Modernizing Crossing Protection With New Safety Features*

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IN DEALING with railroad grade crossing accidents, it is the popular thing to characterize the American motorist by "Lunatic," "Try-to-beat-it-fool," or "Maniac," and to lay the blame for this type of accident directly in his lap. As proof of the suicidal intent of American motorists, the fact was cited that 39 per cent of the grade crossing accidents occur when a motorist runs into the side of a train, instead of the train hitting the motorist.

I believe that most traffic engineers, in their dealings with the motoring public, have come to find that the average motorist is not a fool intent on killing himself as expeditiously as possible, but rather a normal human being who appreciates positive and informative control and regulation, and who very successfully keeps out of trouble at a location or at a time when the hazard is made obvious to him. We are all familiar with the fact that many apparently dangerous locations are free from accidents because the hazard is obvious to the motorist. Therefore, may there not be some other explanation of the grade crossing accidents other than the irresponsibility of the man in the automobile?

Then too, we are not making much headway in eliminating highway and railway crossings at grade. Almost as fast as these crossings are eliminated, either through separation or relocation, new crossings are opened up by new construction. The building of highway-railway grade separations certainly is not the answer. It has been estimated that the cost of constructing separations at all existing grade crossings would be approximately the same as the original cost of construction of all the railroads in this country. It seems apparent, therefore, that the grade separation can be used only at those crossings where the delay is so great that the cost of grade separation construction is justified on an economic basis.

It is true that in 39 per cent of the 1935 accidents, the motor vehicle ran into the side of the train. But is this significant? With the train and automobile each traveling 60 miles an hour, a small fraction of a second difference in timing of either the train or the motor vehicle might have resulted in the train hitting the car instead of the car hitting the train. However, it is interesting in this connection to note that 75 per cent of these accidents in which the car struck the train occurred after dark. I imagine most of us have had the experience of our hair standing on end when driving along a rural highway as our headlights picked up the freight train across our path, with the engine somewhere out of sight, and no other illumination anywhere around to show us this barricade across the highway. Frequently, we are made aware of this freight train's presence only by the flash of the headlights of oncoming cars between the wheels of the passing train. Certainly this situation could be greatly improved, preferably by the actual illumination of the crossing, or at least by the installation of adequate reflectors on the sides of all freight cars. They are now required on the sides of long trucks so why should they not also be placed upon the freight cars.

Why Motorists Ignore Present Signals

The railroad man points out that 1 of every 12 grade crossing accidents occur when a motorist runs into the side of a train that is standing still. Here again it may be largely a matter of illumination. Of the 264 accidents of this type in 1935, 20 occurred in the day time and 244 at night.

In some circles, there is a widespread conviction that the "fool" motorist insists on ignoring crossing signals, running through crossing gates and in general endeavoring to kill himself in spite of all the warnings erected for his protection. I can readily sympathize with the feelings of the motorist even if his actions cannot be condoned. Certainly the old railroad stop sign is out of date—it seems too much to expect that hundreds or thousands of motorists will approach a crossing where 10 or 15 trains pass daily and come to a complete stop before proceeding across the tracks. As far as the cross-bucks and advance warning signs are concerned, they are another example of the old story in which the boy cried, "Wolf."

The wig-wags bear out the old saying that "you can fool some of the people, some of the time, . . ." When a motorist approaches a railroad crossing and sees the wig-wag or flasher light in operation, about all it means to him today is that, "This is a railroad track and on it somewhere there is a train." With the track circuits controlling this warning being operated to provide a 20-sec. warning for the fastest train, it might mean that in 20 sec. a streamliner is going to roar over this crossing or in a minute and a quarter a freight train is going to loaf by. It may mean that there is a switch train somewhere in the track circuit that

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will never cross the highway. It may mean that a car has been left temporarily on the track. It may mean that a train has stopped several hundred feet away at a station and will not cross the highway for some time. If two or three slow trains, one after another, come into the track circuit from the same or opposite directions, the signals may be kept working with little or no necessity, for minutes. The average motorist has been fooled so many times by signals operating in this manner that he cannot be blamed for coming to believe that grade crossing signals merely mean that there is a train somewhere on the tracks and that he, therefore, might as well proceed. Of course, it may happen that the switch train he observes is hiding the approach of a fast express, or perhaps a fast express is coming from the other direction.

The parallel problem in street traffic control is well understood. It has long been known that if traffic signals are operated when there is no cross traffic to justify them, motorists will not stop and wait. Conversely, when this unreasonable traffic control is supplanted by reasonable control such as traffic actuated signals, the motorists will appreciate it and cooperate through greatly improved obedience.

Speed-Time Control

Certainly it is not very difficult to understand why many motorists prefer to take a chance on running into a crossing gate rather than stop and wait. In a study recently made of the gate operation in a busy shopping district, we found a number of cases where the gate was closed for 3 min., and in one instance where it was closed for 4 min. and 55 sec. while trains dragged in from opposite directions or stopped at a nearby station. With delays of this extent possible, it is not surprising that motorists, seeing the gates start down, will do their best to squeeze by at the last minute.

Over a year ago an article appeared in the magazine, *"Railway Signaling"* describing uniform time control for grade crossing signals. Under this system there is one time-element relay by which the speed of an approaching train is measured over a section of track circuit of a definitely computed length. If the train is going faster than the computed speed, it enters the second track circuit before the relay has closed its contacts and the crossing signals start operating at once. If the train is going so slowly that the time-element relay has already closed its contacts before the train reaches the second circuit, the crossing devices will not go into operation until the train reaches the third circuit. With this circuit, trains can stop within any one of the sections of the track circuit, except the last next to the crossing, without operating the signals. Thereby the nuisance of signal operations is avoided while the train stops at a station or switches. Without going any farther into the details of such a system, it is enough to say that it is possible to introduce an effective time element in grade crossing signal circuits and that such a thing has already been done.

Educating the Motorist

Assume that all of our grade crossing protection is changed over-night to operate in proportion to the speed of the approaching train, with no unnecessary operations for switching trains and the like. Now we must devise some way to tell the motorist that the old system is changed and that when these crossing devices are in operation, it actually means that a train is going to arrive at that crossing within 20 sec. or less time. We must convince these motorists that there is no longer any premium on endeavoring to beat the grade crossing signals, but instead a very positive hazard. I believe that as crossings are changed over to the timed control, the wigwag or flashing-light must be replaced by an actual barrier, namely an adequate crossing gate. By no means do I mean the old flimsy, poorly painted type of gate which is illuminated by a dingy kerosene lantern. Instead I refer to a modern gate which carries adequate flashing warning lights and probably also a form of flood light to illuminate the gate itself. Then to overcome the high maintenance costs when motorists occasionally strike these gates, I would use a modern gate which can be struck without damage either to the gate or to the automobile. I have witnessed demonstrations with new gates which have been struck by trucks traveling at 45 m.p.h. without breaking any of the glass on the truck or without damaging the gate, which swung out of the way and then returned to its normal position. This modern gate would also be of the type which would not be damaged or made inoperative if it should strike the top of a car on its downward movement.

Expenditures and Their Effect

You may well ask how much this suggested grade crossing protection is going to cost. As nearly as I can discover, each speed control circuit costs more than $200 on each approach on each track. The gates themselves would cost between $1,200 and $3,000 depending upon the number and size of gates used. Therefore, the total cost of such an installation should be between $4,000 and $15,000, depending upon the number of tracks and complications in the layout.

These proposed expenditures for improved grade crossing protection do not constitute merely another additional cost for the railroad or for the motoring public, but rather are an investment which will pay returns. Certainly if the proposal has any value, fewer grade crossing accidents, with their loss of life and costly damage suits, should result. These accidents are costing the railroads between $35 and $200 for each mile of track in their systems. This type of control should make it possible for the railroad to eliminate grade crossing watchmen. It should result in less damage to grade crossing equipment. Finally, it should meet the demands which are now being made for more expensive types of treatment such as grade separations. Certainly, it would be far more sound economically, rather than concentrating expenditures at one hazardous grade crossing, to use this same amount of money in providing adequate protection at 10 to 20.

Rail and Highway Transportation Both Concerned

The railroads have already begun to adopt the newer practices in grade crossing signaling. In addition to the improvements mentioned, the railroads are considering two other major innovations. A few unlighted crossings have been illuminated with sodium vapor lights and switches have been installed to enable train crews to cut out the crossing signals when the train is merely switching, stopping at a water tank, etc. The railroads most certainly are concerned with the accident problem at grade crossings. Their accident problem is no longer one of passengers, because passenger deaths are now ranging from about 30 a year to none at all, while at the same time the railroads are killing approximately 1,700 people at grade crossings. The motoring public as a whole has a decided interest at stake. The motorist is not only interested in saving his own life but also in conserving time by doing away with needless delay. To gain these two ends, the motorist must, I believe, be willing to contribute his fair share of the cost of modernizing grade crossing protection.