signaling between Relay, Md., and Washington, D. C., in the year 1907 is still in first class shape, and present appearance indicates the insulation is good for at least 15 years. Weatherproof covering manufactured under A.A.R. specifications should be expected to give equal results.

Signaling at Lap Sidings

"At a set of lap sidings on a single-track line where the switches are hand-thrown and the circumstances are such that trains enter the sidings at the lap switches, where would you locate the automatic signals and how would the track circuits and signal control circuits be arranged?"

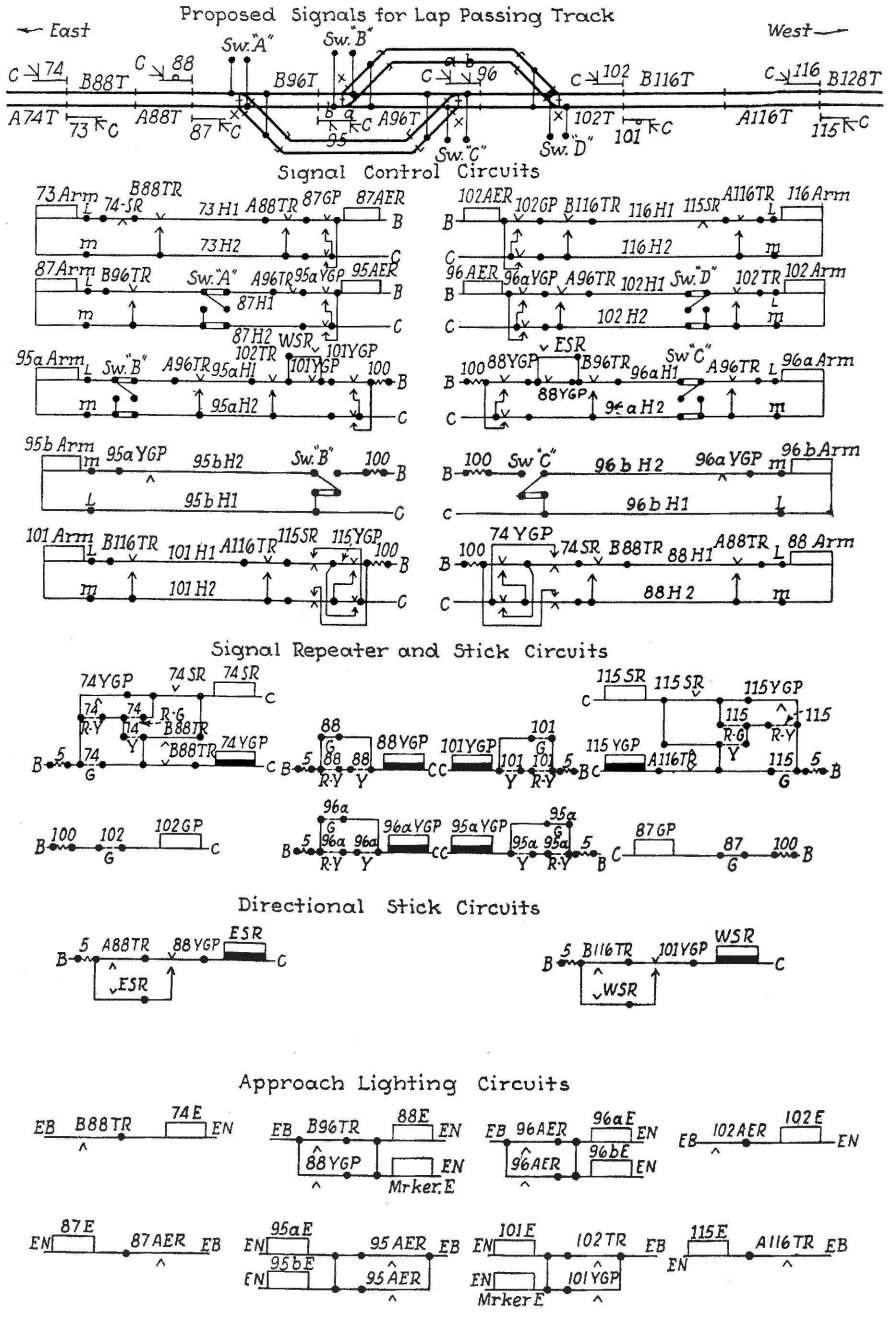
Uses Searchlight Signals in A.P.B. System

C. ROBISON
Signal Wireman, Weston, Ont.

In the sketch of signals and circuits for use at the set of lap sidings, I have used the circuits for single-track, absolute-permissive, two-block indication, normal clear searchlight signals, to illustrate the operation of signals on this particular piece of track. All signals, except No. 95 and No. 96, are located as they normally would be located in absolute-permissive signaling. Signals No. 95 and No. 96 are located approximately 200 ft. in advance of switches "B" and "C." For convenience, let us say signal No. 88 is the eastbound absolute signal, and signal No. 101 is the westbound absolute signal. Back of absolute signals No. 88 and No. 101, the signaling and circuits are straight A.P.B., using two-block indication, the only exception being that there is no overlap on the signal controls through track relays A88 and B116. The overlap is not required because signals No. 95a and No. 96a act as red repeater signals, except for following moves. In other words, when signals No. 88 and No. 101 display red to protect trains approaching the lap sidings, signals No. 95a and No. 96a will also display red. On following moves when the first train has passed by signals No. 88 or No. 101, leaving the lap sidings, the second train will receive a yellow indication at signals No. 95a or No. 96a, depending upon the direction the two trains are moving.

Now suppose we have a superior train approaching from the east, and an inferior train coming from the west. Both signals No. 101 and No. 88 would indicate red, as would their repeater signals No. 95a and No. 96a. Our inferior train should arrive first. As it approaches, it will receive a caution indication at signals No. 116 and No. 102. At signal No. 96a, it will receive a stop indication. Now signal No. 96 having two operable units will display red over red. This indication definitely means stop, and nothing said about proceeding. Therefore, our inferior train comes to a stop. The trainman walks ahead and throws switch "C." The indication of signal No. 96 becomes red over yellow. Thus our inferior train enters the siding, and when it is clear and the switch thrown back for main line traffic, the signals will all be clear for the superior westbound train. If while the inferior train was entering the siding our superior train was closer than was expected, it will receive a yellow indication at signal No. 73, a red at signal No. 87, and a red over red at signal No. 95. If our inferior train has not passed signal No. 96 and the switch is not thrown, our superior train, as it approaches,

(Continued on page 600)



Circuits for searchlight signals at lap siding

will receive a caution indication at signals No. 73 and No. 87, and at signal No. 95 it will receive a red over red indication.

Suppose our superior train arrives first, with the inferior train still back of absolute No. 101. The superior train will have advanced through a yellow block at signals No. 73 and No. 87, and will have come to a standstill at signal No. 95, whose indication will be red over red. A trainman on the superior train has time to walk down to switch "C" and throw it for the inferior train. The inferior train then will receive a yellow indication at signals No. 116 and No. 102. As he approaches signal No. 96, he will receive a red over yellow. As soon as he clears the fouling circuit, and the switch is thrown for through traffic, the superior train will receive a green over red indication at signal No. 95 and can proceed upon its way.

The directional stick circuits shown on the sketch are used to permit a directional control on the armature circuits of signals No. 95a and No. 96a. By this means we permit signals No. 95a and No. 96a to give a caution indication to a following train movement. If signals No. 88 and No. 101 are red due to trains approaching the lap sidings, the directional stick relays are de-energized, as are the yellow-green signal repeater relays, thus the armature control circuits on signals No. 95a and No. 96a will be open, making those signals merely repeaters of the absolute signals.

The armature control circuits on signals No. 102 and No. 87 are overlapped through track relay No. A96. If a train should be entering, at either switch "C" or "B," into the sidings, another train approaching from the opposite direction would have to pass two red signals, one permissive and one stop and stay, before the possibility of collision.

The two take siding signals, No. 95b and No. 96b, serve two purposes. They make signals No. 95 and No. 96 stop signals by providing a red marker. It is impossible for either of them to show yellow, unless the main line signal is red and the siding switch thrown that controls them. If one train is meeting another and has to take the passing track, signals No. 95b and No. 96b permit the train to pass into the siding when the switch is thrown.

Warning Time With Crossing Gates

"Where automatic crossing gates are being installed, should the operating circuits be of sufficient length to provide for the gates being fully lowered 20 seconds in advance of the train reaching the crossing?"

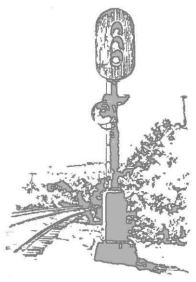
Not Desirable

W. L. Dayton
Superintendent of Signals, Grand Trunk Western, Detroit, Mich.

The Grand Trunk Western has in operation two installations of automatic crossing gates, which are mounted on standard flashing-light signals. These gates extend over only half the highway, blocking the side of the street on which traffic is approaching the railroad, the leaving side being free of obstruction. This allows a vehicle, which may have passed under the gate as it was being lowered, to clear the intersection. It also permits traffic to pass over the intersection by a reverse lane move, in case the gates should fail to clear.

At these installations the operating circuits are so arranged that there is a three-second hesitation period after the flashing lights begin to operate before the gates commence to lower. The operation of lowering the gate is completed in 12 seconds. Thus, there is a period of approximately 15 seconds from the time the flashing-light signals give their warning of the approach of a train and the fully lowered position of the gate.

For this type of installation, we believe that it is not desirable to have the gate in the lowered position for a full 20 seconds in advance of a train reaching the crossing. Such advance warning is given by the flashing-light signals. The gate comes down to block the highway at a time when passage over the intersection would be an extreme hazard. But perhaps even more than this, its value lies in preventing accidents in double-track territory when two trains, traveling in opposite directions, meet at a grade crossing. Many accidents are caused, under such circumstances, when traffic on the highway begins to move after the passage of one train and fails to observe the approach of another coming from the opposite direction. Under such conditions the gates will stay down and hold traffic back until the second train has cleared.



Gates Down Eleven Seconds Before Train

H. G. Morgan
Signal Engineer, Illinois Central, Chicago

Automatic crossing gates lower very slowly and a full protection is afforded before the gate arms have completed their downward travel. Our experience has indicated that operating circuits should be of sufficient length to require 29 seconds for the fastest train to reach the crossing. The auxiliary protection consisting of illuminated stop signs, flashing-light signals and bells, operates instantly. After a time delay of 3 seconds, the gates begin to lower and their operating time is about 15 seconds. The gates are fully lowered about 11 seconds before the train reaches the crossing.

Total Time 25 Seconds

W. H. Stilwell
Signal Engineer, Louisville & Nashville, Louisville, Ky.

When installing automatic gates for the protection of highway grade crossings, we provide operating circuits of such length that the initial warning will start 25 seconds before the arrival of the fastest train operated over the crossing. The initial warning consists of energizing the bell and lamps. A delay time of three to five seconds is provided between the initial warning and the operation of the gates proper. The gates themselves take about 15 seconds to go down. Therefore, we have the gates fully lowered five to seven seconds before the fastest train arrives.

In some instances we have changed from wigwag signals to gates without making any change in the length of the starting circuits. In other cases we have added gates to flashing-light signal protection, using the same controls.