Railway Signaling

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Signals Eliminate Written Train Orders

THE substitution of signal indications for written train orders to direct train movements is receiving increased consideration not only from signal but also operating officers. This comprises a decided change from current practice, but could hardly be characterized as anything radical, because a review of progress in this field during the past 25 years shows that this change is the logical result of efforts to eliminate undesirable train stops and delays.

In the early days of single track railroading the time card system was safe enough; however, serious delays resulted when any train got off schedule. With the development of the telegraph, the right to vary from the time table schedule was given by written orders. With the extensive use of automatic block signals and interlocking plants on the main double or multiple-track lines of the country, the methods of directing train movements have been changed so as to depend more and more on the signal indications not only to space trains but to direct their movements. As a consequence, written orders now serve as but little more than a means of communication in case of any variations from normal operation. Such orders as are used are decidedly different from the formalities, checks, and complications of the original Form "31" procedure. In 1909, the Erie began the use of special semi-automatic second arm signals at head-blocks on 140 miles of double track to direct trains to (a) stop and hold the main track; (b) take siding; (c) proceed on main track regardless of following superior trains. This method of operation was so successful that it has been extended to include over 889 miles of lines on this road. On many other roads the double track operation is carried on practically without delays for written orders, the Form "19" being used with but few exceptions, rather than the Form "31."

Likewise, on single-track lines where modern automatic block signals are used, many roads are using the Form "19" train order for practically all movements where the more cumbersome Form "31" had previously been considered necessary. On several different roads short stretches of single or double track have been operated by signal indication without written orders for years. The development of methods of directing train movements over entire districts or divisions by signal indication without written orders on either double or single track is, therefore, quite logical.

The installation on the Missouri Pacific between Osawatomie, Kan., and Leeds, Mo., on 56 miles of single track which was completed in 1924, included an arrangement of traffic direction locking between towers, all of the main passing track switches being handled either by mechanical interlockings or remote power control. No train orders are used and rights of trains by direction or class are eliminated on this territory.

The next outstanding step to be made in this development is the Central of Georgia installation on 24 miles of single track from Terra Cotta, Ga., to Carmon. As described in this issue, the signals are controlled from only two stations by means of desk lever stands, remote control power switch machines being used on only two switches, the movements into and out of passing tracks being controlled by special signals. Unique circuits were developed to reduce the number of line wires and insure safe operation, but in general, it may be said that the design follows established practices of signaling. The novel feature about the C. of G. installation is that this type of installation was promoted by local operating officers and was designed and installed by the forces of the signal department to meet local conditions quite independent of other methods or ideas being developed. Perhaps the most important feature is that the installation meets every expectation of the dispatchers, division superintendents, and other operating officers with respect to the increased flexibility of train operation. In other words, the desirability of directing train movements by signal indication without written train orders has again been thoroughly demonstrated. This in turn will serve to increase the demand for similar installations which will be met by further developments to accomplish the same or more extensive results with similar control circuits and equipment.

Something New in Relays

FIGURATIVELY speaking the track circuit is the backbone, and the relay the brains of any signal or interlocking installation and it is, therefore, noteworthy that decided improvement in economy and safety have recently been developed for both. The average 4-ohm track relay with four contacts conforming to the existing Signal section, A. R. A. specifications, has a working current of 120 ma. with a drop-away, with contact pressure, of 37 ma. New designs of relays now available have a working current of 70 ma. and a release of 30 to 35 ma.

It is readily apparent that a reduction of about 50 ma. in working current will permit a decided reduction in the consumption of battery for the track circuit. Less track circuit energy will be required because it is possible to increase the resistance in the track battery lead and also because of the resultant lower potential between rails will reduce the ballast leakage, and the current through the relay. Conditions change so often on track circuits that comparisons are misleading but if a track battery on a particular circuit, for example, has a normal life of about six months with the present type of relay, the life should be increased to at least nine months with the new higher efficiency relay. Certain long track circuits with dirty ballast requiring a series-multiple connection of track cells, can be changed, with the use of the new relays, to straight multiple connections, thus making a decided saving in battery consumption.