BY W. S. STORMS,
Signal Engineer

Like the nerve system of the human body, which quickly flashes danger signals when anything goes wrong physically, the signal system of the Erie reaches out into every corner of the road to warn of danger and to keep trains moving safely.

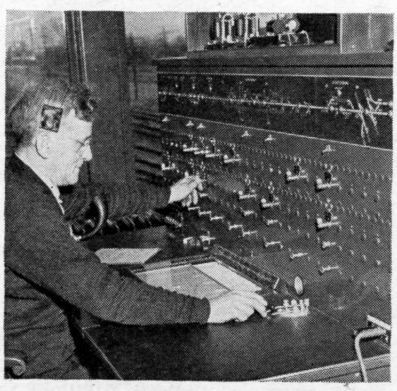
Through the darkest night, in rain, snow and fog, fast Erie trains, carrying passengers and valuable freight, move to their destinations protected by a complete signaling system.

Block Signal System

Along the Erie lines various types of automatic wayside signals are in use for safety first, but also to assure maximum track capacity. All passenger trains are operated under a block signal system to keep safe distances between trains.

The Erie has a complete auxiliary system of telephone train order signals. Dispatchers can set signals along the right of way to direct trains. A red light, or a horizontal semaphore arm or a horizontal position of the lights in a position light signal, means "stop on the main track and report for instructions."

A yellow light, or semaphore arm or lights in a position light signal at 45 degrees, means "take siding and when clear of main track report for instructions". A green light, or semaphore arm or lights in a position light signal at 90 degrees, means "proceed regardless of following superior trains".



Operator C. J. Fenstermaker, in Leavittsburg tower, at the desk of the illuminated control board and pengraph of centralized traffic control between Leavittsburg and Pymatuning

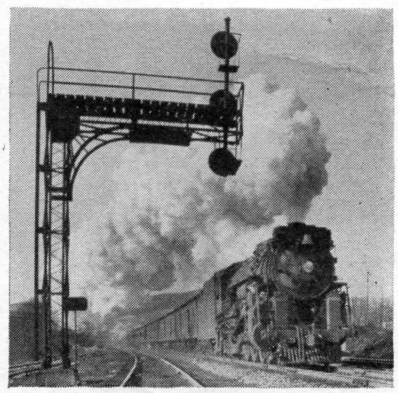
Electric Signals

Electric signals on the Erie are supplied with power from a battery, or when operated by power from a commercial source, an auxiliary battery is provided so that in case of an interruption to the commercial source of supply there will not occur a shut-down of the signaling system.

In the automatic block signal system signals are controlled by an electrical circuit of which the rails of the track form a part; should a broken rail occur and if the break is complete so that the broken parts are separated the continuity of the circuit would be broken and the effect on the system would be the same as with the presence or passage of a train.

Main Line Signals

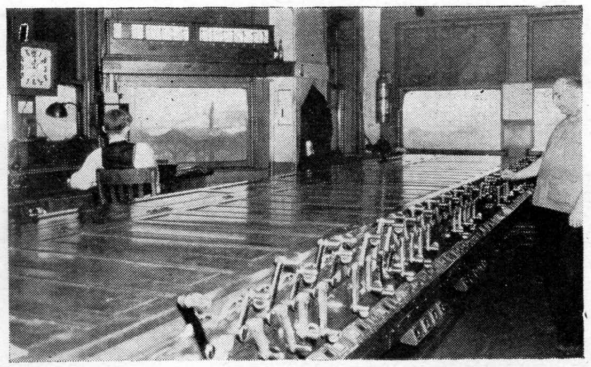
Train movements on the main line between Jersey City, N. J., and Chicago, and the branch lines to Buffalo and Cleveland, as well as on some of the commuter branch lines in the New York area, are protected by automatic block signaling. This automatic block signaling system



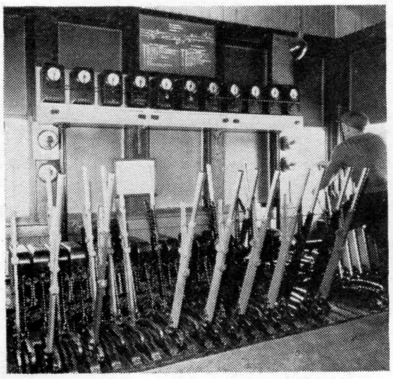
Erie train No. 2 approaching home color signal of interlocking plant at west end of Susquehanna yards

covers 1181.5 miles of road and 2246.1 miles of track. On lighter traffic branches, trains are governed by manual block signals covering 227 miles of road and 243.2 miles of track.

On the Delaware-Susquehanna division, between Port Jervis, N. Y., and Hornell, N. Y., covering 242.2 miles of road and 484.4 miles of track, an automatic train control system is used in addition to automatic signal protection. Should an engineman fail to act in acknowledging a restrictive wayside signal, his train would be brought to a stop automatically.



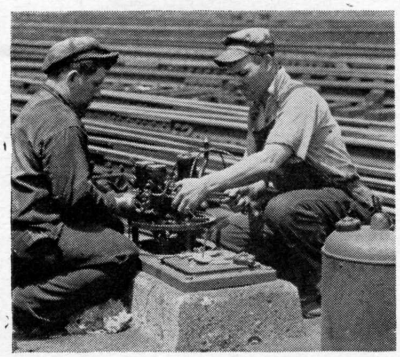
Jersey City tower, showing control levers and miniature signal indicator panel above the window which correspond to signals on the yard bridge. (Left) R. I. Post, tower director, and (right) H. J. Lafrican, assistant director, handling levers of the interlocking machine



J. F. McCann, GH tower operator at Pymatuning, handling control levers

Automatic signals are in service, from the two-arm lower quadrant semaphore signals installed in 1906 on the New York division, to single arm upper quadrant semaphore signals installed over a greater part of the system between 1910 and 1916, to the modern color light signals which have been considered standard for new work since 1924.

Color light signals are, of course, electrically lighted. Originally all semaphore signals were oil lighted and while we still have a large number of oil lighted semaphore signals, they are gradually being changed to electric lighted.



Two Erie signal men adjust Style A-1 electric pneumatic switch control valve at Jersey City. (Left) C. Wilber; (right) C. G. Popper

Automatic block signals operate through the exercise of inherent power as distinguished from those in which the changes are made manually. They are actuated to display indications by the passing train, independent of human control. These automatic block signals are spaced closer than are manual block signals to allow for a more frequent transmission of information on conditions ahead. This not only assures greater safety but also provides greater track capacity.

Manual block signals govern over a series of consecutive blocks. They are operated from open offices where information by telegraph or telephone or other means is received for the safe direction of all traffic. On 24 separate sections of the Erie train operation is controlled through blocks on sections of the track from a designated point without use of train orders. Under this system of operation, the time table schedule becomes only a reference guide for establishing departure and arrival times. Normal operation under this system does not require train superiority either by precedence or

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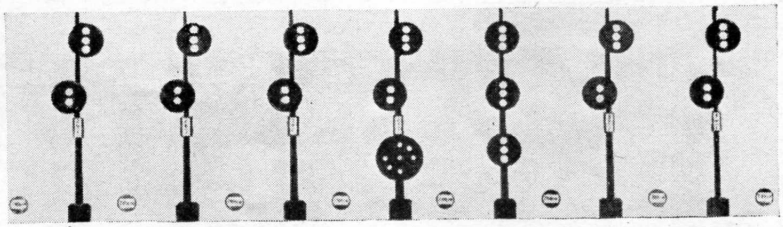
STORY OF THE SIGNAL BOARD



By G. E. McKinney, Electrical Supervisor

Two road foremen were in the office of the district master mechanic of the Eastern district one hot August day. They were explaining to an engineer the meaning of signal indications. One of the foremen had a handful of white cards upon which were different colored spots, representing color light signals. Displaying the cards one at a time, he would ask the engineer what each signal indication meant.

The engineer seemed to be having difficulty remembering the names of the indications other than red for stop, yellow for approach and green for clear. This impressed one of the men, who was sitting near by checking some electric bills. After the demonstration had gone on for some time without making much progress, he said: "Wouldn't it be more impressive if we had a working model to make an actual demonstration?"

This suggestion won immediate approval and from then on the office was transformed into a workshop for the construction of the first model signal board. The storehouse was ransacked for available material and one of the men searched the small shops around New York for small bulbs. After a great deal of searching around, sufficient flashlight bulbs were obtained to make the model. After coloring the bulbs, it was necessary to solder them in place

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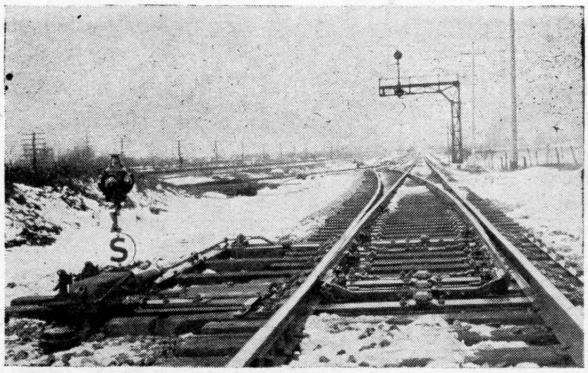


Spring switch with facing point lock near Leavittsburg

Signaling

(*Continued from page 7*)

orders to keep traffic moving swiftly and safely.

At terminals, yards, junction points and railroad crossings at grade it is frequently necessary to have all signaling functions controlled from a central tower. Here in this tower all the levers for operating the switches and signals are grouped together in a common frame called an interlocking machine. There are 105 of these interlocking plants maintained by the Erie.

A factor in speeding up the war time flow of freight traffic on the Erie is the use of the retarder system for reclassifying freight cars where they are put over the hump at the westbound yards in Marion, O. This system was established at a cost of $240,000.

Under the old method of reclassifying freight cars it required 12 riders and three switchmen, with constant operation, to handle approximately 1200 cars daily. With the retarder system 2300 cars can be handled daily. Recently 863 cars were handled in six hours.

Twist of the Wrist

The retarder system enables the tower operator to effectively brake and slow down freight cars, which have been put over the hump, by merely using a lever at his finger tips. Tower operators receive switch lists from the yard office via teletype and route the cars into the right tracks as they come over the hump. As the car is cut loose its speed can be controlled by the electro-pneumatic retarders.

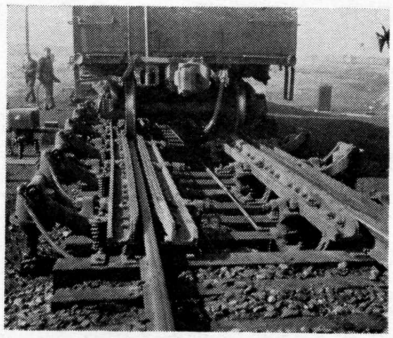
In this retarder system at Marion there are 17 retarders and 24 power-operated switches. There also are track circuits and detector locking to prevent switches from being operated under the cars passing over them.

Repair Shop

To keep its vast amount of signaling equipment in repair, the Erie maintains its own signal repair shop at Meadville, Pa. From a modest beginning in 1916, this repair shop has grown until today it handles practically all repairs, both electrical and mechanical. In the average month this shop produces the following items:

24 signal slot arms, 10 F.P.L. switch stands.
3 bonding machines, 3 track drilling machines and
91 relays of all types.

Erie passengers and freight are always under the protective eye of the watchful signal system. Not only is this signaling system complete, but its performance is on a par with that of the best American railroads.



New electro-pneumatic retarder at Marion, showing how speed of freight car is controlled as it rolls down the hump

Story of the Signal Board

(*Continued from page 7*)

because no lamp sockets were available. Discarded parts of gas electric rail cars were used for the controller.

Then the big day came when the signal board was sufficiently completed for the first demonstration. It worked successfully for the first few minutes, then the fun started. The flashlight bulbs began to burn out and this meant resoldering a new bulb in place. Someone suggested Christmas tree light sockets and soon the men were bringing in strings of them.

However, the Christmas tree light sockets solved the problem and the first signal board was ready for classes of enginemen. This signal board was eight feet long, illustrating in miniature the equivalent of seven separate automatic signals or eight blocks of main track. An imaginary train indicated by a light placed behind a transparent disc was placed in each block. From left to right on the board these signals were shown in order:

Signals Shown

The first, second and third signals represent two unit, three block four indication automatic color light signals.

The fourth signal is the same as the first three but has in addition a position light telephone train order signal.

The fifth signal is a three unit automatic color light home signal which displays eight separate signal indications.

The sixth and seventh signals are the same as the first three.

The position of the train on the board and the corresponding signals displayed were controlled by a hand-operated drum controller which had contact on it for each signal light and train location. This controller operated much like the roll on a grind organ.

This original demonstration signal board was so successful that later a semaphore type of board was constructed. Then followed other boards for use on other divisions of the Erie.

When Henry J. Kaiser arrived in Washington he was late for an appointment with the newspapermen. "I had to wait 30 minutes for a taxi", explained Kaiser.

"Thirty minutes? Why didn't you build one?"—Christian Science Monitor.

"Wot's dat five per cent deduction from mah pay, boss?"

"That's the Victory Tax!"

"Did we win?"