Editorial Comment

Thoughts to Bury With Underground Cables

SIGNALING cables buried underground are "out of sight but not always out of mind" unless considerable thought is applied during the installation. For example, on a certain signaling project the cables were buried in trenches that were not deep enough, and, as a result, on numerous occasions the cables were damaged by picks used by track forces. To avoid such damage by track men, planks were buried on top of the cables when constructing an interlocking at a large terminal. In spite of special care, too many cinders and rocks were allowed to fall in the finished trenches and on the cables before the planks were placed. Subsequently, pressure of the dirt on the planks and vibrations caused by trains forced the cinders and sharp rocks to penetrate the protective covering on the cables, so that eventually there were numerous grounds and opens in these circuits. Based on experiences somewhat similar to those discussed above, the men in charge of the construction of a large interlocking installed several years ago determined that the cable would be installed properly. Accordingly, the trenches were dug at least 30 in. deep on open ground, and this dimension was increased the depth of the ballast where trenches extended under tracks. Clean clay with no rocks or cinders was placed six inches deep in the bottom of the trenches, then the cable was laid, and another six-inch layer of clay was placed above the cables. To prevent picks from being driven into the cables, a cypress plank two inches thick was placed on top of the clay and then the ditch was filled in. A detailed plan was made to show the exact location of each cable, and cast-iron disk markers were installed on the surface of the ground to indicate the locations of the cables. Although several years have elapsed since this interlocking was placed in service, not a single failure has been caused by cable trouble.

Speed Indicators for High-Speed Turnouts

A PROBLEM confronting some railroads is to provide signaling to direct enginemen to utilize new high-speed turnouts and crossovers at the speeds for which they were designed, and the problem is complicated by the use of different types of locomotives, some of which can safely use certain turnouts at higher speeds than other locomotives. As originally constructed with short switch points, No. 20 turnouts were safe for about 30 m.p.h. Turnouts longer than No. 20 are not considered practicable because a No. 20 frog presents as small an angle as may be introduced in track with safety. By using longer switch points, and thereby reducing the angle of divergence and minimizing the first thrust, 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 37 m.p.h., and where 45-ft. points are used, speeds up to 45 m.p.h. are authorized, with an allowance of 5 m.p.h. in excess for safety. Further improvements in track construction to introduce elevation in turnouts have been investigated and tests 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 double track converges to single track, one road uses No. 20 frogs, and by lining up the center of the single track with the center line between the two tracks, thus halving the amount of divergence, train speeds up to 70 m.p.h. are permissible with safety.

From the signaling standpoint, the construction of turnouts and crossovers for higher speeds requires that signaling be provided to bring the trains up to the home signals and through the crossovers or turnouts at the speeds for which the track facilities are designed and also to keep the trains moving in accordance with the occupancy of the automatic blocks beyond. The distant signal must display the proper aspect to give enginemen advance notice of the speed to be in effect at the home signal.

In the speed signaling system, as now used on a great many of the railroads in North America, the top arm of an interlocking home signal directs train movements on the straight-away main track, and the second arm directs diverging moves. When a route is lined up for a train to make a diverging move over a turnout good for 30 m.p.h., the home signal displays the Medium-Clear aspect, red-over-green, and the distant signal displays the Approach-Medium aspect, yellow-over-green. On many railroads medium speed is defined as half authorized speed, not to exceed 30 m.p.h. On some roads the red-over-green aspect is designated merely as the main-track diverging signal, with no reference to speed.

The A.A.R. Standard Code also includes a set of aspects, Limited-Clear, red-over-green-over-green, on the home signal, and Approach-Limited, yellow-over-green-over-green, on the distant signal. The Baltimore & Ohio system of aspects uses lunar-white markers above and below the signal unit to designate the speed. A system developed in France includes a vertical row of lamps on the distant signal; one yellow being the customary Approach aspect; two yellows to bring a train up to and through the interlocking at a certain speed, for example 30 m.p.h.; three yellows, 40 m.p.h.; four yellows, 50 m.p.h., etc. This scheme in part has been used to a limited extent on the Santa Fe.

When the various ranges of aspects in the Standard Code, as well as the other practices just discussed, were explained to an operating officer of a certain railroad, he replied to the effect that, "The various ranges of aspects shown in the Standard Code are all very well for use on railroads which have introduced these aspects from time to time over a period of years so that their enginemen know and understand them, but on our railroad we cannot introduce any considerable number of new aspects at this time and expect the engineers, especially the older men, to learn the new aspects, therefore, I want this problem solved without adding new aspects."

In a simple layout, as for example an end of double track leading to single track via a No. 20 turnout, with the red-over-green aspect, there can be only one possible route when approaching on certain tracks. As applying to such layouts, speed-limit signs along the tracks, and entries in the timetable, could be used to designate the speed reductions applying to the diverging moves via the turnout, this being a practice similar to that which applies to curves, bridges or other special locations.

The problem is more complicated on an engine district where there are several interlockings in which different routes starting from home signals may include turnouts, used by through trains, which are good for various ranges of speed such as 30, 40 and 55 m.p.h. Obviously, if the longer turnouts are to be used as intended, there must be some means to designate the speed to the enginemen. Perhaps a study of some of the history of signaling may bring forth thoughts of help.

In the early interlockings, the aspects of home signals were arranged to designate the routes, as for example in certain layouts the top arm governed from a single-track main line through a turnout to the left, the second arm governed the through route on straight track, and a third arm through a turnout to the right. In extensive terminal layouts with numerous tracks and turnouts, the practice of a blade for each possible route was not practicable, and, therefore, someone developed the idea of using only one blade, with also an indicator which designated the track to which the route was established. Thus in this route signaling system, with either separate blades or with indicators, an engineman was informed of where he was going and was held responsible for controlling the speed of his train as required by the turnouts, curves, or other local conditions on that route.

In our present-day speed-signaling system as generally applied, the top arm governs on the straight-away main track, and the second arm governs diverging moves via turnouts or crossovers. If a track layout includes more than one possible diverging route, good for the same speed, the second arm governs for any such line up. Thus the signal indicates the speed but not the route. The difficulty is that railroads now have high-speed main-line crossovers and turnouts that are designed for various ranges of speed, and they need a means for making one signal aspect designate different ranges of speed as applying to the turnouts or crossovers in any line-up starting from a given signal.

In the early-day route-signaling scheme, the indicator was used in layouts where there were too many routes to have a blade for each. In a corresponding manner, why not now use an indicator in the speed signaling system, in layouts where there are too many ranges of speed to provide an aspect for each? For example, for main-line diverging routes starting at a certain signal, the aspect would be displayed by the second arm according to present practice, with the addition of a lamp-type indicator on the mast to indicate the speed applying to each of the turnouts in that route. An indicator of the same type would be required on the corresponding distant signal to give approach information. Having carried the thought this far, perhaps an indicator on the distant signal would be sufficient, because it is at the distant signal that the engineman must be informed of the speed at which he is to approach the home signal and pass through the interlocking.

The single yellow should continue to be used as the Approach aspect on the distant signal when the home signal is at Stop or cleared for a diverging route over slow-speed turnouts. When the route is via high-speed turnouts good for any one of several speeds, such as 30, 40 or 50 m.p.h., and the block to the next automatic signal clear, the home signal would display the red-over-green and the distant signal would display yellow with an indicator to show the speed at which the train is to approach the home signal and pass through the diverging route in the home signal limits.

This proposal conforms to the stringent requirement laid down by the operating officer mentioned previously in this discussion, in that the enginemen of his railroad would not be required to learn any new aspects; they would merely need to read the figure on the indicator to be advised of speed.

New Book

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