Observance of Signal Indications, How Secured*

By Leroy Wyant

Signal Engineer, Chicago, Rock Island & Pacific, Chicago

THEORETICALLY, the meaning of signal indications, and methods of securing observance of these indications by enginemen is fixed by the operating rule book of each railroad. An occasional special signal, or signal rule pertinent to a peculiar situation, is covered by a temporary general order or time table rule. Trainmen and enginemen are examined regularly by trainmasters. Special rules examiners hold classes of employees to develop and answer questions concerning operating rules.

In view of all these instructions and established rules, there seems to be no good reason for non-observance of signal indications. However, such non-observance does occur as is evidenced in the accident reports of the Bureau of Safety of the Interstate Commerce Commission. Furthermore, the orders of the commission issued in 1922 and 1924 requiring the railroads to install automatic train control at a cost of about $25,000,000 with an annual maintenance bill of probably $3,000,000, were the result primarily of non-observance of signal indications.

Non-Observance Rare

However, it is not to be concluded from the above statements that non-observance of signals is prevalent. In fact, the correct observance of signals is in the 99.99 per cent plus class. Nevertheless, in present day railroading, one case of improper observance of a signal is fraught with such potential disaster that we must strive for 100 per cent in this phase of railroading.

In the early days, signals were installed primarily as safety factors. Later it was discovered they materially increased efficiency of train operations, so, in recent years the economic rather than the safety aspect of signaling has been stressed, and I wonder sometimes whether some railroad officers have not lost sight of the fact that the safety factor of the latter type of signaling is increased a great deal more than in a direct proportion to the extent to which they are used for economic purposes. In the first case, signals check manual operations —in the latter, *the signals actually issue instructions and check themselves.*

The following statement pertaining to the Rock Island, which I believe is rather representative of all railroads, will indicate the extent to which signaling has been used in recent years for economic purposes, such as the substitution of automatically-operated mechanical devices for elaborate personal supervision of train operation. In the period 1925 to date, we have installed some 180 signaling projects, each of which has provided economies. The total sum of the latter amounts to over $400,000 per year.

Obviously, the signal indications which make these projects possible must be accurately understood and followed by train and engine crews. The art of imparting information on how to operate trains by displaying a signal indication to enginemen and trainmen is fully covered by our rule books, and the railroad managements have so consistently followed a policy of encouraging accurate understanding and compliance with these that there is not much new to be said on the subject. Nevertheless, the serious accident at Binghamton, N. Y., caused a lot of checking up by the railroads to see if there were some loop holes. The Rock Island made an analysis of this case as bearing on our practices and my report was along the following lines:

Calling-On Signal Considered

The recent discussion over the "calling-on signal" occasioned by the serious accident at Binghamton, N. Y., recalls the similar discussion after the accident at Buda, Ill., several years ago under similar conditions. There is only one answer to these, in my opinion, and that is "not to change our practices with respect to 'calling-on signals' but determine whether the men have a proper understanding of the rules pertaining to signaling and then to enforce observance by the trainmen."

I do not think the ordinary surprise tests (now called efficiency tests) as usually conducted by trainmasters, can possibly be sufficiently inclusive of the finer points of operation by signal indications to be effective. On our road these are supplemented by a substantial number of observations (so-called to avoid conflict with the efficiency tests referred to above) made and reported each month by each signal supervisor, which embrace observance of various signal indications encountered in normal routine as against those usually artificially set up by trainmasters. These normally-encountered indications are more varied and extend over more territory, including gated crossings, speed restrictions at automatic interlockings and past distant signals as well as "calling-on" signals, proper action leaving a plant, which has been entered on "calling-on signal," and similar ones.

Aspects Should Be Simplified

I am unable to offer any further detailed suggestions on this subject. I am, however, going to make one general comment for which I will, no doubt, be criticized by some, and that is, there should be a tendency to simplify rather than elaborate on the signaling aspects which the enginemen must observe when traveling at a high rate of speed, approached from various angles at junctions on curves, etc.

It so happened that this subject of "how to secure more perfect observance of signal indications" was under general discussion just after the close of the football season last fall, and I jotted down in a notebook a statement which I read in the sports section of a newspaper offering an opinion on the reason for the consistently successful performance of the University of Michigan's football teams over a period of several years. I thought that statement might be used sometime as applying to train operation by signal indications on a railroad. It

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*Abstract of paper presented before regional committee of the Safety Section, American Railway Association.

Track Circuits at Highway Crossings*

"Has any effort been made on your railroad to so arrange the track circuits and controls at important highway or street crossing signals so that the warning will be given until the crossing is completely cleared for both traffic directions? If so, how has this been accomplished?"

Insulated Joints Spaced for Normal Traffic Direction

C. H. Tillett
Signal Engineer, Canadian National, Toronto, Ont.

The only effort we have made to have the highway warning signals operate, while a train is standing on the crossing, has been to space the insulated joints at crossings of highways, with double tracks, so that with the normal direction of the traffic the signal will not cease to operate until the rear of the train has cleared the crossing.

Admittedly, the practice of having a signal operate until the train has cleared the crossing is desirable, and it may reduce the number of side collisions of road vehicles with railway equipment at night. During daytime operation, it is almost inconceivable that highway crossing protection could be made more conspicuous than a train on the crossing.

*For other answers on this same question see page 364 in the July issue.

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Emergency C. T. C. Equipment*

"On the basis of a ten-mile section of C. T. C. installation, how many emergency field coding and storage relay units are necessary to provide proper protection in case of lightning or similar trouble?"

One Code-Storage Unit Ample

T. C. Seifert
Assistant Signal Engineer, Chicago, Burlington & Quincy, Chicago

On the basis of a ten mile section of C. T. C., I would say that one field code-storage unit would be ample protection against any kind of trouble that might happen, lightning or otherwise.

A case of lightning damaging the code equipment is very remote, especially where the coder wires are in aerial cable. The messenger wire for this cable is grounded, possibly fifteen to twenty times between each coder station where code-equipment relays are housed. This provides a nearly perfect lightning protection. In this connection, we have lightning arresters in both sides of the line; also spark-gap arresters across the line to take care of any sudden surge of high-voltage current that may occur in the line.

I note in the question it states in part: "How many emergency field coding and storage relay units are necessary?" To this it may be worth while to mention that with a thirty-five station system each field code storage unit consists of a separate coding unit and storage unit combined in one case and can be used separately, and care should be taken in shelving these units so that there will be sufficient room to replace one of the small storage units with the large code storage unit.

*For further discussion on this subject see page 368 of the July issue.

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Brine Drippings on Track Circuits

"Brine drippings from refrigerator cars interfere with the operation of d-c. track circuits. What maintenance precautions can be taken to overcome or minimize this trouble?"

Precautions Outlined

H. M. Van Osinski
Signal Supervisor, Nickel Plate, Conneaut, Ohio

For the past few years we have experienced very little trouble with track circuits failing due to salt brine conditions. This has been brought about by improved ballast conditions, drainage of ballast, creosote-treated ties, annual oil-spraying of rails, the use of improved types of bonds, and improved track relays. It is also essential that track-circuit rails be entirely free from contact with ballast, including turnouts to fouling points, and that track, shunt, and fouling connections be kept free from ballast or ground connections.

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Painting Galvanized Surfaces

"Some railroads have had trouble with black paint peeling off of the galvanized backgrounds of color-light signals. What methods have you used to make such paint jobs more permanent?"

Washing and a Priming Paint Helps

C. H. Tillett
Signal Engineer, Canadian National, Toronto, Ont.

If the galvanized surface of a color-light signal background is first washed with a solution of blue vitriol and water, and then painted with a priming coat of flat grey paint, the tendency to peel is almost entirely eliminated.

Observance of Signals

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read "The Michigan system of football is popularly expressed by sports writers as a 'punt, pass and prayer' system, because it features very little carried out in very great detail."

And so I say, keep the signal indications as simple as possible, but carry out with greatest care the coaching of the engine and train crews in their proper observance in the most minute detail. As a parting thought—the Michigan football players are coached by men who grew up in a Michigan football atmosphere and who know proper execution of successful football. The signal supervisory forces of a railroad, who have grown up in a signaling atmosphere, might profitably be given a more important part in coaching enginemen and trainmen in the correct interpretation of signals and the execution of their indications.