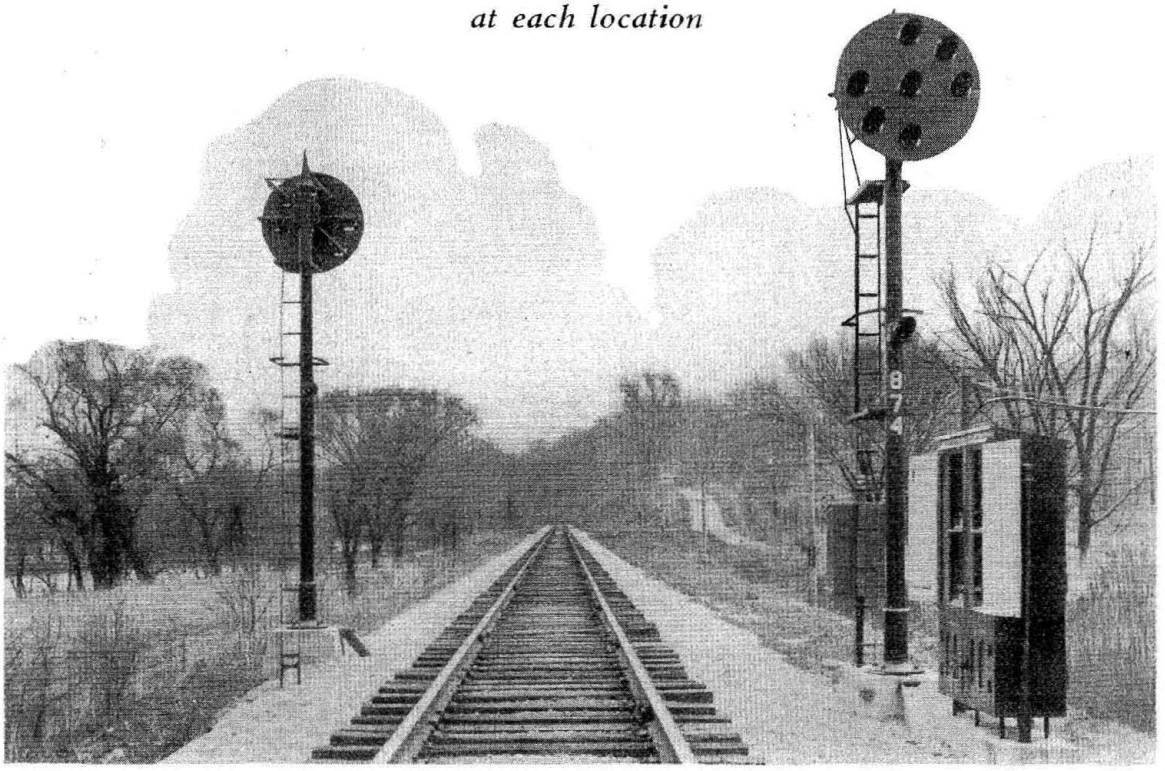
Railway Signaling

Vol. 22 June, 1929 Number 6

Pennsylvania Installs A. P. B. Signaling on 86 Miles

First installation of this type of signaling on this road—Telephone at each location



A typical intermediate double location

THE Pennsylvania has recently placed in service automatic block signals of the position-light type on 86 miles of single track, from Xenia, Ohio, to Foster, 36.6 miles, from Xenia to Dayton, 15.4 miles, and from Wolf Creek, Ohio, to New Paris, 34.0 miles. This installation includes the first single-track automatic block signaling used on the Pennsylvania, as heretofore the single-track signaling on this road has been of the manual or controlled-manual type.

On the 36.6 miles of single track from Xenia southwest to Foster, which is near Cincinnati, there are eight passenger and about nine freight trains each way daily. On the east and west line from Columbus, Ohio, through Xenia to New Paris, on which the other two installations of single-track signaling are located, there are nine passenger and about three freight trains each way daily. Previous to the completion of the new automatic block signals, train movements had been handled by manual block, time table, and train orders.

The new signals are, in general, controlled by the absolute permissive block system of circuits as used extensively on other roads for years. However, several unique features are included to afford flexibility of operation.

As shown on the track and signal plan, the head-block signals are located at each end of the siding layout. The absolute signal governing movement into a single-track block is designated by the absence of both the number plate and marker light. A double-signal location is placed one mile from each head-block location, and the intervening distance to the distant signal for the next head-block is divided into blocks approximately two miles long.

The length of the first block was fixed at one mile for two reasons. In the first place, where a train is on a siding waiting for a train in the same direction

to pass, the train on the siding can start to pull out, when the preceding train clears the mile block. The leading train in the meantime can easily clear the next two-mile block while the following train gets under way and covers the first mile block. In the second consideration, where trains are approaching a siding, the use of a one-mile block brings a train closer to the siding before encountering a caution block, thereby reducing the distance and time consumed while running at reduced speed.

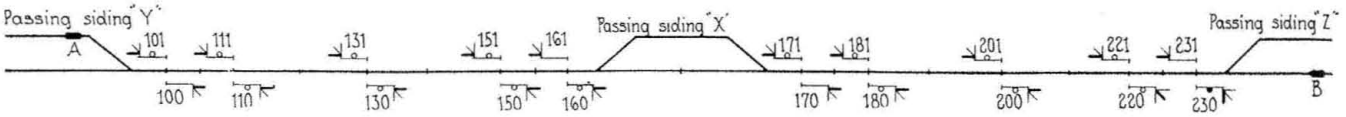
On many single-track automatic signal installations, two signals are held at the caution indication in the approach of a head-block signal, so as to insure that under no circumstances will an engineman encounter a stop indication without first having seen a caution indication at the signal in approach thereto. In the Pennsylvania's new installation, a unique circuit arrangement is used to insure a caution signal in each case, and yet at the same time to reduce to a minimum the length of the caution block and thereby lessen the delays in the vicinity of the passing tracks. The operation of this system of signaling, when two trains are making a meet, is shown in detail in the accompanying diagram, with an explanation under each sketch. Enginemen soon become familiar with local conditions, so that this caution feature is of decided assistance in controlling the speed of the superior train so as to eliminate train stops in many cases.

A telephone is mounted in a box at each signal location, and, in case a train is stopped at any signal indicating "stop," the conductor is required to call the dispatcher for information and get permission to pass the signal.

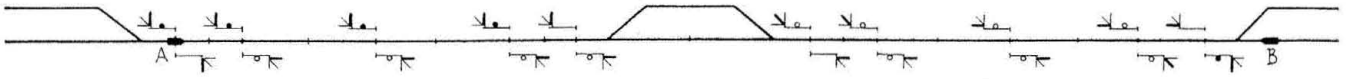
Position-Light Type Signals

The automatic signals are the position-light type, with a 9.0-watt, 12-volt lamp in each unit. In order to provide a simple circuit for the operation of the system, and at the same time to eliminate the use of line repeaters, the track was fed separately in each direction at the cut-section located half way between signal locations. This placed the track relays at signal locations, and also provided means for approach lighting the signals.

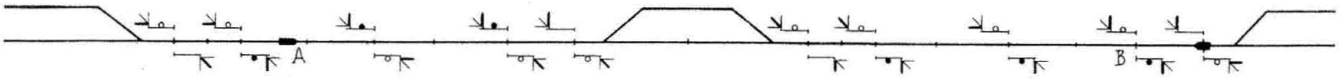
A 440-volt, single-phase, 60-cycle power distribution line is carried on two No. 6 hard-drawn solid-copper insulated wires with weatherproof covering. Double-petticoat glass insulators, with a top groove, are used for these line wires, which are carried on a new signal crossarm, which was added to the existing pole line used for communication circuits. A



Train *A* is about to come out of passing siding *Y* and has orders to meet Train *B* at switch *2*, passing siding *X*. All signals are normally clear. Headblock signals have no marker light. These numbers are for circuit reference only

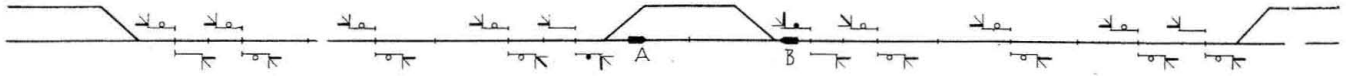


Train *A* has come out of passing siding *Y*. As soon as part of the train passed headblock signal *100*, the signals assumed positions as shown. All opposing intervening signals went to stop and proceed, headblock *161* to stop and stay, and signals *171* and *181* to approach. Train *B* has not reached headblock *231*

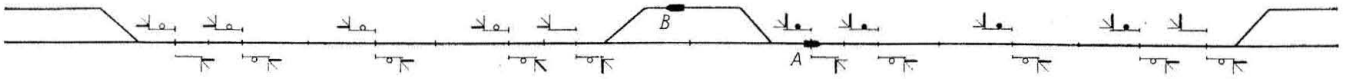


Train *A* has passed signal *110*, opposing signals *101* and *111* cleared up just as soon as train *A* passed them. Headblock signal *100* has gone to approach to allow for a following movement. Opposing signals to be passed remain in their most restrictive indication. Train *B* in passing headblock *231* caused all opposing signals, up to and including headblock *170*, to assume their most restrictive indication and signals *160* and *150*, the approach position

When Train *A* reached the cut-section half way between signals *150* and *160* (tripping point) it caused signal *171* to go from approach to stop and proceed. Train *B* is approaching signal *181*. Should Train *B* reach the tripping point, halfway between signals *181* and *171*, before Train *A* passes signal *160*, it will not drop this signal to stop and proceed in the face of Train *A*, because the first train reaching the tripping point will hold its signal at approach, so long as the block governing the signal is unoccupied



Train *A* is proceeding down the main expecting to find Train *B*, which is about to enter the passing siding



Train *B* has entered the passing siding and Train *A* has passed headblock *170;* thereby causing all opposing signals to assume their most restrictive indication as indicated