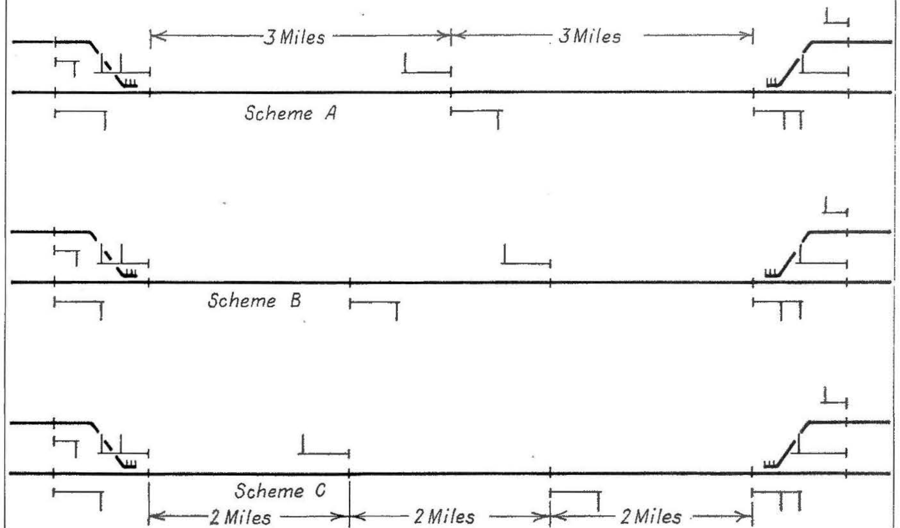
# What's the Answer?

## To Be Answered in a Later Issue

(1) *Under circumstances in which a decision has been made to use only two intermediate signals in each of the station-to-station blocks of a C.T.C. project, which of the schemes shown in the accompanying sketches do you prefer and why?*

*In giving your answer, assume that 6 passenger and 24 freight trains are operated in the proposed territory daily, with little fleeting. Assume level tangent track. The distance between the sidings shown in the sketches is typical of others in the same territory.*




(2) *What four or more different methods can be used for controlling an electric lock on a hand-throw main line switch in C.T.C. territory to comply with I.C.C. Rule 415 reading as follows:*

> "Hand-operated switch electrically locked in normal position shall be operative only after release has been given, after signals protecting such switch display the most restrictive indications the condition requires, and either after a predetermined time interval or, with approach locking, when approach section is unoccupied."

*Please explain the circumstances under which you would use each of the various forms of control.*

**If you can answer any of the questions write to the editor.**

## Track Circuit Numbers

*What scheme of numbering can be used for the track circuits in an automatic block so that, if one or more track circuits are added when installing protection at a highway crossing, the numbering will be consecutive throughout, and the numbers need not be changed on the previously existing track circuits?*

### The Mile Decimal System

By L. B. Yarbrough,
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In recent years, due to highway grade crossing signal programs, respacing of automatic block signals and other changes, it has been necessary to change the tagging on numerous track circuits, in order to maintain a consistent pattern of nomenclature and tagging, although some of the circuits were not actually involved in the changes. We have found it necessary to change the tagging in certain sections as often as two or three times in one year.

Such changes require considerable additional work in marking up the detail prints, making the field changes, and inspecting the changes. The retagging of circuits not actually involved introduces possibilities of failures and some hazards due to disconnecting of wires and the installation of new tags, all of which disturbs the original wiring.

The usual system is to number the track circuit from a signal governing over the track circuit, adding progressive alphabetical prefixes if more than one track circuit is included in the control of a signal. Also, in numerous cases it has been necessary to assign arbitrary numbers to track circuits which include no interlocked switch and which do not govern signals.

It is apparent then that one track circuit added in advance of a certain signal requires the alphabetical prefix to be changed on all track circuits ahead of the track circuit added. In some blocks, for example, you may have 12 track sections and would require the shifting of tags on the 11 track circuits to be included.

In looking for a permanent base from which to assign our track circuit numbers, it was decided to use the mile post location because it appears to be the one thing relatively fixed. This is a consistent policy, because the signals are numbered in relation to the mile post. All of our highway grade crossings carry a number in relation to the mile post, and mile post identification is used extensively in railroad engineering and operation.

In the usual system of numbering, as shown in Fig. 1, each track circuit is numbered with the number of the block signal governing train movements over that track circuit. Odd numbers are used on northbound and eastbound tracks for numbering signals and track circuits. Even numbers are used on westbound and southbound tracks. For example, in Fig. 1, the track circuit from signal 481 to signal 461 is numbered from 481, and that between signal 462 and 482 is numbered from 462. In the event that cut sections are added in the block,

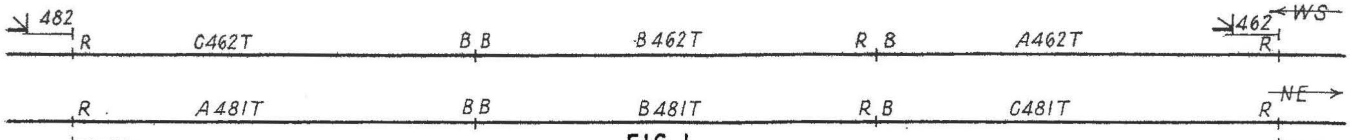


FIG. I

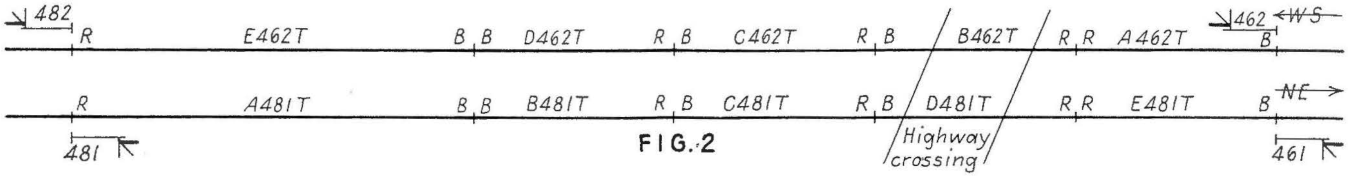


FIG. 2

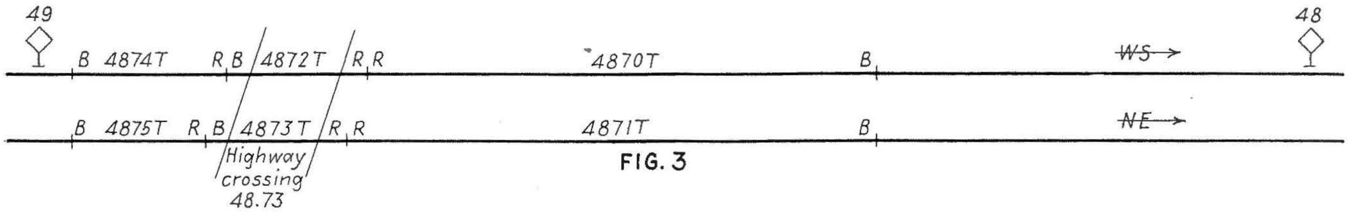


FIG. 3

in order to provide circuits for a highway crossing signal installation, it is necessary to change the tagging in the blocks, due to maintaining the sequence of alphabetical prefixes. This is illustrated in Fig. 2. If, for any reason, other track circuits are added in the future, again the tagging must be changed in order to keep the letters in the proper order.

### New System Used

Under the mile decimal system being tried out on the Wabash, the track circuits are numbered from the location of the track relay at the nearest hundredth of a mile, in accordance with the mile posts between which they may happen to fall. Such an example is shown in Fig. 3. Assume that a highway crossing signal location is to be installed at a distance of 0.73 mile from mile post 48 to mile post 49. The grade crossing identification is number 48.73.

The crossing signal installation makes use of the location number of 48.73. Similar to the usual system of numbering, track circuits on westbound and southbound tracks are given even numbers, while those on northbound and eastbound tracks are given odd numbers. However, on all tracks, regardless of traffic directions, the track circuit numbers only increase as the mileage increases. In Fig. 3, going from right to left, the first new track circuit on the northbound or eastbound track is numbered 4871T, designating that the relay end of this circuit is 0.71 mile from mile post 48 to mile post 49. The next new circuit, which is a short circuit over the crossing, is numbered 4873T, designating that the relay end of this circuit is 0.73 mile from mile post 48 to mile post 49. Since the relay end of the next track circuit is adjacent to that of 4873T, it is numbered 4875T, the next odd number above 4873T. Parallel circuits on the westbound or southbound track technically would have the same numbers as those on the northbound or eastbound track as far as distances are concerned. However, they are given even numbers, either one-hundredth below or above the odd numbers of the circuits on the northbound or eastbound track as a means of distinction.

### Example of Numbering

With the new track circuits numbered, assume that track circuit 4871T is to be cut again. This could be readily done and the new track circuit given an appropriate number between 4800 and 4871. The new number might be 4851T, 4855T, 4863T, etc., all depending upon how far the relay end of the track circuit is from mile post 48. Track circuit 4875T is about 0.75 mile from mile post 48 to mile post 49, the next odd number above 4873T, and the relay end of that track circuit is adjacent to that of 4873T. If additional track circuits are introduced between mile posts 49 and 50, they would all be 4900 values handled in a manner similar to those between mile posts 48 and 49.

Under this system it can be readily seen that once a track relay is located determining the track circuit number, it need never be changed. Also that in making changes, only those relays needing to be relocated need to be retagged. We feel this permanent identification is important in many respects with respect to maintenance of plans and records and tends toward a more efficient system.

## Location of Relay

By J. H. Craig
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Track circuits are usually numbered according to their corresponding signals, and the signals according to their mile post location.

An example: If two automatic block signals are located at mile post 334, pole 10, the signal numbers will be 3342 and 3343, because the signal takes the mile post location 334, and the last digits 2 and 3 are determined by figuring to the nearest tenth of a mile. Pole 10 will be one fourth, or 0.25 of a mile beyond mile post 334. Therefore the exact location, and the proper signal numbers for that pair of signals will be 3342 for the eastbound signal and 3343 for the westbound signal.

The track circuits will take the number of their corresponding signal. That is, the track circuit for the control of signal 3342 will be designated as 3342's track. Likewise, the track circuit for the control of signal 3343 will be known as 3343's track. For the sake of abbreviation, the 33 may be dropped, and the track circuits are known as 42 and 43 track.

Assume that there is a highway crossing at mile post 334 pole 35, and that it is in 43's track. The new mile post location figured in tenths of a mile will be 334.87. Therefore, where two track circuits are to be added, they will be designated as 3348 and 3349 track circuits. If several track circuits are to be added within 4 poles or the same one tenth of a mile, they will be designated as A, B, and C, and be read 48A, 48B track, etc.

However, in automatic block signaling, it is rather unusual to have

*(Continued on page 160)*

more than one short track circuit when installing highway crossing protection. That track circuit is usually through the highway crossing, and can easily be given a milepost number. If all track circuits are given the number of the mile post figured to the nearest one-tenth of a mile, the numbering is easily understood. The location of the relay, not the battery, will determine the mile post number to be used.

# Roller Bearings for Switches

*"Under what circumstances should roller bearings be provided under switches which are included in interlockings or centralized traffic control projects? What various types of roller bearings are available, and what special considerations should be given to each type in order to secure the results for which they were designed?"*

## Various Uses

By H. L. Bone,
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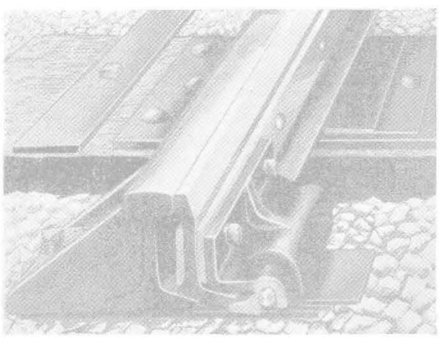
The purpose of applying roller bearings to switches is to reduce friction which might cause switch failures. Roller bearings have proved especially



Bearing attached to the point

valuable in connection with spring switches because of the limited closing force available, and also in locations where sand on riser plates may develop high friction during operation.

The Union Switch & Signal Company makes a roller bearing in which each switch rail is resiliently supported from its adjacent stock rail by a cantilever spring and roller arrangement which takes approximately 80 per cent of the dead weight of the switch rails and their connections. The riser plates carry the remainder of the dead weight and also the weight of passing trains, thus holding the points in alignment for traffic as in conventional layouts. This arrangement is bolted to the stock rail and switch rail in an accessible location above the tie level and does not interfere with existing switch fittings, tie tamping or freedom of action of switch points during operation. Since the support for the switch rail is carried entirely on the stock rail, tie tamping does not affect the functioning of the roller bearings.

On switches up to and including those 30 ft. long, the roller bearings should be located approximately 6 ft. from the switch point. On switches over 30 ft. long, two sets of roller bearings should be used, the first located approximately 6 ft. from the switch point, and the second approximately 20 ft. from the switch point. On spring switches equipped with facing-point locks, the roller bearings should be located near the mid-point of the switch adjacent to the plunger connection. When installing the roller bearings, the springs should be adjusted in accordance with manufacturer's instructions.

## Benefits Derived

By C. Henze,
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General Railway Signal Company
Chicago

Roller bearings should be installed on all spring switches, whether they are equipped or not equipped with facing-point locks, as experience has proved, from the number so far installed, that operation of such switches is greatly improved by the use of the roller bearing.

Where facing-point locks are used, especially in connection with very long points, roller bearings are of special value in insuring that after the switch has been trailed, the switch point will return fully to its stop, thereby permitting the switch to be locked.

Installation of roller bearings on low-voltage outlying switches and on switches in C.T.C. territory has proved very satisfactory in reducing the load on the machine, in some cases cutting down the time of operation, and in most cases reducing the battery consumption.

On high-voltage electrically operated switches, the roller bearings have proved to give very satisfactory operation on long switch points and heavy steel, precluding the use of a second connection at the middle of the point to position it correctly. On mechanically-operated switches, using heavy steel, the roller bearings have been of great help.

Special consideration should be given to the installation of roller bearings, following in all details the instructions given by the manufacturer in order to secure good results. The General Railway Signal Company manufacturers an arrangement of roller bearings for switches. A section of channel iron plate is used to replace one of the tie rods. This channel iron is 6½ in. wide, and, as installed, is inverted so that the edge sections 2 in. wide extend down at each edge. The roller bearing is mounted on a shaft with a supporting bearing on each of two track ties.

This bearing is located on a center line of the track and is adjusted so that both switch points are normally lifted free of friction with their respective slide plates. Thus, when the switch is operated, the weight as a whole is carried on the roller bearing rather than dragging across on the slide plates.

When a locomotive or car uses a switch, in either the normal or reverse position, the wheels use only one of the switch points, and due to the flexibility of the assembly of points and rods, the occupied switch point pivots downward on the roller bearing so that the switch point rests on the slide plates in the usual manner.

The roller bearing at the track center