

signal locations, circuits, etc., because a complete set of prints for a maintainer's territory would be very cumbersome to carry around. Proper protection for such a set of prints would require a special box on each motor car.

There is an advantage in having permanently-mounted blueprints at each instrument housing. However, to maintain the required number of prints and keep them up to date would be a task beyond the capacity of the average signal department drafting force.

We furnish each maintainer and foreman with a binder book of standards which has a lithographed white and black sheet 8 in. by 14 in. overall and 7 in. by 12 in. within the border lines. These plans reflect in a general way all standards. For flashing-light signal locations, interlockings or special locations we furnish the maintainer with a complete set of plans and endeavor to keep them up to date. I feel that regardless of the number of plans furnished, the important part is to keep them correct, as a plan which does not properly reflect the circuits, as in use, is worse than no plans at all.

Complete Circuits Advantageous

C. A. Cotton

Signal Supervisor, Atchison, Topeka & Santa Fe, Arkansas City, Kan.

On the Oklahoma division of the Santa Fe, all maintainers carry with them on their motor cars a complete set of blueprints showing all signal locations and circuits on their territory. The practice is a good one, in that they always have plans to refer to if some question arises or if they are questioned by supervisory officers. At interlocking plants, the prints are kept in the tower or the maintainer's tool house. At automatic plants, copies of circuit plans are kept in the relay house.

All prints are kept up to date. The supervisors are required to notify the office promptly when any changes are made in existing circuits, and corrected plans are furnished to supervisors and maintainers. No attempt has been made to mount blueprints permanently at each instrument housing, as it would require a large number of copies and would be of no great benefit.

All maintainers are required to have in their possession a copy of Standards of Construction and Maintenance, Instructions for Standards of Construction and Maintenance, and Standard Wiring Diagrams and Symbols. These cover all standards of construction and maintenance and the wiring standards.

Speed at Automatic Plants

"In your opinion, should the speed limits of 20 m.p.h. through automatic interlockings be eliminated? Why?"

Eliminate Low Limit

H. J. Foale

Signal Engineer, Wabash

In my opinion, there is no more reason for imposing a speed restriction at an automatic interlocking than at a manually-operated interlocking with derails, over remotely-controlled switches or throughout C.T.C. territory. There are still many purely mechanical interlocking plants with derails throughout the country where no speed restrictions are imposed, which, in my opinion, offers a greater potential hazard, by reason of the possibility of quickly changing a route in face of a train, than is offered by a modern automatic plant.

In either event, safety cannot be attained unless the stop signal is obeyed. With the extended use of signals today, there are few infractions of this rule. The derail is installed as a disciplinary agent, and if operating officers will require engineers to obey the rules of stopping at "stop" signals, and impose strict discipline for the few infractions, there is no reason why unlimited speeds cannot be maintained through automatic plants without derails.

I favor a recording device at automatic interlockings to check any infractions and to aid operating officers in substantiating their case where infractions are detected. When it is known by engineers that such a recording device is in use, it acts as a disciplinary agent similar to the derail, but in a considerable safer manner. I am wholly in favor of the elimination of the speed limit of 20 m.p.h. through automatic plants.

Favors High Speed Limits

Leroy Wyant

Signal Engineer, C. R. I. & P.

When introducing these plants, we had to be conservative and recommended relatively low speed restrictions. Our first plant was installed in 1925. We have now had a large number of these plants in service for a long period, and I am definitely convinced we should eliminate speed restrictions so far as they might be prompted by the automatic versus manual operation of the signaling.

We have operated terminal interlocking plants without derails and without speed restrictions for over

25 years, to my personal knowledge. Therefore, it would appear that the determining factor should be safety of operation of trains over the crossing on hand signals (in case of failures) by a "towerman" versus member of train crew.

It has been said that a towerman has more information on the position of his signals through normal indication locks, repeater indicators, etc. We are now giving consideration to this problem and have in mind two procedures at automatic plants—(a) add special electric lock, with indicator, similar to an ordinary outlying electric switch lock, indicator to check positions of home and distant signals on cross line, to the present time-element releasing arrangement for use of trainman; (b) require trainman to flag on cross line, per standard code rule 99, whenever he cannot get his own signal to clear by operation of the present time-element releasing arrangement. Assuming that the instances requiring a train to flag through an automatic plant will be very infrequent, I am inclined to favor scheme (b). However, this matter is still under consideration.

After satisfactorily taking care of the condition cited above, I will support the elimination of any speed restrictions now imposed at automatic plants just because they are that type.

Changes Necessary at Some Plants

P. M. Gault

Signal Engineer, Missouri Pacific

An automatic interlocking must be designed and constructed to conform to the same requisites of safety as a manually-operated plant. To do otherwise would result in delays and possibly serious accidents. Even in the present day manual plants, a good many of the devices operate automatically so that about all the leverman does is throw a few levers, and the devices connected to them perform their cycle of operation. It is not general practice to establish any particular low-speed limit through a manually-operated plant, at least not on account of the interlocking, and I have never been able to find any logical reason for doing so through an automatic plant. Certainly a leverman standing by the

(Continued on page 436)

interlocking machine adds no element of safety to its operation.

Personally, I believe when the idea of automatic plants was first tried out, nobody had the nerve to say that trains could be operated through them without restriction as to speed. A large number of automatic plants have been installed, and the results have been found to be very satisfactory, just as satisfactory as with the old manually-operated plants which many of them replaced. Enginemen do observe and obey signal indications, and that is about all that is necessary to insure safety. How well the job is done depends on the man himself and his immediate supervising officer.

In going to higher speed limits through automatic plants, we should bear in mind that the present plants were designed for comparatively low speeds. Many automatic plants do not have operative distant signals, and where they are used, the spacing is not always proper for high speeds. A new plant can be built to take care of any train speed we may wish, but before raising speeds through existing plants, a careful check will be necessary to see that sufficient distance is provided for proper operation of brakes on all trains.

Depends on Local Conditions

R. A. Sheets

Signal Engineer, C. & N. W.

I would not concur in any idea that trains be permitted to operate through automatic interlockings without some speed restriction, but have no objection to a reasonable increase in present speeds. I cannot see any particular reason to recommend the use of traffic recording instruments.

Train speeds at signal-protected crossings where derails are not a part of protection have, in my opinion, been limited or restricted not because derails were not used, but rather because by reason of the crossing, the conditions affecting the safe movement of a train might change. It is common practice for a railroad to protect junctions of its own line with signals or interlocking apparatus without derails, and permit the movement of its trains at high speed. It seems that the reasoning back of this is that the trains are those of the same company, and the employees are familiar with the schedules, operating conditions and rules. This practice has existed for many years and the operation has been safe.

The crossing of one railroad by another generally involves the operation of trains of two different companies by employees not familiar with

schedules, operating conditions and rules of the other. Because of this it has, in the past, been considered essential that derails constitute an important part of any signal protection installed at such crossing to permit the operation of trains at high speeds. The use of automatic signal protection, (or gates with signals) without derails, to enforce observance of signal indications has been predicated on the principle that the speed restriction took the place of the derails. I have never considered that derails were installed for the purpose of penalizing an engineman who overlooked or misinterpreted a stop indication of a signal, but rather as something to protect him and his train against such possible oversight. At a crossing, enginemen disciplined by enforced speed restrictions where operating on signal indications only, will be more on the alert, and in the event that two trains approach such a crossing with some restriction in speed, even though one should misjudge or misinterpret signal indications, the speed restriction of the other may be all that is required to avert an accident.

Speed of trains permitted at such signal-protected crossings without derails should primarily be considered on the basis of view and signal arrangement. It is self-evident that at an open crossing with good view, and signals properly located, high speeds might be considered safe, but regardless of signal arrangement, if the view is greatly restricted at the crossing, speeds must be restricted. Of course, in such instances operative distant signals, to give advance information as to conditions at the crossing, are of some value. Time elements, instead of push buttons, to delay manual change of routes, and the location of the home signals well out from the crossing, are additional safeguards that would permit reasonable increase of speed.

The use of traffic recorders will not in themselves prevent accidents by reason of misjudged or willfully disobeyed signal indications, but do have some value perhaps as enforcers of discipline. The best check on observance of signal indications or observance of speed restrictions is the proper supervision and checking on the ground by operating officers.

At crossings with signal protection, and with the distant signals inoperative, certainly the speed should be restricted to that required by the approach or caution displayed by the distant signal, and the signal should be located braking distance from the home signal. Without question, the maximum speed for a passenger train

approaching such a crossing where inoperative distant signals are used, should be restricted to 30 m.p.h., and freight trains probably to 25 m.p.h. Where operative distant signals are used and the view at the crossing is not greatly restricted, speeds of 35 to 40 miles per hour could safely be permitted. I would not be in favor of unrestricted speed.

Raise the Speed Limit

L. B. Porter

Signal Engineer, C. M. St. P. & P.

The Milwaukee first advocated the use of automatic signal protection for railroad crossings in 1921, and since then has carried out some 60 installations of that type at crossings and gauntlets on its lines, that had previously been without protection or where manually-operated interlocking plants had been in service. When such protection was first proposed, several of the state railroad and public service commissions were reluctant to approve the plans for non-stop, non-interlocked railroad crossings, and the railroad management also felt that the protection should be put on probation. Consequently, it was considered advisable to restrict the speed of trains, and, consistent therewith, to display restrictive signal indications only.

On our road, a speed limit of 20 m.p.h. was established, which has since been adhered to quite uniformly except in terminal or yard territory where the local conditions might require a somewhat lower limit. Operative approach signals have not been used. It has recently been decided to raise our limit generally to 25 m.p.h. At several points the road crossed has a 35 m.p.h. restriction, and we will probably gradually work towards higher limits as train speeds are increased. It is felt that this can be done with safety, as the automatic signal, whether it be used for the blocking and spacing of trains or to govern their movement over railroad crossings, has proved through the years to be dependable and effective, and the new form of railroad-crossing protection has now passed beyond the experimental stage and is here to stay.

At manually-operated interlocking plants, where regular attendants are provided to line the routes, supervise the movements and to watch the observance of the signals by trains, the elimination of the derails should be advocated—possibly those for reverse current moves first and for the normal direction of traffic later. At automatic plants, we favor the use of the graphic recorder.