Crossing Protection With Indicators For Train Movements

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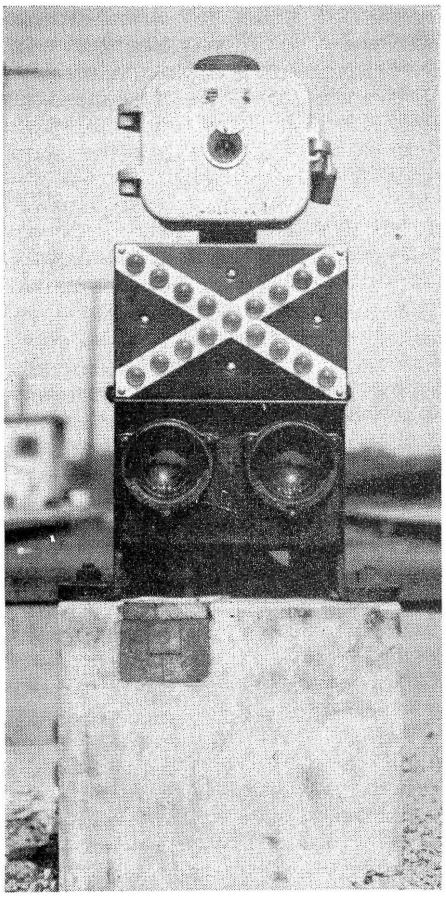


This indicator, 50 ft. from the crossing, has a key-controller on top

New Installations, on Terminal Railroad Association of St. Louis, include special color-light dwarf signals, known as crossing protection indicators, which inform enginemen whether flashing-light signals and gates are operating, and give advance notice of time cut-outs

THE first of seven highway crossing gate installations to be made on the Illinois Transfer Railway, operated by the Terminal Railroad Association of St. Louis, has been placed in service recently at Lynch avenue in East St. Louis, Ill. A traffic count for 24 hours over this crossing showed a total of 195 pedestrians and 2,636 street vehicles, which included buses of the East St. Louis City Lines. In a peak period, from 7 a.m. to 8 a.m., there were 240 vehicles, and in a second peak, from 4 p.m. to 6 p.m., there were 448 vehicles. In the 24 hr., 49 train movements were made over the crossing, all of these being freight as there are no scheduled passenger trains over this division.

This crossing was formerly protected by four mechanical gates that were operated by crossing watchmen 24 hr. a day. The new protection consists of flashing-light signals and short-arm gates which are located to block only the approaching traffic, the receding lanes being left open. The new flashing-light signals and gates at Lynch avenue are controlled automatically by track circuits but, on account of switching moves to serve industries, and because of other unusual operations, special cut-out features are necessary.

As shown in the plan herewith, two main tracks and one side track extend over the street crossing. The project includes track circuits to control the crossing protection automatically by trains approaching the crossing in either direction on both main tracks. At the crossing, on each main track, and on the side track, there is a separate track circuit which extends over the street and about 50 ft. beyond. When any of these three track circuits at the crossing is occupied, the flashing-light signals operate and the gates go down and stay there, with no automatic cut-out of any kind. Based on maximum permissible train speeds in this territory, the approach control sections on the two main tracks are about 750 ft. long. The fastest train which was checked consumed 24.4 sec. from the time it shunted its approach until it fouled the crossing. The flashing-light signals operated 4.6 sec. as a prewarning before the gates were released; and the gates descended in 10.5 sec. Thus, the gates were down 9.3 sec. before the train arrived at the crossing. Conventional directional stick relays are used to clear the gates for receding train moves. The clearing time of the gates is 10.4 sec.

Time-Element Cut-Outs

Although many of the trains move through this territory at normal speed on the two main tracks, on the other hand there are many instances in which stops are made on the approach sections and cars are left on the main track while switching moves are made to serve industries. Therefore, in order to prevent delay to street traffic on Lynch avenue, an arrangement of automatic time cut-outs was installed in connection with the controls applying to each of the four main-track approaches to the crossing. As previously explained, on the

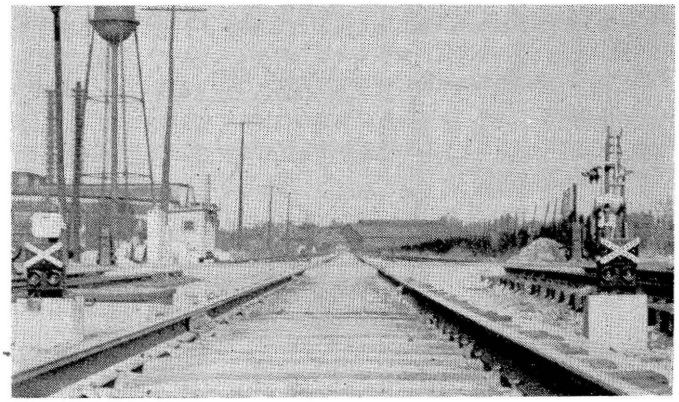
average a train at normal speed arrives at the crossing about 25 sec. after it enters its approach section. If a train stops, the flashing-light signals will cut out and the gates will go up, 75 sec. after the train entered the approach.

Crossing-Protection Indicators

This project includes eight special wayside dwarf signals, known as crossing protection indicators, which inform enginemen whether the flashing-light crossing signals and gates are operating to protect the crossing, and also these dwarfs give advance information of the termination of the operation of time cutouts. Each indicator is located at the immediate right of the track on which it governs. In order to distinguish these crossing protection indicators as such, a small-sized reflectorized cross-buck sign is mounted on the case as shown in an accompanying picture. As applying to each direction of approach to the crossing on both of the main tracks, there are two of these indicators. For example, for a westbound train movement on the westward track, there is an "outer indicator "A" at the entering end of the approach section; and a home indicator "B" located about 50 ft. from the curb line of the street. The "outer" indicators such as "A" normally display green, and the home indicators such as "B" are normally dark.

Typical Train Movement

As applying for a westbound train on the westward track, as the train approaches, the outer indicator "A" displays green, which informs the engineman that the controls are normal and that he can expect that the gates and flashing-light signals will operate to protect the crossing for 75 sec. after the leading truck of his locomotive passes indicator "A", i.e., enters the approach section. This drops the track relay which indirectly starts the operation of the flashing-light signals and releases the gates. When the gates descend about 1 deg., the home indicator "B" is lighted green which indicates to the engineman that the gates and flashing-light signals are operating to protect the crossing, and will continue to do so if he proceeds at normal speed toward the crossing.



View showing two crossing-protection indicators

Time-Element Relays

Associated with the circuits for each approach section, there are two time-element relays, one of which operates in 60 sec. and the other 75 sec. Both these time-element relays are set in operation when the corresponding approach track relay drops. The stick relay of the 75-sec. time-element relay checks the stick relay of the 60-sec. time-element up. At the end of the 60-sec. period, the "B" indicator at the crossing changes from green to red. At the end of the 75-sec. period, the approach control section, occupied by the train, is cut out of the control of the crossing protection, so that the gates are raised and the flashing-light signals cease to operate.

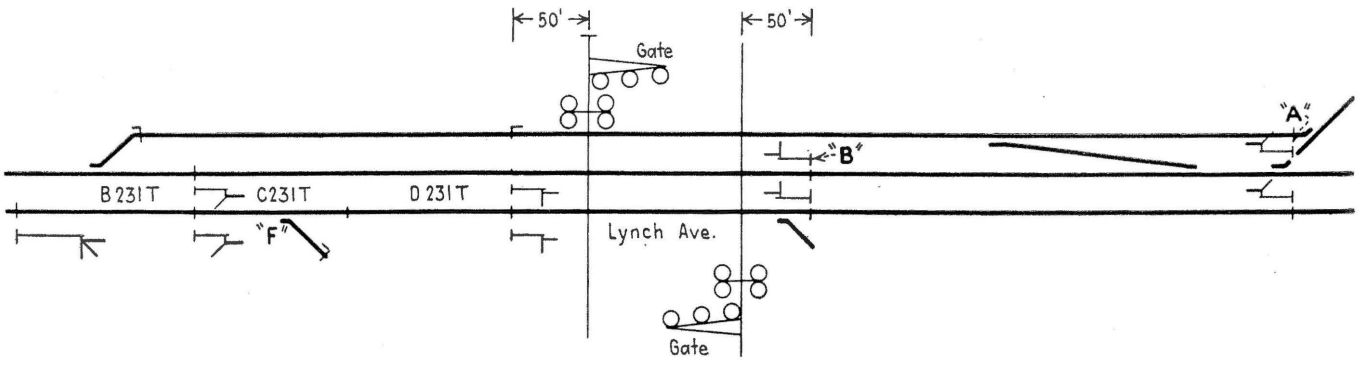
The change of the aspect of the indicator "B" at the crossing, from green to red, as mentioned above, gives the engineman 15 sec. advance warning that the gates are to be raised. Accordingly, if he is moving toward the crossing, he brings his train to a stop short of indicator "B" which is about 50 ft. from the street curb line.

In order to protect the crossing and move past the red in the "B" indicator, either of two procedures can be followed: (1) move the front truck of the locomotive (or leading car) past indicator "B" onto the track circuit over the crossing. This operates the flashing-light signals and lowers the gates, and then the train can move over the crossing. (2) A member of the crew can use his switch key to operate controller on a short pipe mast at the rear of "B" indicator which causes the flashing-light signals to operate and the gates to be lowered. Then the train can proceed over the crossing.

Lunar White on Indicator "A"

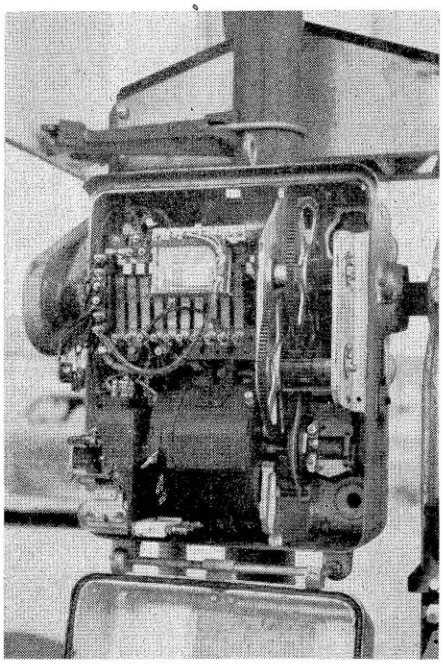
As previously explained, as a westbound train approached the "outer" indicator "A", that indicator showed green if the controls were normal. On the other hand, if the approach section had been occupied previously to initiate a timing period that had partially expired, this "A" indicator would display a lunar white aspect, rather than green. This lunar white aspect indicates that an engineman is to reduce speed prepared to stop short of indicator "B" at the crossing.

The main-track approaches, with the normal direction of traffic, are



approximately 750 ft. long, and each of these approaches includes a hand-throw switch leading to an industry, such as switch "F" in the eastward approach on the eastward main track. This approach is cut into two track circuits, C231T and D231T. A switch circuit controller is in service on the switch "F".

Circuits are arranged so that if an eastbound train enters the approach and stops on the first track circuit, C231T, a stick relay is picked up when the switch "F" is thrown to make a move to the industry. When the stick picks up, the gates are raised. If after completing the switching, the train moves toward the crossing, the crossing protection will be set in operation when track circuit D231T is occupied.



Gate mechanism with case open

If the main track is not occupied, and if a switch engine on the industry spur is to move to the main track, and if the switch "F" is reversed before the switch engine occupies the track circuit, the stick relay will pick up when the track circuit is occupied. In this instance, the gates will not go down as long as only track circuit B231T is occupied.

On the Side Track

On the side track, there are no approaches, the only track circuit on this track being the one over the crossing and about 50 ft. beyond the curb in each direction. When preparing to move over the crossing on this track, the crossing protection can be set in operation either by using a key controller or by occupying one of the 50-ft. sections beyond the curb line and waiting for the gates to go down. The ends of this track circuit are marked by small reflectorized cross-buck signs the same as on the indicators as previously explained.

All the relays on this project, including the Model KB motor-driven time-element relays, were furnished by the General Railway Signal Company. The crossing gates installed on this new project are the Western Railroad Supply Company's Model-10, with the No. 3564 mechanism including the drive-down feature from 90 deg. to 45 deg. The operating battery consists of 10 Edison A6H storage cells, and each track circuit is fed by one Edison B4H cell. These batteries are charged by rectifiers fed from a.c. A 25-watt lamp in a weatherproof fixture is mounted on the outside of the instrument case at the crossing. This lamp normally burns on the 110-volt a.c. supply. If section men, trainmen or any other railroad employe sees that this lamp is not burning, the signal department is notified at once, so that the maintainer can determine the cause of the power outage.

This crossing protection project was planned and installed by railroad forces under the direction of A. P. Hix, signal engineer.

PETITIONS DENIED

Division 3 of the Interstate Commerce Commission has denied petitions wherein the Southern Pacific and Western Pacific sought authority to operate streamlined trains at speeds in excess of 80 m.p.h. without installing automatic train-stop or cab-signal systems, as required by the commission's June 27, 1947 order. The division's adverse report, by Commissioner Patterson, found that there was no necessity for the proposed relief, because it was sought "for the sole purpose of making up lost train time." The petitioner estimates that if the maximum speed were reduced to under 80 miles per hour the scheduled running time would have to be increased 26 minutes east bound and 25 minutes west bound.

The S.P. petition sought authority to maintain the present authorized maximum speed of 95 m.p.h. for the City of San Francisco (Chicago-San Francisco train) over its 778-mi. line between Ogden, Utah, and Oakland, Cal. The 182.9-mi. section of this line between Weso, Nev., and Alazon and the 177.6-mi. W.P. line between the same points are practically parallel, and a joint trackage agreement provides for eastbound train operations of both roads over the W.P. line and for westbound operations over the S.P. line. The petition of the W.P. was for authority to maintain the present maximum authorized speed of 95 m.p.h. for the California Zephyr (also a Chicago-San Francisco train) over this jointly-operated section.

The Southern Pacific now has an automatic train-stop system of the intermittent induction type on approximately 84 mi. of road in California. It estimates that the cost would be $1,183,290 to install the same system on the remainder of its line between Ogden and Oakland, except on that portion between Roseville and Sparks where the maximum authorized speeds are less than 80 m.p.h. If the present automatic train-stop system were extended from Martinez to Roseville and a three-indicator cab signal system installed from Sparks to Ogden, the petitioner estimates that the cost would be $2,321,295. Each of these estimates includes the cost of equipping 180 locomotives.

The Western Pacific estimates that it would cost $1,161,740 to equip its line between Weso and Alazon with continuously controlled cab signals if all locomotives operating in that territory were equipped with cab signals, and $966,515 if only the three locomotives handling streamline trains had to be equipped. Its estimates for the installation of automatic train stop on the same bases are $298,355 and $239,645.

The Railway Labor Executives' Association and individual railroad labor organizations opposed the granting of the petitions. And locomotive engineers assigned to the runs involved testified that the wayside signals were not always clearly discernible because of rain, sleet, snow or fog.

The commission did grant one phase of the S.P. petition and thus exempted that road from the requirement to use the June 27, 1947 order's prescribed definition of "medium speed" ("A speed not exceeding one-half authorized speed, but not exceeding 30 m.p.h."). The exemption was based on the fact that the commission is now giving consideration to a revised definition of "medium speed."