EDITORIAL COMMENT

Illumination as a Type of Crossing Protection

In addition to automatically-controlled signals to warn drivers on the highways not to run their vehicles onto tracks where they will be hit by approaching trains, extensive consideration is now being given to another type of protection—the illumination of trains so as to deter highway drivers from running into trains which are occupying crossings. The need for this illumination first became evident at crossings where numerous switching moves were made, or where freight trains moved at slow speeds or stopped, thus obstructing the crossings frequently or for extended periods during the hours of darkness. Where tracks in such areas crossed high-speed highways, numerous accidents have occurred by reason of highway motor vehicles being driven into the sides of trains.

Casualties Involved

Data prepared by the Interstate Commerce Commission show that there were 1,108 accidents in the United States during 1936 in which vehicles were driven into the sides of trains, and that in these instances 297 persons were killed and 2,134 injured. In these accidents 84 persons were killed and 400 injured in daylight, as compared with 213 killed and 1,734 injured at night.

It is not correct to assume that all of the drivers who ran into the sides of trains were intoxicated or imbued with a spirit of recklessness. State laws require that the headlamps of motor vehicles be directed downward so that the rays of light will not interfere with the vision of drivers of cars coming in the opposite direction. This limits the effective range within which the driver of a car can distinguish objects on a highway. Dark-colored objects, such as freight cars, are most difficult to distinguish because of the lack of reflection of light.

At a meeting of a Safety Commission in a large city recently, a statement was made to the effect that automobile headlights will provide for safe driving only at a speed of not more than 35 m.p.h. This statement takes into consideration the average efficiency of brakes, mental lag on the part of the driver in taking action to stop the car, etc. At first consideration this 35 m.p.h. figure may seem unduly conservative and may justify analysis. Vehicles moving or standing on a highway at night are required to display lights both front and rear. Likewise, a temporary obstruction must be marked by lanterns. The driver of an automobile keeps his eyes directed on the pavement ahead, and is watching constantly for tail lamps of vehicles ahead or for lamps marking obstructions which are readily seen beyond the range of illumination afforded by the headlamps of his own car. The introduction of a dark-colored obstruction into the situation is unexpected, and by the time an automobile approaches close enough for the upper section of the beam from a head light to illuminate part of the side of a freight car, the automobile may be too close to stop short of the crossing. On this basis, 35 m.p.h. does not seem to be too low as the maximum speed for safe stopping, but rather may be considered as perhaps an upper limit. However, it is a well known fact that speeds on open highways average at least 50 m.p.h., and speeds of 60 to 70 m.p.h. are common.

Typical Installations in Service

In view of the circumstances outlined above, it would seem practicable to reduce the hazard at certain crossings by illuminating the trains. This has been done to a limited extent for several years at crossings in San Francisco, Cal., Louisville, Ky., and at scattered locations in Ohio and Iowa, as well as various other states. In 1936, the Niagara Junction railroad, operating in the vicinity of Niagara Falls, N. Y., equipped 12 crossings, and the Illinois Midland installed illuminating equipment at one crossing, while similar installations have been made recently at one or more highway crossings on the Big Four , and the Missouri-Kansas-Texas. From the early idea of general illumination of the crossing area, the method has been improved by the use of reflectors to direct the light onto the track and especially on the sides of cars on the crossings, as well as to direct the light under the cars and between the ends of cars so that an approaching driver can not only see the cars but also gets flashes of light from the lamps on the other side of the track when car trucks and the ends of cars pass. On the Illinois Midland installation, two reflector units, each equipped with a 200-watt lamp, are used on each side of the track, the reason for using two separate units being to afford protection in case the filament of one lamp fails. The lamp units are mounted on a bracket attached to a pole about 30 ft. above the level of the pavement, and the reflectors are directed downward so as to illuminate the crossing area and side of a train without shining in the eyes of automobile drivers or enginemen. The Missouri-Kansas-Texas located its reflector units 23 ft. above the level of the rail and 25 ft. from the center lines of the track and highway. In some installations sodium lamps are used, thus displaying a special color which is an added warning to drivers acquainted with the locality and equipment in use.

On perhaps the majority of installations of illumination now in service, as, for example, on the Niagara Junction and the Illinois Midland, the crossings are located on tracks where switching moves are involved or where trains move slowly or stand for extended periods. If a portion of the train is occupying the crossing, it is, of course, important that the cars be illuminated so that they can be seen by the driver of an approaching vehicle. On the other hand, during switching operations when no movement over the crossing is imminent, the illumination of the crossing is not considered by a driver as a signal aspect of any kind. Thus, for crossings on tracks where train movements are at slow speed, illumination seems to be adapted to reducing the number of accidents caused by vehicles being driven into the sides of trains.

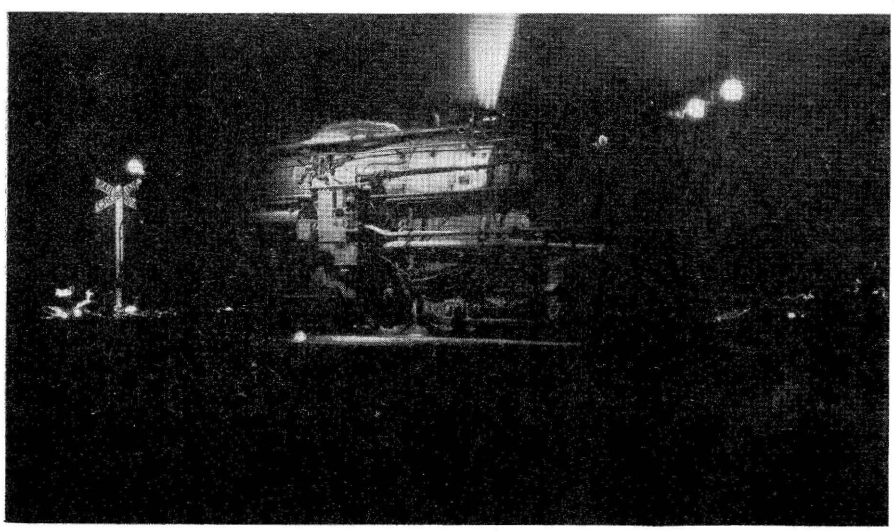
However, on some tracks in the vicinity of junctions or terminals where the traffic includes trains moving at high speed and others at low speed, as well as cases where cars stand on the crossing for short periods, the function of providing a warning of the approach of a train is properly performed by a signal such as the standard flashing-light type. The argument might be advanced that, regardless of whether a train is approaching the crossing, switching on the approach sections, or occupying the crossing, the signals would be operating and should, therefore, afford warning sufficient to cause a vehicle driver to stop, regardless of whether he could see the train on the crossing.

Especially during the hours of darkness, the aspect of a flashing-light signal can be plainly distinguished for several thousand feet, providing no objects interfere with the line of vision of the approaching drivers. If drivers carelessly disregard this signal protection, it does not seem logical that anything more can be expected. However, at some locations signal aspects are difficult to distinguish. For example, at one crossing equipped with flashing-light signals on the Illinois Midland, stores and taverns along a highway near the crossing use so many neon signs that it is difficult for the driver of a fast-moving automobile readily to pick out the flashing-light crossing indications. As a result, automobiles have been run into the sides of trains at this crossing, and, therefore, illuminating equipment is to be installed to supplement the signal protection. Likewise, at a crossing on the Missouri-Kansas-Texas near Coffeyville, Kan., where through trains as well as switching movements are involved, a complete new installation, including flashing-light signals as well as illumination, has been in service since May of this year.

Subject Deserves Study

In consideration of the information given here, and also because of the fact that engineers of several state commissions are studying illumination as a type of crossing protection, it would seem that signal engineers might well give the subject adequate study in order that they may be prepared not only to give their managements advice as to the policy to be followed with reference to this type of protection, but also be informed as to the types of equipment and construction methods to be followed. The installation on the M-K-T, mentioned above, was installed by the signal department forces of the railroad, the installation being paid for by the state from federal funds.

Regardless of whether signals are used in connection with illumination installations, the use of track circuit control seems most practicable as a means of reducing the charges for electrical energy consumed by the lamps, as well as increasing the life of the lamps. The power required for the lamps can, in most instances, be taken from the a-c. power distribution lines of the signal department used to feed the a-c. floating or a-c. primary signal power systems. Furthermore, as this illumination is a form of protection, it should logically be handled by signal department forces.



Night view at an illuminated crossing on the Chicago & Illinois Midland

Milwaukee Gates

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raise the arm is likewise minimum. The flashing-light units are Western Railroad Supply Company, Style A.A.R. with 10-volt, 18-watt lamps. Soft-toned, 12-volt, d-c. bells were provided.

Power is obtained from the railroad's power line at 220 volts, 60 cycle, power being fed from a commercial tap at Forest Glen, Ill., 1.3 miles east of Edgebrook. Power is transformed by a Union W-10 transformer at each crossing, with 6 cells of Exide 80 a.h. DMGO-9 battery floating on an RX-21 rectifier.

Instrument Cases

All line relays are of the Union DN-11 type, with the exception of the DX-13 interlocking relays, NF-2 flasher relays, and ANL-30 power-off relays. The relays are shelf-mounted, with shock-absorbing spring supports. All line wires are No. 10 weatherproof. Either sheet steel or cast iron instrument cases are located at each crossing. Parkway cable is used between signals and is run under each concrete slab crossing in two 3-in. iron pipes. At Devon and Caldwell avenues, the lead-in from the pole line to the instrument cases are in two 10-conductor No. 14 parkway cable. The lead-in at Lillard avenue consists of No. 14 weatherproof wires made up in cable form. The signals, mechanism, instrument cases, etc., are painted with aluminum paint.

The neutral track relays between the crossing are fed by 3 Edison 500 a.h. primary cells in multiple. On the approaches the primary cells are floated on RT-5 rectifiers. Track leads are No. 9 parkway terminated directly at the rail with Saco rail terminals. Elastite trunking pot heads are used in bringing the parkway up to a rail terminal. Battery housings at the crossing consist of 16-cell capacity concrete battery tubs made by the Milwaukee at the Tomah shops. Brach lightning arresters, A.A.R. porcelain terminals, black fibre tags, and No. 12 and No. 16 flexible wire jumpers and relay leads were used.

This installation was designed in the office of L. B. Porter, superintendent of telegraph and signals of the Milwaukee, at Milwaukee, Wis., and was installed by a crew of six men from the signal department forces under the direction of J. Ellefson, signal inspector. The installation was placed in service on September 16.