# Respacing Automatics on the Pennsylvania

## Blocks on 245 miles of double track on Ft. Wayne division lengthened from an average of 5,000 ft. to 8,500 ft.

THE Pennsylvania has carried out an extensive program involving uniform respacing of automatic block signals on the Ft. Wayne division, extending from Crestline, Ohio, to Hobart, Ind., and comprising 245 miles of double-track main line, over which approximately 64 trains are operated daily. Automatic block signaling was installed on this territory in 1910, three-position, upper-quadrant d-c. semaphores being used.

Previous to the respacing, the automatic blocks were from 4,800 ft. to 5,200 ft. long. In view of the fact that automatic block signaling with two-mile blocks was being used successfully on other divisions of the Pennsylvania to handle traffic similar in nature to that on the Ft. Wayne division, it was decided to adopt a block length of approximately two miles for the revised layout. As the location of the interlockings and stations fixed the location of certain signals, the intervening locations were spaced as near as it was practical on the two-mile basis, the average block length being about 8,500 ft., including distant signals to interlockings. As a result of the changes, 40 per cent of the automatic signals were eliminated.

All of the interlocking home and distant signals that were not already of the position-light type were replaced with position-light signals. Likewise, semaphores used as automatic block signals on the opposite side of the track from home or distant interlocking signals were replaced with position-light signals. Where these changes left only one intermediate location of semaphores, these also were changed to position-light signals.

The track circuits were not changed, except in some instances in which the removal of a signal permitted the elimination of a short track circuit in the control section for a highway crossing signal. The maximum length of the track circuit is 6,000 ft. The track relays were retained in service without change. The 0- to 45-deg. operation of the signals is controlled by relayed track circuits, and a two-wire line circuit is used for the 90-deg. control. Model-13, 1,000-ohm line relays are used.

Approach lighting is now provided for all signals, excepting home and distant interlocking signals which are lighted constantly. The position-light signals are equipped with 12-volt, 9-watt lamps which are normally fed at about 11.5 volts. On the semaphores, the old lamps were replaced with Style-D cast-iron lamps. An 8-volt lamp with two filaments, one rated at 13 watts and the other at 3.5 watts, is used in the semaphore lamp, the feed being regulated to about 6 volts. A 12-volt 2.5-watt lamp is used in the marker. The lamps are fed normally through a connection to the battery which is on a-c. floating charge.

**One of the new automatic block locations using position-light signals**

Power is supplied to the signaling by the a-c. floating system, either 220 volts or 440 volts being used for the supply line. Each track circuit is operated by an Edison B4H 75-a.h. storage cell, and as only a few changes were made in the track circuits, these were left as they were. At each signal location, a set of six cells of 75-a.h. lead storage battery is used, nearly all of which is of the Exide DMGO-9 type.

Where signals were installed at new locations, underground cable, with lead and steel sheath, was installed, using single-conductor No. 9 parkway for the track connections and seven-conductor No. 14 for the control circuits. The parkway cable for the track connection is brought up through a riser 20 in. long, made of Elastite, set with the top level with the tie and about 3 in. from the rail. The conductor of the cable is connected to the stranded bootleg connection by a Dossert connector. The bootleg connection is made up of two $\frac{3}{8}$-in. strands and is plugged into the rail with a $\frac{3}{8}$-in. pin. After the connection is complete, a cast-iron cover is placed on the top of the bootleg riser.

At each cut section, the old signal case on the line side was left in place to serve as an instrument case. The mast was removed, and the hole covered with a specially designed cover. The line cable was brought in through a two-inch pipe with a cable gooseneck screwed into the top of the case. Manufactured aerial cable with 12 or 19 conductors was used between the cases and the line poles, $\frac{5}{16}$-in. stranded Copperweld being used as messenger.

The signaling changes on this territory were handled by signal forces, the work having been started in July and completed early in January. A force of from 12 to 35 men was required at various stages of the project.

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# Raising a Signal Pole

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NOT LONG AGO, I raised a 35-ft. two-arm electrically-operated semaphore with no other help than that of my assistant, and the use of a welding outfit. The nuts were taken off two of the foundation anchor bolts (on opposite sides); the bolts were beveled, and a piece of bolt of the proper size and length was then welded on.

When two bolts were so prepared, spacers (such as large nuts) were slipped over them, and the anchor bolt nuts put on and tightened. The other two anchor bolts were then extended in the same manner. After the four anchor bolts had been extended, the pole was raised with a pinch bar, one side being raised about ½ in. and blocked up; then the other side was raised in the same way and so on until the pole was raised to the desired height. Two pieces of 2-in. by 8-in. by 18-in. plank were then placed on edge under the pole just inside of the anchor bolts, and the pole was tightened down on these after being plumbed with a level. A form was then built around the elevation and filled with concrete, provision having been made for a wire inlet.

The whole job was done in a day, and the signal was not interrupted.