Cut-Out Control for Crossing Signals

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AT LINCOLN, N.J., the Central Railroad of New Jersey has installed a special cut-out and restoring circuit for the control of flashing-light crossing signals at two streets, so that drilling crews can cut out the operation of the crossing signals when switching movements would otherwise operate the signals un-On the four-track necessarily. main line through this territory, the two north tracks, No. 2 and No. 4, are used by westbound trains, and the other two tracks, No. 1 and 3, are used by eastbound trains, all four tracks being equipped with twoarm, two-position, electro-pneumatic lower-quadrant semaphore automatic block signals. This line handles trains of the Central of New Jersey, as well as the Reading and the Baltimore & Ohio, into and out of Jersey City Terminal, the total number of train movements daily being about 225. The vast majority of the traffic consists of through trains operated at comparatively high speeds, the limit for passenger trains through this town being 70 m.p.h.

Mountain Avenue crossing is located 2,612 ft. west of westward signal 271 on track No. 4, and Cedar Avenue crossing is located 2,914 ft. west of Mountain avenue. Connected with track No. 4, there are, within the control territory, five turnouts leading to freight houses and industries. The local freight train that serves these tracks operates westbound on track No. 4, and, while setting out and picking up cars, the track circuits controlling the crossing signals are occupied from 15 to 45 min. or more. To prevent a lengthy or unnecessary operation of the crossing signals at these crossings, a system of cut-out and restoring control was devised.

A special control box is mounted on the mechanism case at Signal 271, and a special cut-in key box is mounted on the mast of the flasher adjacent to track 4 on each of the crossings.

The control box mounted on the mechanism case at Signal 271 is fitted with an indicator lamp and two circuit controllers operated by key mechanisms in which a standard switch key is used. The keyhole at the left has the words CUT OUT embossed under it, and the one at the right is marked RESTORE. Each is fitted with a dust cover. The indicator is centrally located below the keyholes, and a Mazda No. 1141 lamp with a single-contact bayonet base is used behind a small red lens in a weather-proof mounting.

When a standard switch key is inserted and turned in the keyhole marked CUT OUT, the lock mechanism is so arranged that the two normally-open independent contacts will be closed. When the key is removed the contacts will be open. When the key is used in the lock marked RE-STORE, two normally-closed contacts will be opened. These contacts will be closed when the key is removed.

The control box mounted on the flasher mast is of similar construction except that no indicator is used and only one keyhole is employed. The words CUT IN are embossed under the keyhole. When a key is inserted and turned, a normallyclosed contact will be opened. The removal of the key will again close the contact.

These boxes are made of cast iron $10\frac{1}{2}$ in. wide, 8 in. high, and $4\frac{1}{2}$ in. deep. The contacts and key mechan-

ism are made accessible for maintenance by means of hinged and gasketed door which is hasped and fitted with a signal department padlock.

Operation of Special Control

When the westbound local freight approaches Lincoln and a lengthy or unnecessary operation of the crossing flashers is anticipated, the train is stopped east of Signal 271. A trainman then checks to see that the block for Signal 271 is unoccupied, which is indicated by this signal displaying a proceed indication. He then goes to the special box which is mounted at the case at Signal 271. By inserting a switch key in the keyhole marked CUT OUT, and rotating it one-half turn, the key mechanism is operated to close a circuit which picks up a stick relay; the result being that the operation of the flashing-light signals at both crossings is cut out in so far as the control of track No. 4 is concerned, and furthermore, automatic block Signal 271 is controlled to display a stopand-proceed aspect. As an indication that these results have been effected the indicator lamp is lighted. When the trainman sees this lamp light, he removes his key, and the switching operations may be started. The special cut-out is established only for westbound trains on track No. 4; if a train approaches on any of the other tracks the crossing signals will operate as usual.

If, during the switching, a train movement is to be made over one of



Layout in the vicinity of Mountain Ave. and Cedar Ave.

Outside view of

cut-in and cut-out

control

the two street crossings, the train is stopped short of the crossing and a trainman goes to the key box mounted on the mast of the crossing signal adjacent to track No. 4. He inserts his switch key and rotates it onehalf turn and leaves it there. This key operation opens a circuit which causes the signals at that crossing

fected is indicated to the trainman by the indicator light being extinguished. At the same time, automatic Signal 271 changes its aspect from "stop" to "proceed," providing the block is unoccupied; and then the train is ready to start. It is not likely that the train would pull out without a trainman operating the



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addition to the outside controls, and a cutover switch to place either inside or outside units in service. Normally, a towerman controls the plant from the inside units during the hours when branch trains run through to Dudley street. At other times, the switches ordinarily remain at normal and the signals, being non-stick, clear automatically for successive main line moves. Emergency or work trains using the branch must first wait for any conflicting main line trains to pass, then use a change button to cancel main line signals before a branch route can be set up. When a trailing move is made from signal RC4 over

to operate, independently of the cutout previously set up for track No. 4. After the trainman observes that the signals are operating, he signals the train to proceed over the crossing and after the crossing is clear he removes his key from the box, which stops the operation of the signals.

Restoration After Switching

When all of the switching movements are completed and the train is east of Signal 271 and coupled up ready to proceed westward to the next town, a trainman goes to the key control box at signal 271, inserts his key in the hole marked RE-STORE and rotates the key one-half turn. This operation opens contacts included in the stick relay circuit, previously mentioned, so that this

RESTORE control, because automatic Signal 271 will not indicate "proceed" until this RESTORE control is operated.

If the trainman neglected to operate the restoring feature of this circuit, the cut-out control arrangement will automatically be restored to the normal operation of the crossing protection when a following train enters the control track section of the stick relay. This control section is located 5,876 ft. east of Signal 271. In fact any following train will automatically restore the crossing protection to normal, but Signal 271 (track No. 4) cannot be cleared unless the key is operated in the lock marked RESTORE.

The operation of this cut-out system has been entirely satisfactory and has met the approval of the



relay is de-energized, thus returning the crossing signal control circuits, as well as the control of automatic Signal 271, to normal condition. The fact that these results have been efrailroad as well as local authorities. The circuits were designed and the installation made by the signal department forces of the Central Railroad of New Jersey.

switches

-South Tower D" North-RA4 To Dudley 1 RA4 AT Main line. 2TRG4 RC4

switch 3 reversed, switch 1 is also

reversed for protection. When switch

Layout at Tower "D"

1 is reversed for this purpose only, it returns to normal as soon as the move is completed; otherwise, the switches remain in their last used position until operated from some control point. Branch signals are stick and must be cleared by push-button operation for each move. Tower D was cut over on January 26, 1935. Neither Tower D nor Tower J has any provision for back-up moves.

The equipment for these changes was furnished by the Union Switch & Signal Company, and the installations were made by the maintenance department, signal division, of the railway. Features of the old interlockers which were not changed included electro-pneumatic switch machines, color-light signals, electropneumatic trip stops, single-rail track circuits for signal control and approach and detector locking, 55-volt, 25-cycle signal circuits, and d-c. polarized switch control relays fed at 16 volts from copper-oxide rectifiers.

