What's the Answer?

If You Have a Question That You Would Like to Have Someone Answer, Or If You Can Answer Any of the Questions Shown Below, Please Write to the Editor

Four-Position Dwarfs?

"In terminal areas involving only dwarf signals, is four-position signaling justifiable as a general rule?"

Three-Position Signaling Amply Satisfies Requirements in Most Cases

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I would say that as a general rule four-position signaling is not justifiable in terminal areas involving dwarf signals. In considering what can be done with a three-position signal, as compared with a four-position signal, it must be recognized that the Proceed indication and the Stop indication of both signals are the same, and therefore the point to be decided upon is whether it is necessary to give more than one degree of approach information. Obviously there are two distinct bits of approach information to be given by the signal, that are of interest to the engineman. One relates to the condition he may expect to find at the next signal, and the other relates to the occupancy of the track before he gets to the next signal. An occupied track between him and the next signal means that he must put himself in condition to stop sooner than he would if he knew the next signal was to be a Stop signal but that the track was unoccupied to that signal.

It is necessary, therefore, with the three-aspect signal, to recognize the intermediate indication as a permissive signal whose indication is "Block occupied, proceed prepared to stop short if train ahead," rather than as the approach signal indication, "Prepare to stop at next signal, etc." Safe operation is secured by requiring the track to be unoccupied to the second signal in advance on the route set up, before a Proceed signal can be given. Theoretically, four-aspect signals, by separating the intermediate information, permit more speed. Practically, in most cases, the speeds of the train would be so nearly identical that it is not worth trying to differentiate between them.

Justifiable Only Under Special Conditions

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It is apparent that trains must move in terminal territories at slow speed in order that they may safely traverse various routes. If there were not various routes throughout this territory, high signals could doubtless be used. It is also apparent that the territory is such that the signals must have comparatively close spacing and also that the total length of any route must be comparatively short so that the time required for a train to move from one end to the other will be comparatively short. It is also assumed that the trains shall stop at or near the end of each route, and, further, that in this territory the crossovers and turnouts will not permit the operation of trains at a speed of more than 15 miles an hour. Since the train can be brought from such a speed to stop in 300 or 400 ft., it is my opinion that four-position signaling (or four-indication signaling) is not justifiable as a general rule, but will be needed only under

To Be Answered in an Early Issue

(1) Should dwarf signals in terminal layouts be semi-automatic, particularly with reference to the "H" aspect? If so, should the call-on feature be used with such signals?

(2) What kind of leak-proof compound do you use in pipe joints in air lines at an electro-pneumatic interlocking? Is red lead satisfactory?

(3) What is the best procedure in adjusting a track circuit which is fed by primary battery, so as to secure the longest possible battery life and yet operate the circuit satisfactorily?

(4) What is the most satisfactory type of bonding to use where joints are located in station platforms or street crossings?

(5) How often should ordinary braided aerial cable be painted and what kind of paint do you use?

(6) On branch lines where a maintainer does not cover the territory daily, is the operation of highway-crossing signals checked daily? Who makes the check and what record system is used?

very special conditions. There may be some advantage, occasionally, where the continued even acceleration of a train in leaving the station will save some time.

Required At Certain Locations

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The question as to the indications which should be given by dwarf signals is slightly misleading, as the term, "dwarf," has to do with the physical properties of the signal and not with its indications. The indications necessary for terminal areas are identical whether the signals are high signals or, for physical reasons, are low, dwarf, signals. The type of indication required has to do with the character and quantity of the traffic to be handled.

At practically all points where signals are used, two indications are necessary, the Stop indication and the indication requiring the enginemen to proceed prepared to stop short of cars on an occupied track. Where there are long trains, as for example, 8 to 18 car passenger trains, entering a station with considerable momentum, even though the speed may be low, it is desirable that a separate indication be provided to distinguish between an occupied and an unoccupied track. Three indications will take care of a great many terminal situations.

Where trains may pass through the terminal without stopping or where there are several signals which a train must pass in reaching the station, it is advisable that a fourth or proceed indication be provided in order that trains may have ample notice in case they are required to stop at a given signal. Such situations make four-position signaling desirable. All of the above conditions are based on a maximum authorized speed of 10 m.p.h.

Smoother Handling of Trains

H. S. Loomis
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The answer to the question as to whether or not four-indication signaling is justifiable in terminal areas using dwarf signals only, involves the consideration of other questions, such as: Is it desirable to differentiate between occupied and unoccupied sections between signals? Are trains to be moved at the maximum speed at which they can be operated safely when governed by the most complete signal system? Will the greater safety of movement and increase in average speed be commensurate with the additional cost of providing the fourth indication on dwarf signals? The answers to these questions will, in turn, automatically provide the answer to the original question. These questions resolve themselves into matters the importance and value of which must be appraised by the individual operating men of the railroad involved.

When referring to four-indication dwarf signals it is here understood that the four indications would be interpreted as Clear, Caution, Stop and Permissive (or Call-on). This combination of aspects should not be confused with the "Three Block, Four Indication" system of aspects as used in speed-signaled territory.

Barring the question of cost, there is no argument as to whether or not it is desirable to provide a signal indication which will differentiate between occupied and unoccupied sections between signals. By providing a fourth indication and differentiating between occupied and unoccupied sections, there is no queston but that a train can be moved at a higher average speed when running with the assurance of a minimum of two clear sections in advance, or even when being governed by an indication guaranteeing but one section in advance being clear, as compared with the speed at which it could safely operate when being governed by an indication that has to be interpreted as meaning that the train should run prepared to stop within range of vision and expecting to find the section occupied.

A three-indication system, wherein the clear indication assures two sections in advance being clear, is commonly used at terminals where dwarf signals are involved; when running under clear indications the trains operate under every advantage that is provided by a four-indication system, for the clear indication in both arrangements is interpreted the same. In the three-indication system, however, the caution indication cannot differentiate between an occupied and an unoccupied track section. The principal danger under that arrangement is in the fact that the engineman finds that in the great majority of instances the track section is unoccupied when he receives the Caution indication and this results in his being taken unawares when he finds the section occupied, and the necessity of an emergency application results. Emergency applications at terminal interlockings are dangerous inasmuch as passengers are by that time usually on their feet and in the aisles, and under an emergency application they may be thrown with resultant personal injuries.

There is no question but that a higher average speed can be maintained and that the engineman can operate his train with less liability of rough handling when operating under the four-indication system. The unexpected situation of finding a section occupied when expecting to find it unoccupied, is also eliminated with the four-indication system. These factors unquestionably make the four-indication system the more desirable. As to whether or not they afford sufficient advantage in operation and contribution to safety, to justify the additional expense, is indeterminate and resolves itself into a matter of evaluation on the part of the operating officials of each individual terminal.

Considers Four-Position Signaling Justifiable as a General Rule

W. M. Post
Assistant Chief Signal Engineer, Pennsylvania, Philadelphia, Pa.

In terminal areas it is very desirable to give an engineman all the advance information possible regarding conditions ahead, in order to permit him to operate his train smoothly. Most switches lead to many routes; if an engineman knows that the next signal indicates Stop, or that the track ahead is occupied, he can handle his train with fewer rough speed reductions and stops, and consequently with less discomfort to passengers. When trains are approaching terminals, this is especially important, because then the passengers are busy with baggage and wraps and are frequently standing in the aisle. Rough handling of the train under such conditions will be unpleasant, and might cause injuries. It is necessary to provide four-position signaling if these conditions are to be avoided.

Even when moving at slow speed in terminal areas, it is helpful to an engineman to know whether he can move by the next signal or must stop at the next signal, or whether he must stop before reaching the next sig-

nal. Three distinct indications in addition to the Stop indication are necessary to give this informaton. This, then, is four-position signaling, which I consider justifiable as a general rule.

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Lock Releasing

"What are the relative merits of the practice of using one clockwork time-release or one time-release lever for the release of the locking of an entire group of signal levers, as compared with the practice of using a separate release for each lever in the group?"

Levers are Grouped in Terminal Interlocking

L. E. Carpenter
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In first cost there is little difference, the one-time-release plan being slightly cheaper. The first installation in which we became interested used one time-release lever. We were somewhat opposed to it, as it was on a large terminal plant, and we felt that, if the release should be started for one route and it should be necessary to released a second route, the release must either be restored and started again, thus lengthening the time the first route was held; or, the second route must be held until the first route was released before the release could be started for the second. However, the delays that we feared might result have not been experienced.

However, in later installations, which are practically all in terminal territory, we have grouped the levers, using two or more releases for the entire plant, so as to reduce the number of delays that might result for the reason given. To date, this practice has been very satisfactory.

The advantages of the plan of using one release are: Less apparatus on or near the machine, resulting in neater appearance, as well as reducing the chances of error on the part of the leverman in manipulating the wrong release. Where a release for each lever was installed, one with a latch was used, and the signal controls were passed over the release contacts closed when the release was wound up. Delays and reported failures were not uncommon, due to the release having been manipulated to change a route and then being overlooked and not wound up again. A release without a latch is used where only one is applied; thus, the possibility of the delays mentioned is eliminated.

Group Release Is Less Expensive

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Chief Signal Draftsman, Illinois Central, Chicago

Regarding the relative merits of the use of one clockwork time-release or one time-release lever for the release of the locking of an entire group of signal levers, as compared with the use of a separate release for each lever in the group, I would say that the use of the group release is less expensive in first cost and in maintenance. Furthermore, the use of the group release results in an appreciable saving of time in the operation of the machine, and should, therefore, speed up the movement of trains, although at times it may unnecessarily delay the movement of some trains.

However, in some instances, individual releases, especially if they are automatic in operation, perform a very important function. I have in mind an electric interlocking which was recently installed at a very busy suburban train terminal. A description of this individual automatic releasing circuit, together with a description of a plug box and group clockwork time release circuit, is given under the caption "Time Release Selector," on pages 10 and 11 of *Railway Signaling* for January, 1932.

While the plug box and group clockwork release circuit, as described in the article mentioned above, is used for the release of switches, the same principle can be applied to the release of signals.

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Shortening Masts

"When replacing semaphore signals with color-light signals, what is the best method of shortening the masts; how is the mast cut off?"

Acetylene Torch Is Useful

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When replacing semaphore signals with color-light signals there are usually other problems besides shortening the masts. Where the bottom-post mechanisms have been used they must be removed from the case and the case must be revamped. Usually the ladders should be altered. The battery arrangement for the operation of the color-light signals is frequently changed. Considering these various angles to the matter, my recommendations are as follows:

For miscellaneous signals here and there send out from the store a case, pole and ladder of proper size, length, etc.; replace the semaphore signal and return it to the store or shop where it can be reconditioned and used for the next change. The old case provides a convenient shipping "crate" for the mechanism. At the shop the usable parts can be properly salvaged. The old paint can be removed from the pole and case; rusty and damaged spots or special openings which have been made in the case can be patched; the ladder can be worked over to the type required for color-light signals.

To change out an entire installation of semaphore signals, I would procure a few cases, poles and ladders properly fitted for color-light signals and use these to replace a rotating quantity of the old signals. I would then have these old signals taken to the outfit where the cases could be cleaned, patched and refitted for color-light signals; ladders and poles cut and refitted; then taken out to replace a second batch of old signals, etc.

An acetylene torch is the best for cutting off the poles at the shop or in the field. All signal, maintenance and construction outfits should be equipped with them.

An Efficient Procedure

C. H. Cameron
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It is an easy and simple job to convert any semaphore signal to a light type if the proper procedure is followed. The following method has been used with success: First, the light unit is fastened to the existing mast at the proper height above the rail head and then focused and alined. Single-unit searchlight signals are usually fastened at about 14 ft., measured to the center of the lens.

Next, drill the hole in the mast for the control wires