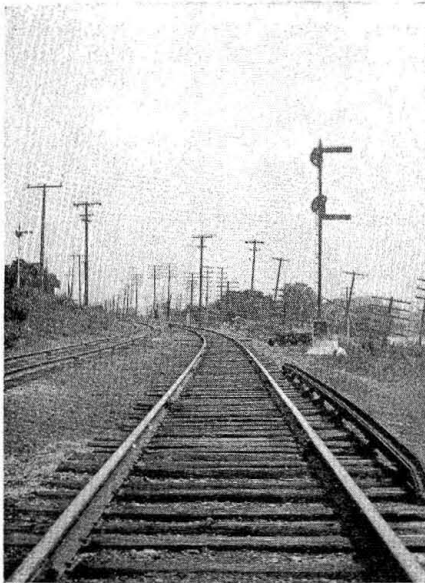
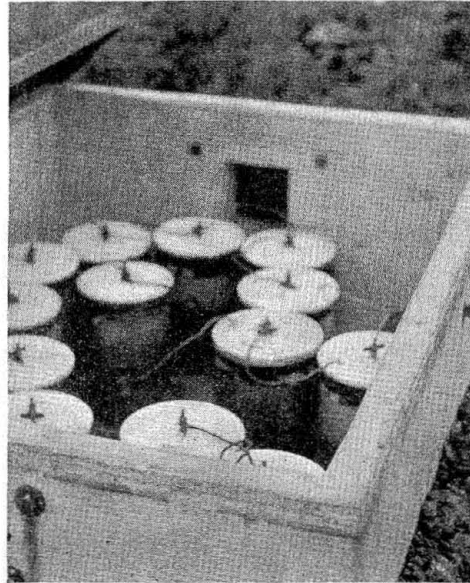


# Automatic Interlocking in Train-Control Territory

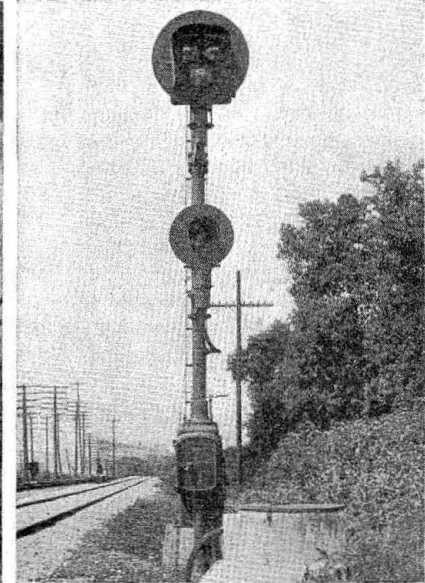
Mechanical plant replaced at crossing of high-speed double-track line of Rock Island with branch line of Burlington



Rock Island eastward home-signal; ramp in foreground



The entire plant is operated by primary battery



The westward home is of the color-light type

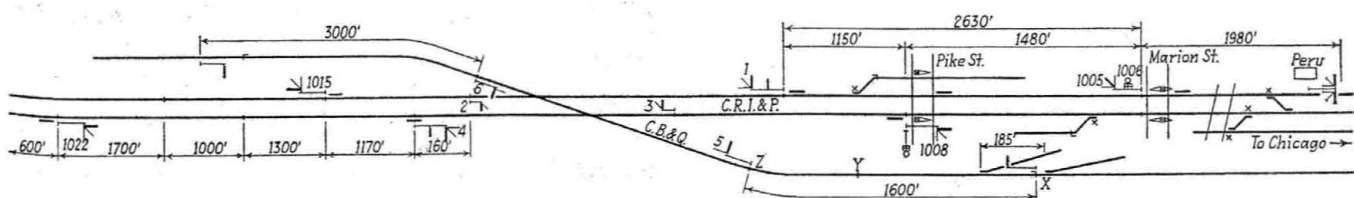
**A** MECHANICAL PLANT has been replaced by an automatic interlocking, at the crossing of the Illinois Division high-speed double-track main line of the Rock Island with a single-track secondary line of the Burlington, at Peru, Ill. The traffic on the Rock Island includes 14 scheduled passenger trains and about 12 freight trains daily, while the traffic on the Burlington includes 2 gas-electric passenger trains and from 2 to 4 freight trains daily.

A 24-lever mechanical interlocking, with derails on all tracks, was installed at this crossing in 1887, one leverman being on duty each trick. In 1922, in order to reduce operating expenses, a cabin-door lock arrangement was installed, the signals on the Rock Island, which is the more important line, being left normally at Proceed and those on the Burlington at Stop. When a Burlington train was to be operated over the crossing, a trainman went to the tower to line up the levers for the train movement, and then, after the train passed, returned the levers

to normal. This arrangement was not satisfactory from an operating standpoint on account of the delays to trains on the Burlington, particularly to northbound trains, which were forced to start on a heavy ascending grade after passing through the plant and stopping to wait for the trainmen to return the levers to the normal position. After a few months, the cabin-door lock arrangement was abandoned, and two levermen were put on duty on split tricks to cover almost all of the Burlington train movements, and were called in case a Burlington train was to be run in the "off" hours.

## Problem Solved by Automatic Interlocking

Even this schedule was not entirely satisfactory, and furthermore, the operating expense was still high. Therefore, it was decided to replace the mechanical plant with an automatic interlocking. An important consideration in favor of the approval of an automatic layout was that



Track and signal plan of automatic interlocking at Peru

this division of the Rock Island, which is the high-speed heavy-traffic line over this crossing, is equipped with automatic train control, including speed control, and it was decided that the protection provided by this system would afford adequate safety without derails, which were included in the old plant.

The old electric motor semaphore for the westward home signal on the Rock Island was replaced by a color-light signal, but the existing semaphore, used for the eastward home signal, was included in the new layout. Electric semaphore dwarf signals are used for reverse running on the Rock Island. The mechanical home signals on the Burlington were replaced by lower-quadrant top-post electric signals. Inoperative semaphore distant signals, giving a caution indication, are used on the Burlington.

### Train Control Protection

In order to provide an adequate time interval for the approach clearing of power-semaphore home and distant signals, the eastward approach clearing section on the Rock Island was extended 3,600 ft. in the approach to the distant signal, the remote end of the clearing section being 8,770 ft. from the home signal. An equally long approach clearing section on the Rock Island westward track would have extended into a zone at the Peru yards where there is considerable switching on the main line, and which, when occupied by switching movements, would have caused the Rock Island signals to clear, thereby locking out the Burlington signals unnecessarily. This undesirable operating condition was obviated by using an approach clearing section only 4,610 ft. long, which was practicable because the new color-light home signal operates instantaneously, thereby reducing the time required for the clearing operation of the signals. As mentioned before, this division of the Rock Island is equipped with the Regan intermittent ramp-type automatic train control, including speed control, thereby enforcing proper operation in accordance with signal indications. The ramps are located and controlled so as to stop a train before it passes a home signal indicating Stop.

### Special Control on the Burlington

The northward approach clearing section on the Burlington is only 1,600 ft. in length, but, on account of local operating conditions and switching movements, it is frequently occupied by trains for a considerable length of time before the train is ready to proceed through the plant. In order to prevent this circumstance from tying up the plant and thereby delaying Rock Island trains, a special time release was incorporated in the control. When a Burlington train enters the approach section (X on the diagram), the time-element relay starts and if the train does not enter the second track circuit, starting at Y, within one minute, the time relay will have completed its operation and thereby opened a contact in the signal control circuit, which restores the plant to its normal condition and allows the Rock Island signals to clear for a train, if one is approaching on that road. If, however, the Burlington train does not stop in the approach section X to Y, and continues on through the section Y to Z, the energy is cut off from the time-element relay, so that its operation is stopped before it opens the signal control circuit. This time-element relay functions only when a northbound Burlington train is approaching the crossing.

At the crossing are two clockwork time releases, one for the Rock Island and the other for the Burlington.

These releases are used when track circuits fail, or when two trains are on hand, to provide a proper time interval between the setting of clear signals on one road to stop and the clearing of the signals on the other road. A trap circuit was provided on the Burlington to protect the long dead section extending over the two Rock Island tracks.

### Primary for Power Supply

The signals, track circuits and control circuits on this entire installation are operated by primary battery. At each semaphore signal there is a set of 20 cells of 500-a.h. battery for operating the signal, four of these cells being used to feed the 3.50-volt 0.12-amp. electric lamp, which is on approach control. The westward home signal on the Rock Island, which is a color-light signal, is equipped with 10-volt 18-watt lamps, which are fed from a set of 16 cells of 1,000-a.h. battery. Each track circuit is fed by three cells of 500-a.h. battery. About half of the battery is of Edison manufacture and the remainder Waterbury.

### Construction Details

Parkway cable with lead sheath and steel tape was used for all the connections from the relay cases to the rails, as well as for circuits running under the tracks to signals and cases. The insulated wire and cable was furnished by Okonite. The relays in the vicinity of the crossing are housed in a large wooden case mounted on two large cable posts set on concrete foundations. The wires and cables are brought in at the rear of this case and are terminated on terminals or arresters, the arresters being the Type-R-2020-H of the Western Railway Supply Company.

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In the Great Northern's relay repair shop at St. Paul