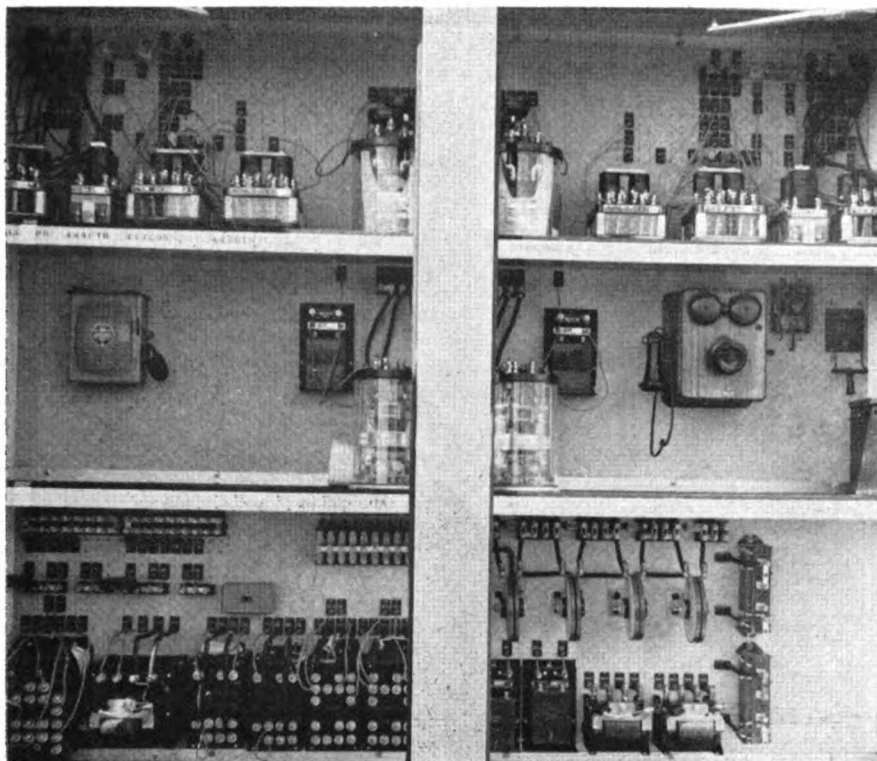


Pennsylvania Installs



Code transmitters (top shelf center) and tuned alternators (middle shelf center) installed in wayside intermediate signal case supply cab signal energy

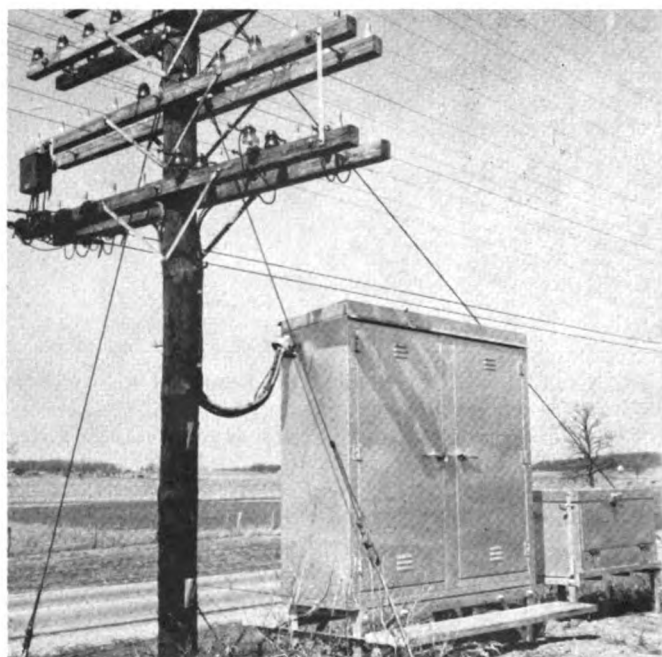
THE PENNSYLVANIA on that portion of the railroad extending from New Paris, Ohio, to Columbus, via Dayton and Xenia, Ohio, recently respaced automatic signals and installed cab signaling. They also remote controlled siding switches at East Manchester, Brookville and East Brookville, as well as hold signals east and west of Dayton and west of Xenia.

The territory between New Paris and Xenia, 51.7 miles, is single track, with the exception of a short stretch of double track at Dayton. Automatic signals were in service on both the single and double track, with traffic control on the double track. As part of the new project, traffic control was provided on the single track in accordance with ICC rules, standards and instruction requisites, thus eliminating the necessity of train orders. The territory from Xenia to Columbus, 54.7 miles, is double-track automatic signal territory with traffic control operation in effect from Alton to Columbus on track No. 1, and from Miami Crossing to Columbus on track No. 2. The semaphore-type signals were changed to position-type and respaced.

New Cab Signaling is for Passenger Line

For several years, the Pennsylvania has been installing speed control equipment on its locomotives, and wayside cab signal equipment on its principal main line routes: New York to Philadelphia and Washington; and Philadelphia to Pittsburgh and Indianapolis. The recent installation of wayside cab signal equipment completes a section of the Pittsburgh-

Wayside Equipment for Cab Signaling



Indianapolis line that is used primarily by passenger trains. The double-track main line from Columbus to Indianapolis, via Bradford and New Paris, previously equipped for cab signal operation, is primarily a freight line which handles 13 freight and 2 passenger trains daily. Traffic via Xenia and Dayton consists of 16 passenger and 2 freight trains daily. The Columbus-Xenia portion of the railroad, which connects with the Cincinnati division at Xenia, also has 6 passenger and 10 freight trains daily. Thus there are 22 passenger and 12 freight trains using all or part of this territory daily.

Wayside signals are the position-light type and are spaced approximately three miles apart. Except where there are crossing signals in the block and approaching wayside signals, track circuits are approximately 5,000 ft. long. Track circuits approaching wayside signals average 4,000 ft. The reason for this is to provide advance warning to engineers, by displaying restrictive cab signals when a train is approaching a wayside signal displaying an aspect more restrictive than Slow-Approach. Track relays were changed from 4 ohms neutral d.c. to 0.5 ohms quick-releasing.

The 100-cycle energy, for superimposing cab signals on the track, was obtained by the use of tuned-reed alternators operated by the 12-volt storage battery at the signal and cut-section locations. Storage batteries are of such capacity that in case of power outage, service can be maintained for several days. Wherever possible, circuits were so designed that in case of a line prostration, trains can be operated on Approach indications.

The cab signals conform to previous installations on the Pennsylvania and consist of four indications: Restricting, Approach, Approach-Medium and Clear. The cab signals give the engineer a continuous indication of the block. They are miniature po-

sition-light signals, in the cab of the locomotive, which reflect the aspect displayed on the wayside signal just passed.

How Speed Control Operates

Speed control is a device which will automatically control the speed of a train when operating under certain signal aspects. For instance: a train traveling under a Clear cab signal, when passing a wayside signal displaying Approach, will receive an Approach cab signal and a warning whistle in the cab. The engineman must, within six seconds, acknowledge the more restricting cab signal, and make a service application of the air brakes to bring the train down to a speed of 30 m.p.h. If this is not done, the brakes will be automatically applied and the train will be brought to a stop before the brakes can be released. If the engineman acknowledges the change in the cab signal, and makes the proper service application of the air, the speed of the train will be brought down to 30 m.p.h. or less. When a train reaches the 4,000 ft. track circuit approaching the wayside signal displaying an aspect more restrictive than Slow-Approach, the cab signal will change to Restricting and the warning whistle in the cab will sound. The engineman must, within six seconds, acknowledge this change of cab signal and make a service application of the air brakes to bring the train down to 20 m.p.h. or less. If he fails to do so, the brakes will be applied automatically and the train brought to a stop before they can be released. If the engineman acknowledges the change in cab signal and makes the proper service application of the air, the speed of the train will be brought down to 20 m.p.h. or less. Hence a train equipped with speed control apparatus cannot enter an occupied block at a speed greater than 20 m.p.h. If after acknowledging a more restrictive cab signal and bringing

the train down to a lesser speed than that specified by the cab signal, such speed is exceeded, the air brakes will automatically be applied; thus preventing operation at a speed greater than that permitted under the wayside and cab signal received. The authorized speed in this territory is 70 m.p.h. for passenger and 50 m.p.h. for freight trains.

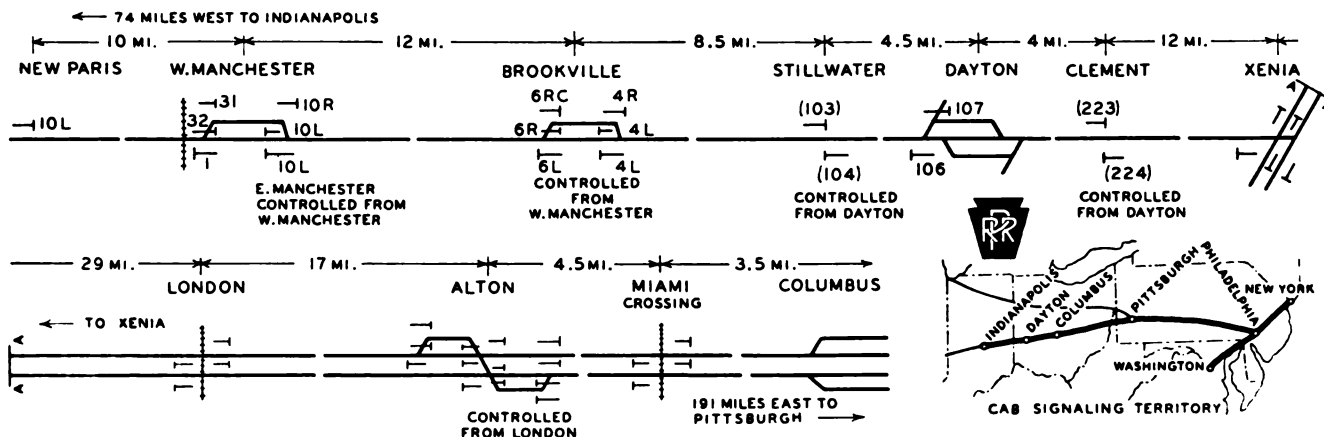
The 100-cycle a.c. coded cab signal energy is superimposed on the d.c. track circuits through the contacts of an approach relay at the exit end of the track circuit. This relay is line wire controlled from the track relay at the entering end of the track circuit. The approach relay is quick acting in its operation to avoid cab signal flips.

Signal Power Line Already in Service

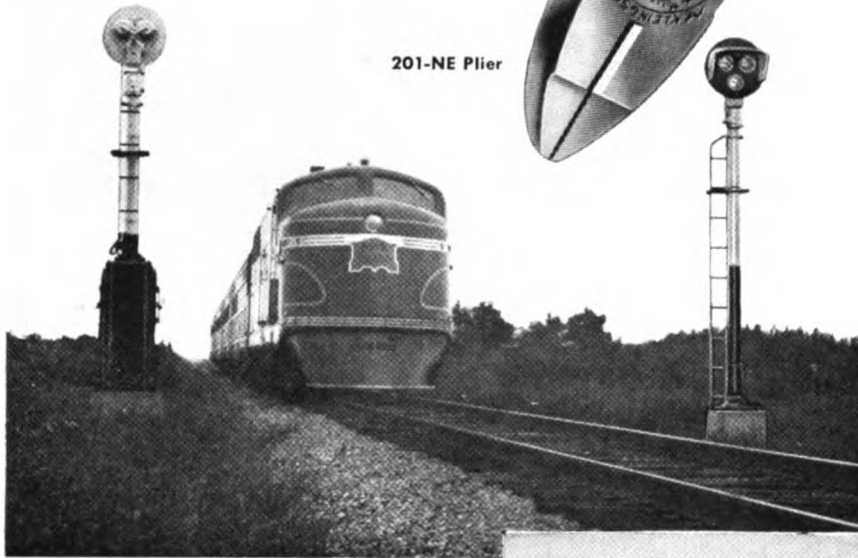
A 440-volt, 60-cycle a.c. power line was installed years ago. At each signal and cut-section location, the 440-volts a.c. is stepped down to 110 volts for use in the relay house or instrument case, by means of a transformer mounted on the pole line. In no instance is voltage in excess of 110
(Continued on page 56)



Cab signal bench test set in relay shop



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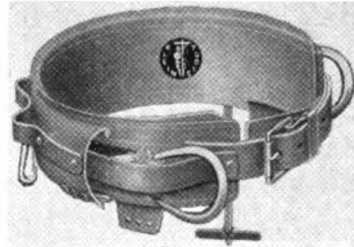


If you have not received a copy of the Klein Pocket Tool Guide, write for one. It will be sent without obligation.

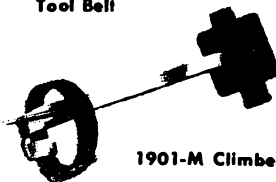
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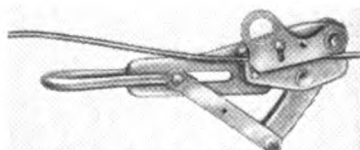
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PRR Cab Signaling

(Continued from page 23)

volts brought into a house or case. Rectifiers are provided for charging the storage battery. All signals except home and distant signals are approach lighted. Normal lighting is from a.c., and from storage battery by means of a power-off relay should the a.c. source of power fail.

Dragging equipment detectors, previously installed, were relocated on account of the respacing of signals. These detectors are located approximately 9,000 ft. in approach to the distant signals to interlockings to detect the presence of dragging equipment that might cause a wreck or derailment. When actuated, they place the distant signal at Approach and the home signal at Stop. The signalman in the tower is provided with a visual as well as audible warning to indicate to him that a detector has been actuated. When the train is stopped, he instructs the train crew to examine the train for dragging equipment, and does not allow it to proceed until satisfied that it can do so safely.

Traffic Control Also Installed

The east end of the siding at East Manchester and both ends of the passing siding at Brookville were remotely controlled by means of a machine located in the tower at West Manchester. Track occupancy lights were provided for the single track New Paris to Xenia. Low voltage switch machines were used at the ends of sidings, and steel housings were used for the relays, terminal boards and other control equipment at the ends of sidings.

At Columbus, the Pennsylvania motive power department has a shop in which speed control and cab signal equipment is tested, inspected and repaired. This shop, 20 ft. by 60 ft. with a 10 ft. ceiling, is located inside a large shop building. It has its own ventilating system to keep it free from dust. Two electricians man the shop. A bench is completely equipped with a cab signal test set to duplicate wayside conditions. A speed governor test set is used when adjusting governors in the speed control system. A test circuit consisting of a short section of track is set up just outside this shop to test locomotives.

The construction and engineering for this project was performed by railroad signal forces, and the major items of equipment were furnished by the Union Switch & Signal division of Westinghouse Air Brake Co.