# EDITORIAL COMMENT

## Today's Crossing Protection Problem

DURING the last 25 years, the extension of paved highways and the increased use of highway motor vehicles have created many problems in highway-railroad crossing protection for the railroads to solve, and the end is not yet.

As time went on, signals were improved to increase the distinctiveness of the aspects displayed, and every conceivable means was employed to improve their reliability of performance. Signals were equipped with signs giving definite instructions regarding the proper action to be taken by vehicle drivers when stop aspects were displayed. In so doing, it would seem that the railroads had gone to extremities to provide the best protection, and that those drivers who would not take the required time to observe and be governed by such signals could be blamed for the accidents resulting from their own carelessness. On this premise, it would seem that nothing more than signals can be justified at crossings of single-track railroads with two-lane highways where the signals can be located properly at the right-hand side of the lanes of traffic governed. Some exceptions to this rule may be brought about by exceptionally heavy traffic on a highway or on a railroad or on both, as well as at crossings in towns or cities where views of approaching trains are obstructed.

### Problems at Multiple Track Crossing

At crossings between multiple-track railroad lines and highways or streets, especially where more than two normal-direction lanes are provided, it would seem that proper consideration might well be given to a study of human nature, recognizing the fact that the actions of drivers of highway vehicles are subject to very little supervision and practically no instruction. Based on common sense, it would seem no more than fair that the driver of a highway vehicle should be afforded adequate opportunity to see the signals as he approaches a crossing. Trees and bushes which obstruct the view of signals should be eliminated or trimmed properly. On curved sections of highways, and where buildings, high banks or trees obstruct the view of signals, other means discussed later may be employed. Where highways of three or more lanes are constructed across tracks, it is not practicable to locate a signal at the immediate right of each lane. Signals placed overhead vary from the standard location and, at heights sufficient to clear large trucks, are too high to be noticed readily by drivers of modern passenger cars.

At multiple-track crossings the signals continue to operate as long as any train is using or approaching the crossing. This fact is not understood or acted upon, however, by many drivers, who, after waiting at or when closely approaching a crossing, proceed onto the tracks as soon as the rear of a train clears the crossing without waiting to determine whether the signals cease to operate. In too many instances, a second train on another track arrives at the crossing, to the surprise of vehicle drivers, and accidents result. Special signals, known as "second train" indicators, have been installed, but comparatively few drivers, except those who reside in the vicinity or use the particular crossings frequently, learn the significance of these indicators.

A conclusion from this discussion is that, where multiple-lane highways cross heavy traffic lines, and where any heavy traffic highway crosses multiple-track lines handling high-speed trains, something more than signals is needed. The next form of protection beyond signals is some sort of a barrier, such as a gate, that will effectively deter drivers of vehicles from proceeding on the track when otherwise, due to deliberate carelessness or the lack of opportunity to see signals, they might be hit by a train on the crossing.

The installation of manually-operated gates at many crossings is, of course, impracticable on account of the excessive operating costs. The alternative is to provide barriers, such as gates, which are power-operated and are controlled automatically by track circuits where such control is practicable. One major objection to the use of automatically-controlled gates has been that arms long enough to extend across the full width of the traveled roadway may trap vehicles on the tracks. This has been obviated by the use of shorter arms which extend over the sections of the highway normally used in approaching the crossing, thus leaving the highway free for vehicles on the crossing to depart.

The first installation of this character was placed in service in 1936, and since that time many more have been installed as auxiliary protection for standard flashing light signals. In brief, it may be said that such installations accomplish the results for which they were designed. The United States Public Roads Administration, which has jurisdiction over the federal funds allocated for installations of crossing protection as a means of improving highway safety, believes that the additional expense required to include short-arm gates is justified in installations at multiple-track crossings, as well as at crossings of single-track lines on which trains are operated at special high speeds. Several states are proceeding on this basis. For example, the Illinois Commerce Commission has issued an order requiring the installation of short-arm gates at 16 crossings of the Grand Trunk Western with highways in Cook County, Illinois, the expense to be shared by the railroad, the state and the county. Flashing-light signals are now in service at these crossings, and the gates are being added as additional protection. The locations for this added protection were chosen after a survey of local conditions and the volume of vehicular traffic indicated the need for a more effective method of protection than that afforded by signals alone.

It would seem evident, therefore, that regardless of whether the railway signaling field desires it or not, automatic gates are destined to be installed at many crossings, and the major objection to such equipment, i.e. maintenance and expense of operation of motors, controllers, etc., must be met by the development of apparatus and methods of maintenance that will render reliable performance under all conditions normally encountered. Without the thought of criticizing equipment in service at gate installations, it would seem that more complete mechanisms are needed which will successfully handle gate arms regardless of strong winds, sleet loads and other unfavorable conditions. To meet all these requirements, it may be necessary to devise means for driving the gate when being lowered as well as when being raised. The gate would, of course, be balanced so that the force of gravity would exert sufficient torque to lower the gate normally, while the drive would be in service to overcome any unusual condition tending to retard the downward motion. Power requirements should be a minimum but some additions may have to be made in this respect to insure proper operation.

Adequate thought must be given to the provision of effective electric lamps, reflector buttons and other warnings on the gate arm to mark their position at night, thus providing effective indications which helps to reduce the number of instances in which arms are broken. Also, the cooperation of local police authorities should be sought in an effort to prevent the parking of automobiles and trucks at locations where they obstruct the view of signals and gates.

In general, it may well be said that railway signaling systems, including crossing protection, are now being maintained at a high plane of excellency. Nevertheless, when introducing motor-operated mechanisms in the territory of maintainers not previously having had experience with other than light signals, thorough instructions may be desirable.

# Annual Statistics on Signaling Issued by I. C. C.

In accordance with past practice, the Interstate Commerce Commission recently has issued a tabulation of statistics covering signals, interlocking, automatic train control, and communication facilities utilized for train order transmission. This data, compiled by the Bureau of Safety, is effective as of January 1, 1939.

The total length of railroad in the United States operated under the block system as of January 1, 1939, was 108,006.9 miles. Of this total 64,662.9 miles of road were automatic and 43,344.0 miles, non-automatic; comparing these figures with the corresponding figures for January 1, 1938, there was an increase of 465.1 miles in the length of road operated under the automatic block system and a decrease of 466.0 miles of road operated under the non-automatic block system. Principal increases in miles of road under automatic block operation were reported by the Chicago, Rock Island & Pacific and Chicago, Rock Island & Gulf (424.6), the Missouri Pacific (47) and the Wabash (39.3). The total of 64,662.9 miles of road operated under the automatic block system represented 95,344.5 miles of track, or 90,747 block sections; 54,236 miles of track were equipped with semaphore signals, and 38,702.2 miles of track with light signals.

### Manual Block Mileage

A total of 16,958.8 miles of road are operated under the manual block system using telegraph; 26,726.3 miles of road using telephone; 239.8 miles using electric bell or light; 132.5 miles of road under the controlled manual system; and 66.2 miles under the train staff. Manual block signal stations total 5,116. Permissive signaling is forbidden on 3,039.9 miles of road; permissive signaling is allowed, for all trains, on 21,215.2 miles of road, and for all except passenger trains on 19,082.6 miles of road.

An aggregate of 7,871.7 miles of road, representing 14,358.1 miles of track, and 5,237 locomotives and 1,184 motor cars are equipped with automatic train stop or train control devices. Automatic cab signal devices and equipment is in service on 4,012 locomotives and 505 motor cars, and on 8,414.9 miles of track. Cab signal operation is provided in connection with automatic wayside signals, without automatic train control on 6,055.9 miles of track; without automatic wayside signals and without automatic train control on 10.6 miles of track on the Central of New Jersey; with automatic wayside signals and automatic train control on 608 miles of track; and with automatic wayside signals but without automatic train control, on 1,740.4 miles of track (A. T. & S. F., 355 mi.; C. & N. W., 1,041.9 mi.; and I. C., 343.5 mi.)

As of January 1, 1939, automatic interlockings were in service at 352 points, electric interlockings at 1,283 points, electro-pneumatic at 333 points, electro-mechanical at 429 points, mechanical at 1,997 points, pneumatic at 7 points, and other types at 166 points; a total of 392 interlockings were remotely controlled.

A total of 180 installations of centralized traffic control are in service, covering 1,594.3 miles of road, 2,051.3 miles of track, and 280 passing sidings; controls are affected for 1,295 switches, 686 semaphore signals, and 2,738 light signals; 346 automatic semaphore and 1,323 automatic light signals are utilized in these areas.

One direction operation by signal indication, without train orders, is utilized on 144.2 miles of track in C. T. C. territory (14 installations), on 3,314.3 miles of track in manual block territory (60 installations), on 11.6 miles of track in controlled manual block territory (3 installations), and on 26,586.7 miles of track in automatic block territory (379 installations). Either direction operation by signal indication, without train orders, is utilized on 1,879.7 miles of track in C. T. C. territory (137 installations), on 448.7 miles of track in controlled manual block territory (69 installations), on 2,168.5 miles of track with automatic block in both directions (127 installations), and on 497 miles of track in territory provided with automatic block in one direction, traffic locking reverse direction (67 installations).

Telegraph is used in transmitting train orders on 86,709 miles of road, and telephone on 148,211 miles of road.