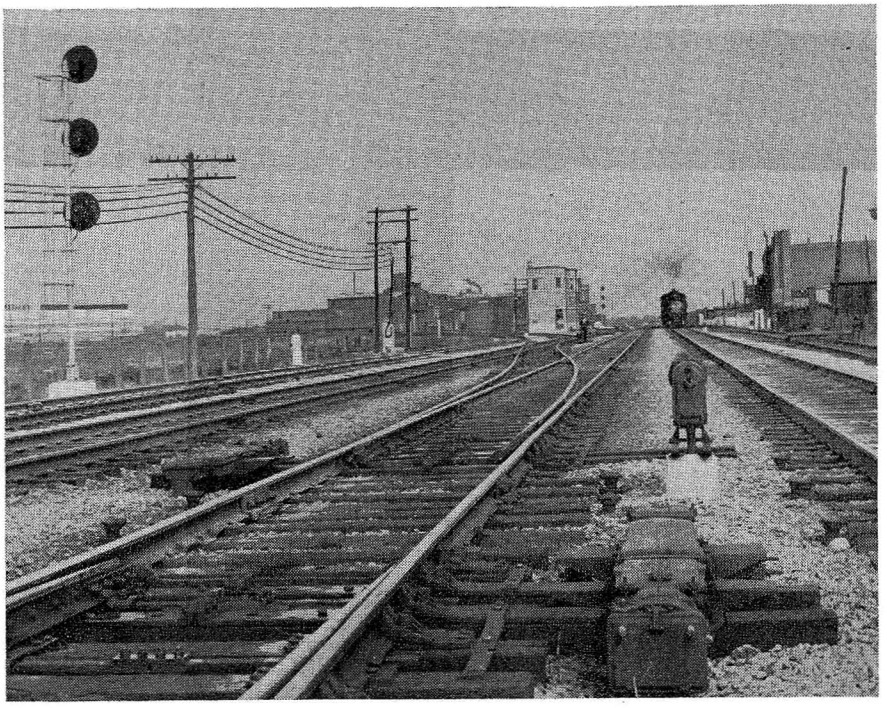
Having thrown the switch levers for a line-up, the signal for that route is then cleared when the leverman



Rectifiers for battery charging



interlocking the East End interlocking and the tracks between



Electric heaters, inside these machines, minimize frost trouble

operates the knob for that signal. When the signal knob is pushed or rotated, a small lamp behind the knob illuminates the arrow red. When the signal clears, another lamp is lighted to turn the arrow green. To display a "Clear" aspect for a normal direction, maximum speed route, such as a through train on a straight track line-up, the signal is controlled by the operator "pushing" the signal knob. The controls are "stick." When the train accepts and passes the signal, the lamp in the face of the knob goes out and the circuits revert to normal without further action by the leverman.

If the track line-up, or routing, calls for a restricted speed aspect, the leverman must rotate the signal knob 90 deg., to clear the signal. If the route improves, the signal will automatically display a less restrictive aspect. The controls are "stick" so that the signal will remain, or return to, the restrictive aspect after the train has accepted the signal, and the leverman must rotate the knob back to its normal position to return the controls to normal condition.

If a high-speed through-route signal, that has been cleared, is to be taken away, the leverman pulls the knob for that signal. Approach locking then comes into effect automatically. If there is no train on the approach section, the route is released at once, and the leverman can throw switches to line up a different route. On the other hand, if a train is occupying the approach section, electric locking is in effect until an adequate time period expires. Straight time locking is on routes where no approach section applies. When electrical locking is in effect, the red lock lamps (under the switch levers that are so locked), are lighted until the time expires. The time element relays are the motor-driven type.

Switches Well Built

The rail on the main tracks through this interlocking is 100 lb. On the principal routes, the turnouts are No. 10 with 16-ft. 6-in. points and No. 12 with 22-ft. points. The turnouts on the high speed eastbound mainline is No. 20 with 33-ft. points. In each switch layout, adjustable rail braces are used on five ties, including the No. 0, No. 1, No. 2, No. 3 and No. 5 ties. Insulated gauge plates 1 in. thick and 7 in. wide are used on ties No. 0, No. 1 and No. 2. On two ties, these plates extend and are attached to the switch machine, thus maintaining the exact relation between the stock rail and machine.

These switch machines are the Model 5C, with 110-volt d.c. motors. Each switch machine is controlled by a biased-neutral switch machine controller which is housed in the switch machine case. To minimize frost in these switch machines, a 100-watt 110-volt a.c. heater element is located in the controller, and a similar heater is located in the motor commutator compartment. At each switch, the buried cables come up through a 2-in. riser pipe to a cast-iron box, which includes terminals where the solid wires of the incoming cables are connected to flexible wires extending in 2-in. rubber hose to the switch machine. This practice minimizes the number of failures that might be caused by broken wires due to vibration.

Plug-In Relays Save Space and Time

Because of the numerous train and transfer movements through this interlocking area, serious delays might occur if trouble in the interlocking is not located and corrected promptly. For this reason, a decision was made to adopt modern plug-in type relays for this entire interlocking, both in the tower and in the instrument cases at the signal bridges and elsewhere. These relays are in racks which are supported on springs to absorb vibration. In the relay room in the tower, these racks are accessible from the rear. In the sheet-metal cases at the signals, the racks are hinged at one edge so they can be swung out. The wiring in the tower and in the cases is No. 16 stranded, using Aircraft-Marine solderless terminals. The wires from cases and tower to track connections are No. 9 solid. Control circuits are in No. 14 cables, some underground and some aerial. Power is on No. 9 cable wires. All wires entering the tower or cases are terminated on Raco Clearview arresters. Two ⅝-in. by 10-ft. Copperweld ground rods are driven at each case.

Each track circuit is fed by one cell of 120-a.h. lead storage battery. The 110-volt d.c. for switch motors at west end is taken from a set of 55 cells of 120-a.h. lead battery. This Battery was made by the Hart Battery Company, St. John's, Que.

Syncrostep Used to Advantage

Between the tower and the switches and signals in the West End layout, the control and indications are handled by conventional direct wire circuits. However, between the tower at West End and the instrument at East End, 13,200 ft., the outgoing controls and the returning indications are handled by means of a duplex Syncrostep system, which operates over a three-wire circuit, which is 90 per cent open wire and the balance in buried cable.

This interlocking was planned and constructed by forces of the Canadian National under the jurisdiction of H. L. Black, system signal engineer, at Montreal, and E. P. Stephenson, signal engineer, Central Region, at Toronto. The major items of interlocking equipment were furnished by the General Railway Signal Company.