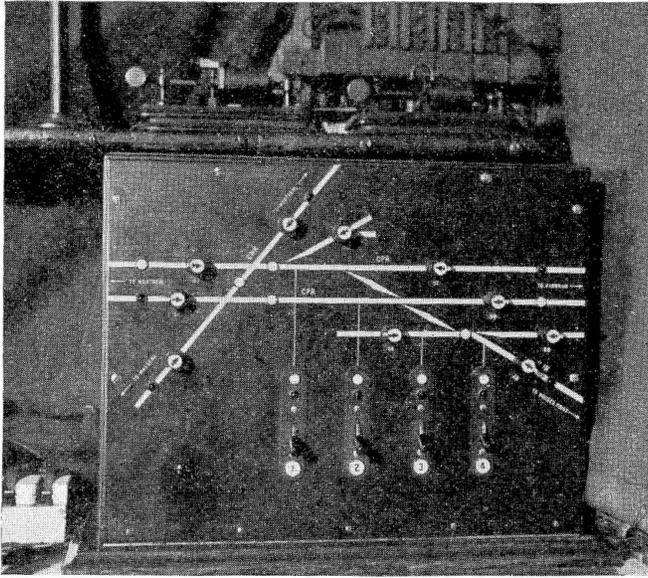


Railway Signaling

Mechanical Plant Replaced by Electric Interlocking



The control machine is of the C.T.C. type

by Electric Interlocking

Power apparatus controlled by C.T.C. type machine in the operator's office reduces the annual operating costs

AT DELSON, QUE., the Canadian Pacific has replaced a mechanical interlocking with an all-relay type of electric interlocking, using power switch machines and signals which are controlled from non-interlocked miniature levers of the C.T.C. type, mounted in a small cabinet on the operator's desk in the station, thereby eliminating the manually-controlled mechanical plant.

Delson is located south of the St. Lawrence river, 14 miles from Montreal, on the double-track main line to eastern points. The single-track

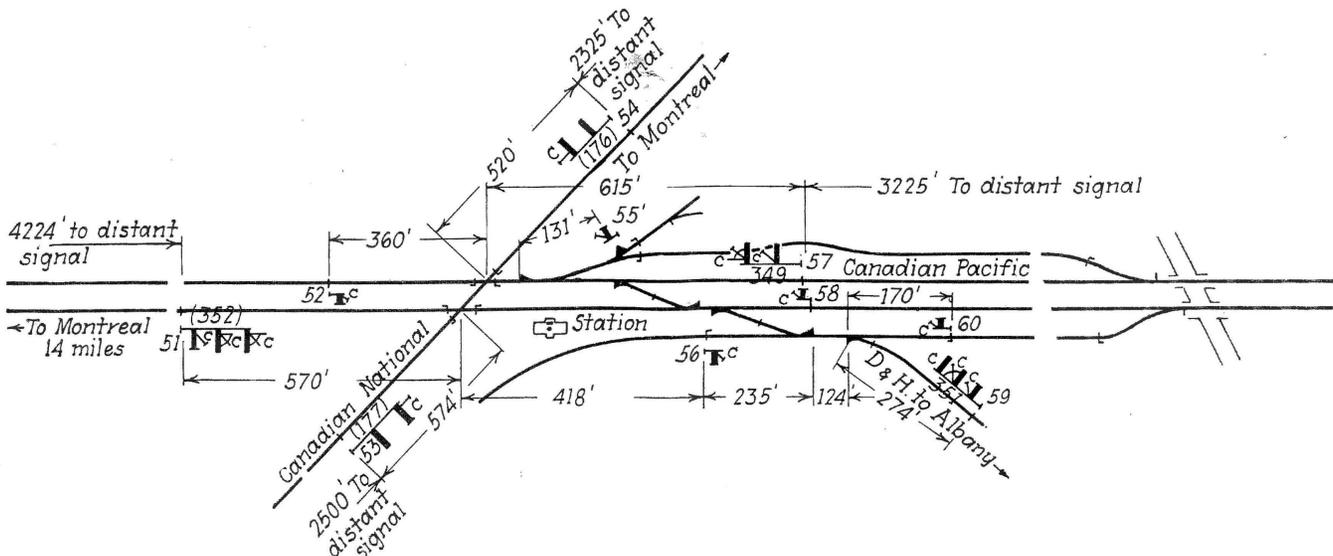
main line of the Delaware & Hudson (Napierville Junction Railway) forms a junction with the Canadian Pacific at Delson, the D. & H. trains being operated over the Canadian Pacific between Delson and Montreal. Also a single-track line of the Canadian National crosses the Canadian Pacific main line.

was previously handled by the mechanical interlocking with 31 working levers, the tower being located just west of the crossing south of the C.P. tracks.

The daily traffic through this plant includes 13 passenger trains and 7 regular freight trains on the C.P., 6 trains on the C.N., and 6 passenger trains on the D. & H. The D. & H. freight trains set out and pick up cars at Delson, these cars being handled by the C.P. between Delson and Montreal. These transfers involve a considerable number

Layout of Plant

This track layout, including the crossing, two single switches and two crossovers, with proper signals,



Track and signal plan of the Delson interlocking

of switching movements over the switches in the plant.

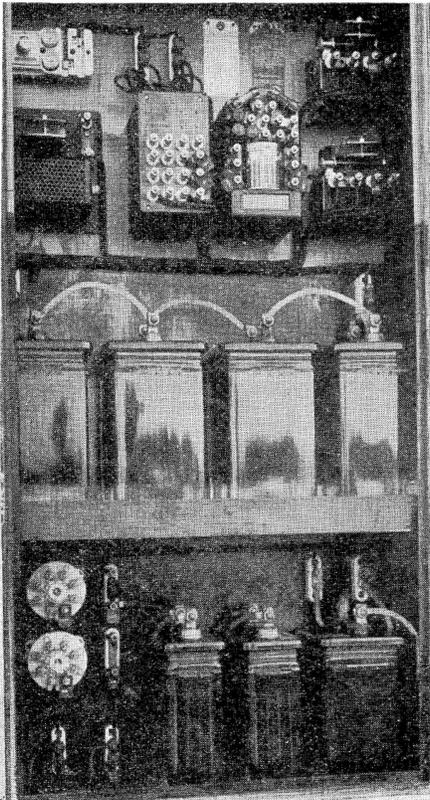
The change was made primarily to effect an operating economy by dispensing with the wages of the three towermen, and the heating and maintenance of the tower building. In addition, switching movements are facilitated by the new plant, controlled by the operators, who are conversant with the movements to be made.

With the mechanical plant, the operating expenses including wages, maintenance, fuel and supplies, totaled \$5,911 annually. Maintenance of the new plant costs about \$300 annually, and there is no added charge for fuel. The annual saving in operating expense is, therefore, \$5,611 which represents 18.1 per cent on the expenditure for the new interlocking.

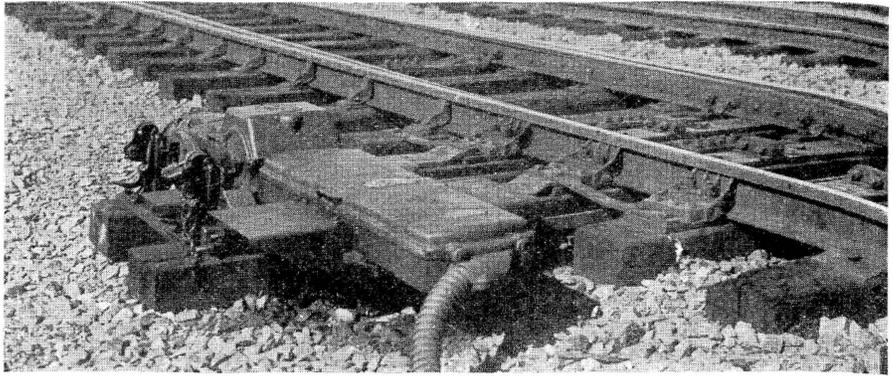
All-Relay Interlocking Control

The control machine, as shown in one of the illustrations, has 10 levers for the control of 10 signals and 4 levers for the control of two single switches and two crossovers. The control circuits are of the direct-wire type, no code equipment being used.

The track diagram is equipped with normally extinguished lamps to indicate track occupancy of the corresponding sections of the plant or approaches.



Battery and charging equipment at a signal location



Dual-control switch machines are used

The switch levers, located at the bottom of the panel, are of the key type, being normally in the lowered position; and are thrown to the upper position to reverse the corresponding switches. A small red lamp just above each switch lever is lighted when the switch is locked or when the lever is out of correspondence with the switch. A white lamp, just above the red lamp, is known as the transit light and lights when the switch is operating. As a further assistance to the operator in checking the line up, the track diagram is equipped with movable switch points which are operated by magnets controlled by the switch repeater relays so that the miniature point does not move until the corresponding switch has completed its operation and is locked.

Switch Lever Control

Each switch lever controls a circuit operating a d-c. polar relay which, in turn, controls the operation of its corresponding switch. The switch indication circuits are controlled through a KR polar relay which follows the position of the switch, being controlled through the controllers in the switch machine as well as the point detector.

The control relays for the switches are, of course, checked through the track circuits, relays and signal repeater relays to secure approach route and detector locking. Release of the approach locking is secured automatically by the use of thermal time-element relays. Circuits are arranged to provide what is termed the "electric lock equivalent."

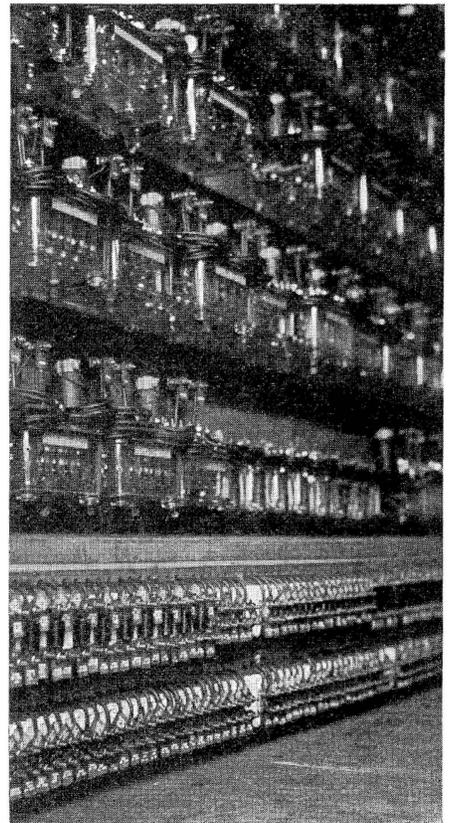
The signal levers are of the rotating knob type, each lever being located on the track diagram in the position corresponding to that of its respective signal; those for the two C.P. and the D. & H. home signals operate to two positions, while the others only to one position. An arrow on the face of each lever

points in the direction which the signal controls. When a signal is to be cleared, the knob is rotated 90 deg. and when the corresponding signal changes to the proceed aspect, a small lamp, inside the lever knob is lighted as an indication.

Signal Lever Control

Each signal lever controls a d-c. neutral circuit operating a neutral relay for the control of the corresponding signal. This circuit is checked through the track circuit relays, the switch repeater relays to secure SS control, and through the repeater relays of opposing signals.

For a signal equipped with two or more "arms" the proper aspect is



The equipment in the instrument house is well arranged

secured for each route by selecting the controls through the switch repeater relays.

Stick control is used for all signals. An operative distant signal is provided for each approach to the plant, the distant signal being cleared automatically when the corresponding home signal is cleared. Thus it may be seen that, in so far as the control of the field functions is concerned, this interlocking is practically the same in effect as that of a centralized traffic control installation; the important difference

control circuits it was possible to design the circuits so as to economize on the wire requirements and yet secure reliability of operation equal to that of modern requirements for signaling practice.

Modern Equipment Used

The six switch machines on this plant are the Model 5D equipped with dual-selectors permitting hand operation if necessary. As shown in one of the illustrations, each switch layout is equipped with three insulated gage plates 1 in. thick and 6½ in. wide. Two plates extend and are attached to the switch machine so as to eliminate lost motion. Enclosed type switch adjusters are used and the head rods are of the C.P. standard type. Each machine is equipped with a point detector. Ramapo Ajax adjustable rail braces are used on three ties including the one ahead of the points.

The old semaphore-type interlocking signals were all replaced with G-R-S Type-SA d-c. searchlight signals. The operative approach signals in approach to each home signal are of the semaphore type.

Wiring Distribution and Housings

The main wire runs on this plant are single conductor insulated wires and cables run in creosoted wood trunking supported on the concrete foundations used previously for the pipe lines of the old mechanical plant.

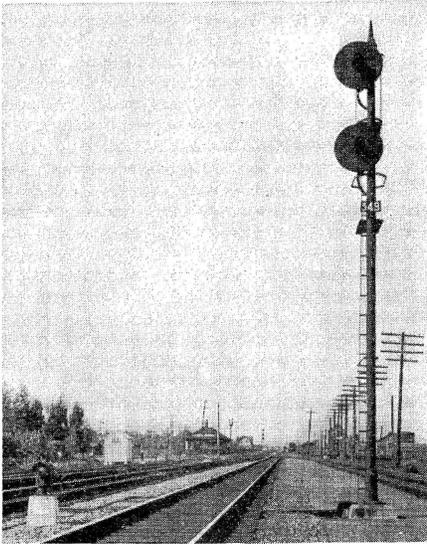
At a central location on the plant a sheet metal house 5 ft. by 7 ft. is used for housing the instruments and battery. The wires for all in-

coming circuits are terminated on porcelain-based terminals mounted on a board at the lower section of the left wall. The relays and other instruments are mounted on boards attached to a rack set out from the wall about 8 in. to allow space for running wires behind the boards. The track and control relays are all Type-K wall-mounted spring-suspension type, and the thermal time-element relays are the Type TB.

The power apparatus is arranged on a panel on the end wall. ANL-40 transformer relays are used to secure proper low voltages for the signal lamps and to transfer this load to the storage battery should the a-c. supply fail. A set of 16 Exide EMGO-9 storage cells is used for the operation of the power switch machines, this battery being charged by an RT-81 rectifier. Two sets of five cells each of KXHS-13 battery, arranged for a split battery feed for control circuits, is charged by two separate RT-21 rectifiers. Fixed Racor sealed resistance units are used to adjust the voltage for the feeds to different control circuits. Each track circuit on this plant is fed from one-cell of KXHS-7 type.

The power feed for this interlocking and adjacent automatic signal territory on the C.P. is secured from a 110-volt commercial source, a General Electric Type-TC 1-kv.a. transformer being used to raise the voltage from 110 to 220 for distribution over the plant.

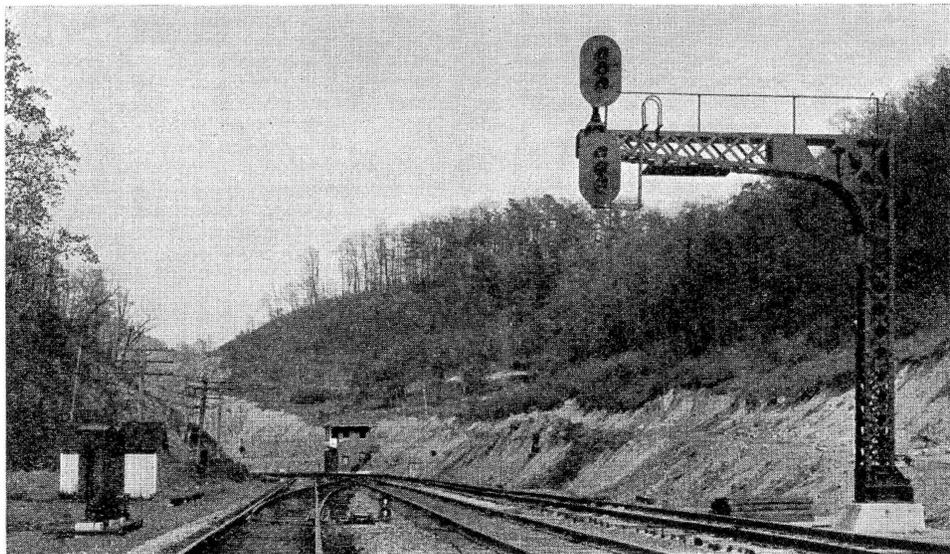
This interlocking was planned and installed by the signal department forces of the Canadian Pacific, the principal items of material being furnished by the General Railway Signal Company.



Westward home signal on the main line of the Canadian Pacific

being that the comparatively small area of the plant imposed no serious limitation to the number of wires used for control or indication circuits.

However, by means of a split battery arrangement for the feed of the



On the Chesapeake & Ohio in the Allegheny mountains