EDITORIAL COMMENT

Track Turnouts and Signal Aspects

THE installation of longer turnouts and crossovers in interlockings to permit higher train speeds when making diverging moves offers a much less expensive means of saving train time than making line changes or curve revisions to effect equivalent savings in time. Saving a few minutes at each of several locations where diverging moves are made may permit a reduction of as much as 30 min. or more in the overall time between terminals. However, the expenditure for installing the longer turnouts and crossovers is wasted, and the saving in train time is not accomplished unless signal aspects are provided to direct trains to approach and pass through the diverging routes at the maximum speed for which the turnouts and crossovers are designed, and then to accelerate in the automatic block which includes the home signal limits, in accordance with the train occupancy of the blocks beyond. For example, where a crossover good for 45 m.p.h. and a shorter turnout good for only 25 m.p.h. have been installed between different tracks, proper aspects on both home and distant signals must be provided to indicate the different ranges of speed over each of the diverging routes otherwise the minimum of 25 m.p.h. must apply for both, and the possible benefits of the high-speed crossover are lost.

Speeds Over Turnouts

As a general rule the speed of trains when making diverging moves is limited to about 10 m.p.h. for No. 8 turnouts, 15 m.p.h. for No. 10 turnouts, and 25 m.p.h. for No. 15 turnouts. As originally designed with short switch points, No. 20 turnouts were safe for about 30 m.p.h. but using longer switch points and thereby reducing the angle of divergency, higher speeds can be permitted, while still further improvements can be made by curving the switch points. With No. 20 turnouts and 30-ft. curved points, some roads permit diverging moves at speeds up to 35 m.p.h., and where 45-ft. curved points are used, speeds up to 45 m.p.h. are authorized, with an allowance of 5 m.p.h. in excess for safety.

Turnouts longer than No. 20 are not considered practicable as yet because a No. 20 frog presents as small an angle as may be introduced in track with safety. Further improvements in track construction to introduce elevation in turnouts have been investigated, and installations in service in England indicate that diverging moves can be made through No. 20 turnouts of proper construction at speeds up to 55 m.p.h. with safety. In simple track layouts where two main tracks converge into a single track, one road operates at train speeds up to 70 m.p.h. with safety by using No. 20 frogs, and lining the center of the single track with the center line between the two tracks of the double-track line. The same type of track layout can be used where three tracks converge to two, providing certain normal routes are used. Thus, it is evident that turnouts and crossovers may be installed which are good for diverging train movements at speeds of 15, 25, 30, 45, 50, 55, and even 70 m.p.h.

As nearly as practicable, signal aspects should be provided to indicate the speed at which trains should be operated when reductions below the maximum permissible speed are necessary. In addition to the Clear aspect, Rule 281, for directing through movements at the maximum permissible speed, the Code includes aspects and indications for four ranges of speed within interlocking limits; Rule 290, Restricting; Rule 287, Slow Clear; Rule 283, Medium Clear; Rule 281C, Limited Clear. The Restricting aspect is ordinarily used to govern over a route to an unsignaled track such as a house track, or for use as a "call-on" aspect when closing up trains within interlocking limits. The Slow Clear aspect may be used to govern over routes extending through interlockings which include short turnouts. The Medium Clear aspect may be used to direct moves over certain turnouts good for better than slow speed, while the Clear Limited aspect may be used to direct moves over turnouts good for a higher range of speed.

In order to confine the aspects to those mentioned, some sacrifices may be required if turnouts good for all ranges of speed are in service, and it is perhaps better to make the sacrifices in the lower ranges. For example, the Slow aspect may be used for routes good for a maximum of 15 m.p.h., the Medium for 30 m.p.h. and the Limited for 50 m.p.h. Different speed limits can, of course, be determined by the lengths of the turnouts and crossovers in service.

Automatic Aspects of Home Signals

In addition to indicating the speed at which trains are to operate through turnouts and crossovers, the home signals must also give information as to whether the next automatic block signal in advance is displaying an Approach aspect or better, this information being necessary so that an engineman may know whether to control his train to stop at the next signal or, after the train has passed through the turnout, to accelerate to the maximum permissible speed as soon as possible. Neglect in providing for this feature of operation may defeat the advantage of the longer turnouts.

The Clear aspect on a home signal indicates not only that a route is lined for a straight through move at the maximum permissible speed, but also that the next automatic block signal in advance is displaying an Approach aspect or better, while the Approach aspect, Rule 285 A or B, gives the variation of the home signal

aspect to indicate that the next signal is displaying the Stop-and-Proceed aspect. With three-aspect automatic block signaling, the Medium Clear aspect of a home signal for a medium speed diverging route or the Limited Clear aspect for a diverging route at a higher speed would not logically be displayed unless the automatic block signal in advance were displaying an Approach aspect or better. Where automatic block signals with more than three aspects are used, however, the multiple-aspeets can be carried through on home and distant interlocking signals.

In order to operate a train through a diverging route within an interlocking at the speed for which the crossovers and turnouts are designed, the speed when approaching the home signal must be properly governed by distant signals. With three-position distant signals, the Clear aspect is ordinarily used as advance information that the home signal is indicating clear for a straight through route, and at many plants where distant signals with only three aspects are used, the Approach aspect of the distant signal is displayed just the same when a diverging route is lined up or when the home signal is displaying the Stop aspect. Under this arrangement and with signals spaced train stopping distance, an engineman encountering an Approach aspect at a distant signal would be required to apply the brakes, and the speed of the train would be materially reduced before he came within view of the home signal, if the sighting distance is short. Especially with long heavily-loaded freight trains, if the speed is below 15 or 20 m.p.h., the brakes should not be released until the train stops. Such operation, involving train stops or speed reductions below that for which the crossovers and turnouts are designed, defeats the possible advantage of the new track facilities.

Therefore, where high-speed crossovers and turnouts are in service with home signal aspects in accordance, additional distant signal aspects are required. The distant signal aspect used in conjunction with the Medium-Clear home signal aspect is Rule 282, Approach Medium; the distant signal aspect corresponding with the Limited Clear home signal aspect is Rule 281B, Approach Limited, while the distant signal aspect corresponding with the Slow Clear home signal aspect is Rule 284, Approach Slow.

A Logical Procedure

If turnouts of various lengths are installed indiscriminately, the provision of proper signal aspects to permit trains to use the track facilities most efficiently may become impracticable, and it is desirable, therefore, that signal engineers confer with the operating and engineering officers to point out the possible difficulties. Granting that on many roads it may not be practicable to provide aspects for all four ranges of speed in the near future, the neglect to install Medium Clear and Approach Medium aspects as a part of any project involving high speed crossovers and turnouts evidences lack of consistency because the track improvements are of little benefit without corresponding signaling. On an engineman's district where the majority of the turnouts are good for a certain high speed, a practicable solution may be to work toward a standard by making the necessary track changes at the remaining locations so that all diverging moves in normal main line routes can be made at a given speed, such as 45 m.p.h. Then an operating rule, effective on that sub-division, can be established to the effect that medium speed within interlocking limits is 45 m.p.h. Making the necessary track changes would effect desirable reductions in train delays and perhaps can be made at less expense than required to provide the additional aspects applicable for four or more ranges of speed.

Army-Navy Game Signaling

(Continued from page 547)

with switch circuit controllers over which the home signal control circuits are selected through "SS" repeating relays. At this point there are two of the position-light pedestal type signals which govern movements from the two main tracks to the platform tracks, and four standard position-light dwarf signals governing movements from the platform tracks outward to the two main running tracks. Knife switches, located in the block station, are used to control these signals.

Trains are operated between "D-6" and "Stadium" under automatic block signal rules, the current of traffic being toward "Stadium" on both tracks between 9:46 a.m. and 1:16 p m., and toward "D-6" on both tracks from 4:01 p.m. to 7:01 p.m. Between 1:16 p.m. and 4:01 p.m., when the automatic signal system between "D-6" and "Stadium" is reversed on both tracks, the pedestal type signals are transferred at each location to govern traffic in the opposite direction. The track circuits and controlling circuits are changed, and the entire system is checked out before the outward-bound traffic begins to move.

In addition to the work on the freight tracks east from "Arsenal," two position-light pedestal type automatic signals are installed on the normally westward (No. 2 track) between "Arsenal" and "Zoo" interlocking plants to provide for the eastward movements toward the Stadium on this particular track, between the hours of 9:46 a.m. and 1:16 p.m. In this way the "football" trains from New York are operated between "Zoo" and "Stadium" without interfering with the trains to and from Washington. These trains, coming to Philadelphia in opposite directions, are then moved side-by-side from "Arsenal" to "Stadium," using both tracks, with the current of traffic the same on each. Trains returning from "Stadium" between 4:01 p.m. and 7:01 p.m., likewise operate side-by-side from "Stadium" to "Arsenal," and thence to New York, or to Washington, as the case may be, without interfering with each other.

The interlocking plants at "D-6," "Arsenal," and "Zoo" are in service throughout the year. Only minor changes are necessary to tie in with the operation of the freight line as a two-track passenger railroad in each direction on the day of the football game. After the movement has been completed at 7:01 p.m., the automatic signals are removed from "D-6" to "Stadium," and "Stadium" block station is closed. The tracks are again restored to their normal condition for the exclusive handling of freight trains to and from South Philadelphia, Greenwich coal piers, and the Girard Point grain elevator.