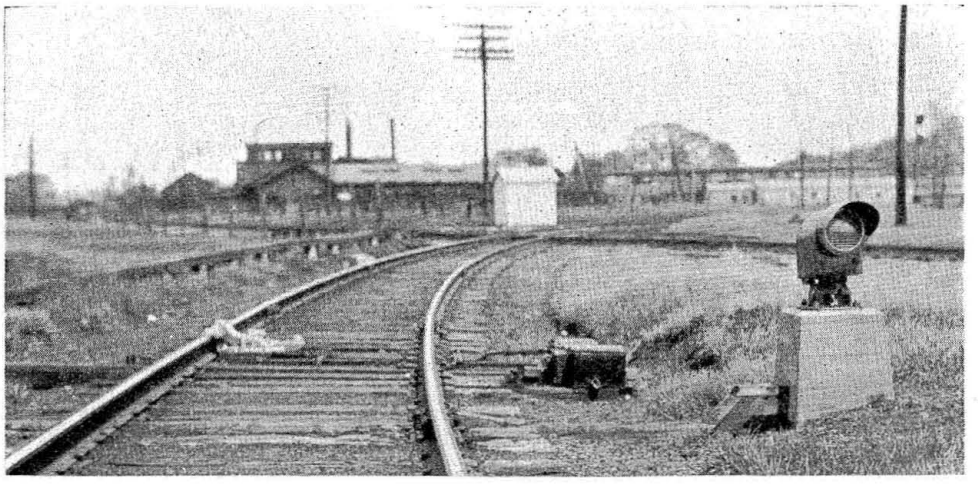
Remote-Control Replaces Mechanical Interlocking on Canadian Pacific

C. T. C. type machine uses simplified circuit including polar relays—saving represents 63 per cent



Derail and dwarf signal on the Canadian National at the crossing

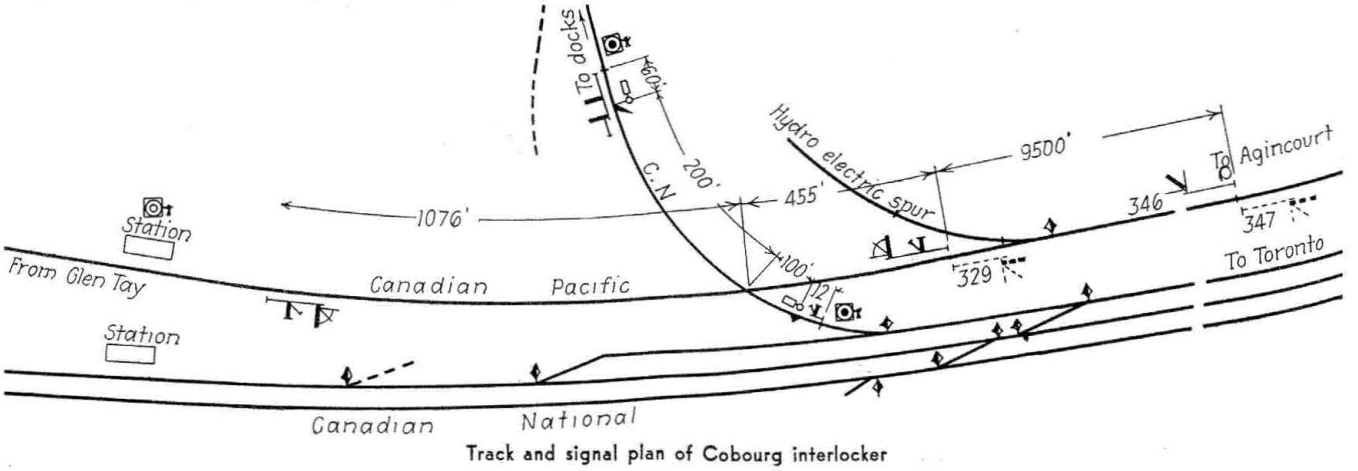
AT COBOURG, ONT., a 32-lever mechanical interlocking plant, at a crossing of the Canadian Pacific main line with a switch lead of the Canadian National has been replaced by a remotely-controlled interlocking. As the new machine is controlled by the operator in the station, the levermen formerly required at the interlocking have been transferred to other points.

The main lines of the two railways are approximately parallel through Cobourg, and at a point about 1,200 ft. west of the station a single-track line of the Canadian National branches off to the south, crosses the main line of the Canadian Pacific and extends on about a mile to factories and docks along the shore of Lake Ontario. The Canadian Pacific operates about 20 trains daily over this crossing while the Canadian National makes about five round trips over the crossing daily with a switch run of 10 cars or more each trip. Although the mechanical interlocking was in good condition, it was decided, as a means of reducing operating expenses, to replace this plant with power signals and switch machines controlled remotely by the operator in the Canadian Pacific station at Cobourg.

With the new arrangement the two derails on the Canadian National are each operated by an electric switch machine. A searchlight dwarf signal and a high signal were installed to replace the mechanical signals on the Canadian National, while the searchlight home signals on the Canadian Pacific were left in their former locations and incorporated in the new plant.

Feature of Control Machine

The control machine in the Cobourg station is very simple, including an illuminated track diagram and two miniature non-interlocked levers of the C.T.C. type. The two-position lever at the left, controlling the operation of the two derails, stands normally at the left when the derails are on the rail. When this lever is thrown to the right the derails are operated. Above this lever are two lights, the green one to the left repeating the normal position of the derails, and the red



Track and signal plan of Cobourg interlocker

one to the right repeating the reverse derail position.

The three-position signal lever normally stands on center to control all signals in the stop position. When this lever is moved to the left position, the Canadian Pacific home signals for both directions will be cleared. As the plant is included in automatic block signal territory, an approaching train will automatically control the opposing signal to cause it to display the stop indication.

Each of the Canadian Pacific home signals has two units, the upper operating to three positions and the lower to two positions. The lower unit is used to display the call-on indication under certain circumstances when the block is occupied. For example, when a westbound train stops with part of its train within the home signal limits, cuts off and takes a few cars to switch into the "Hydro-electric" spur, some arrangement must be provided to give a proceed indication for this locomotive to return to its train. This result is effected automatically. If the route is lined up, under the circumstances as explained, a thermal relay functions, and after 20 sec. the signal will display the call-on aspect. The same control arrangement is provided for the eastward signal. When the signal lever is thrown to the right, both of the home signals on the Canadian National will be cleared.

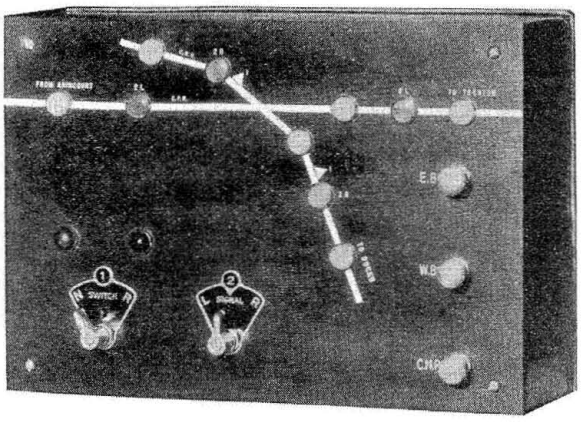
In case the leverman lines up the route and clears the signals for a Canadian National train which does not move at once, and in the meantime a Canadian Pacific train approaches, the leverman returns the signal lever to center, causing the Canadian National signals to return to stop; then a thermal unit, set at one minute, operates. At the end of this period a stick relay is picked up, after which the Canadian Pacific signals can be cleared by the leverman in the usual manner. In changing from a Canadian Pacific line-up to a Canadian National line-up the thermal relay is set for two minutes.

Each signal is represented on the illuminated track diagram by a lamp, and when the corresponding signal is cleared the lamp lights to show an arrow pointing in the direction which the signal controls. One lamp for each road shows when the track inside the home signal limits is occupied. Each approach annunciator section is represented by a lamp on the diagram and a bell rings in conjunction with the lighting of each lamp. Two pushbuttons are provided to cut out the annunciator bell on the Canadian Pacific and one button for the Canadian National. There is no available space for a southward annunciator track section on the Canadian National. Therefore, a pushbutton arrangement is provided so that when a Canadian National southbound switching train wants to use the crossing, a member of the crew pushes the button which causes the corresponding annunciator lamp to be lighted on the track diagram.

Control and Indication Circuits

The control of the four signals is accomplished over a line circuit of "one wire and common," from the lever to a polar relay at the crossing. When the polar contacts are in one position, the circuit is completed to control the signals on one road, and when in the other position, to control the signals on the other road. Thus the interlocking of this feature is very simple for the polar contacts can be in only one position at any one time. A "one wire and common" circuit is likewise used for the control of a polar relay to control the operation of the derails.

Although the control circuits between the machine and the crossing are very simple, requiring but few wires, there is a total of 14 separate indications to be brought into the control machine from the field, and each requires a separate wire, connected with common. As these are all features for information only and do not enter into the vital control, it was decided to use telephone-type relays at the control office for these circuits; the control of the lamps on the levers and track diagram is taken through the contacts on these telephone-type relays, which are wound to 500-ohm resistance and are operated on 10 volts d-c.



Only two levers are required for the control of the plant

These relays with resistors were mounted on a panel which is housed in a sheet-metal case located in the office near the control machine. This case is equipped with gaskets and clamp clasps so as to make the case practically dust-proof, this feature being necessary to prevent dust from settling on the open contacts of the relays.

Located in a similar case is a Union rectifier and a set of 10 cells of Exide BTM-11 32-a.h. cells which is used to feed the lamps on the illuminated track diagram. As this territory is equipped with automatic block signals operated by the a-c. floating power system, it is desirable to have a simple indication to inform the operator when the a-c. power is cut off the feed line. A power-off relay controlling an indicator could have been installed but a much simpler arrangement, as employed by the Canadian Pacific at this and other stations, is to provide an ordinary lamp socket of the wall-mounted type and to place a one-watt Neon lamp in this socket. Although the amount of power consumed by the lamp is very small, the glow of the lamp is very distinctive, and if extinguished will be soon noticed by the operator.

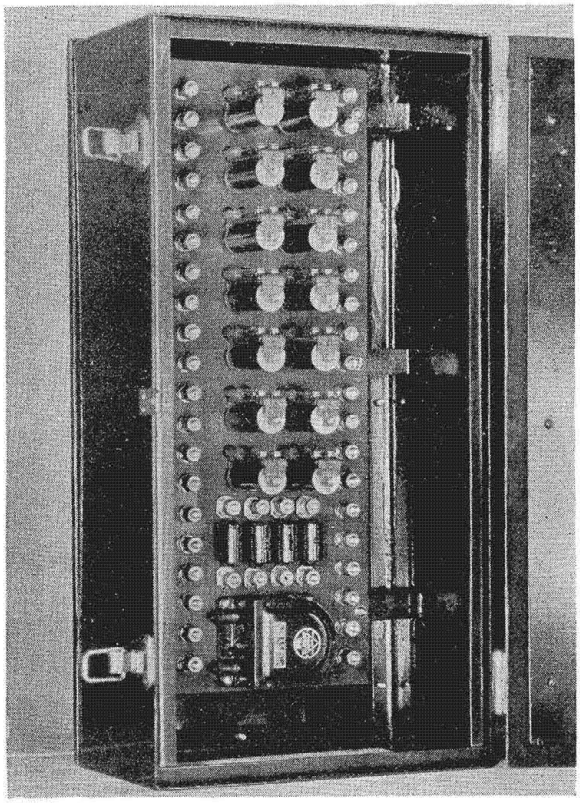
Control in the Field

Between the control office and the instrument house at the crossing there is a 17-conductor No. 14 aerial cable suspended from a stranded messenger run on the pole line. At the crossing a U. S. & S. Co. sheet-metal steel cabin, 5 ft. by 7 ft., is provided to house the instruments and batteries. The relays are of the spring-mounted wall type attached to boards 1¼ in. thick and 8 in. wide set out 3½ in. from the wall so as to allow space for wires to be run up behind the boards and out through small holes to the terminal posts. The incoming cables all terminate on porcelain-based terminals mounted on boards at the bottom. The lightning arresters are the Everett Type-510, and Raco sealed resistors are used.

A polar relay, operated by a two-wire circuit, is used as a repeater for each of the switch machines. And, as explained previously, one polar relay is used for the control of the signals and another for the con-

trol of the switch machines. These polar relays are the G.R.S. Co. Type K. The neutral relays are the U. S. & S. Co. DN-11 Type J, the track relays being of the two-ohm quick-acting type.

The battery for operating the switch machines consists of 12 Exide EMGO-9 lead cells. This battery is split for feeding control circuits. Each half of the battery is charged by a separate RT-21 rectifier. These



The telephone-type indication relays are mounted in a sheet-metal cabinet

rectifiers operate on 220 volts a-c. direct from the distribution line.

The signals on the Canadian National are constantly lighted, while those on the Canadian Pacific are approach lighted. The signals are of the Union searchlight type with 10-volt d-c. mechanisms employing a 250-ohm armature and a 500-ohm field. The switch machines are the Union Style-M equipped with 24-volt motors.

Savings Effected

This installation was placed in service on August 3, 1933, and has rendered very satisfactory service. An annual saving of $4,729 has been effected in operating expenses which represents 63 per cent on the expenditure required for the changes in the interlocking. The installation was planned and constructed by the signal department forces of the Canadian Pacific.

After reading the description of this installation the question might arise as to why an automatic interlocking was not used instead of the remote control arrangement as was installed. One reason for not using an automatic control system was that there is no space for an approach control for movements in either direction on the Canadian National. A further reason is that the operation on the Canadian National consists entirely of switching movements so that preference can be given to through train movements on the Canadian Pacific without serious delay to the Canadian National. In order to get this selection of preference, it was desirable to place the control in the hands of an operator.

Preservation Treatment of Poles

AT THE annual convention of the American Wood-Preservers Association, held in Houston, Tex., a report was presented by the Committee on Poles, which is of interest to signal and telegraph men, and is abstracted as follows:

This report was divided into three parts, namely, new specifications for pressure-treated creosoted pine poles, a report on bleeding, and a report on conditioning. The report on bleeding is abstracted briefly below:

There are several factors that affect bleeding, which are subject to control, the most important being the treatment process, the retention of creosote, the type of creosote, the viscosity, and the resultant color of the pole. Bleeding may not be totally eliminated through the control of these factors, as variations in the structural characteristics and the moisture content of the various poles in a charge may bring about a lack of uniformity in treatment which means differences in retention, and, as a consequence, difference in bleeding.

Examination of matched test poles confirms practical experience to the effect that poles treated by a 12-lb. full-cell process bleed more than poles treated by an 8-lb. empty-cell process. After from 1½ to 6 years' exposure, 75 per cent of the empty-cell posts of a group treated in 1926 were listed as "clean," whereas only 12.2 per cent of the full-cell posts were so listed. After the same exposure, none of the empty-cell posts were listed as "severe asphaltic," whereas 17 per cent of the full-cell posts were so listed.

With respect to the retention of preservative, it was reported that 61.1 per cent of some posts treated up to 10 lb. were listed as "dry" or "damp" while only 27.7 per cent of the posts treated to 10.1 lb. or more were so listed. Of the posts treated up to 10 lb., 16.7 per cent were "wet," while 54.6 per cent of the posts treated with 10.1 lb. or more were so listed.

The residue, above 355 deg. C., of the creosote used in the treatment of test specimens, has been found to be an important factor in the bleeding of pine poles. Moreover, observations of poles in actual service confirm the result obtained on the test posts: The greater the amount of residue above 355 deg. C., the greater the bleeding.

The two characteristics of creosotes that seem to be functions of the residue and most likely to affect bleeding, are viscosity and color. While the work of the subcommittee has not been carried far enough to explain the exact mechanism of bleeding, there appears to be a definite correlation between viscosity, residue and bleeding.

It has been noted that during periods of intense solar radiation, black poles are warmer to the touch than brown poles, and that the surfaces exposed to the sun are warmer than the shaded portions.

In a series of tests, higher temperatures were recorded on the black posts than on the brown-black and brown posts, and that the black posts bled more than the brown posts. In general, the use of light colored creosote, usually low-residue oil, results in brown poles.

The committee's recommendations on this subject were as follows:

1. Whenever possible, poles should be stacked on the yard and allowed to dry to a moisture content somewhere between 30 and 45 per cent of their oven-dry weight.
2. Poles should be steamed in accordance with their size. (The committee submitted a table of suggested periods of steaming at different pressures.)
3. The vacuum following the steaming period should be drawn as quickly and to as high a degree as plant facilities will permit.