



What's the Answer?

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Railway Signaling

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.

Advantages of Modern Relays

"What are the advantages of modern relays that can be used as an argument for replacing older types of relays now in service?"

Track Relay Replacements Most Profitable

A. R. Whitehorn

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In modern relay design, several factors are stressed for the express purpose of obtaining certain characteristics, such as are listed as follows:

1. A more dependable relay
 - (a) More uniform release
 - (b) More uniform working current value
 - (c) More uniform contact pressure
 - (d) More uniform contact resistance
 - (e) More uniform current-carrying capacity
 - (f) More convenient readjusting
2. A more efficient relay
 - (a) Lower working-current values
 - (b) Maintain high release value
3. Proper insulation-resistance values between current-carrying parts.

With these improvements incorporated in the new relay designs, an analysis of the advantages or benefits to be gained by replacements may be made as follows: Those features enumerated under Item 1 are self-indicative of the benefit to be gained. Under Item 2, a more efficient relay, it is difficult to show sufficient economy to justify replacements where relays are operated from storage battery. Neither is there any great economy to be shown on line relays operating from primary battery, but with track relays operated from primary

To Be Answered in a Later Issue

- (1) *What improvements have been or can be made to reduce the phantom indication on flashing-light type highway crossing signals?*
- (2) *Considering the maintenance of track as well as signaling circuits, what is the proper location of a parkway cable bootleg outlet for track connections; i.e., should the bootleg be located between the ties near the rail, beyond the ends of the ties, or between the ties in the center of the track? Why?*
- (3) *Under what circumstances are non-stick power-operated signals advantageous at interlockings?*
- (4) *On an installation of flashing-light crossing signals with the lenses or roundels equipped to give a horizontal beam spread of 30 deg., how should each of the four separate lamps on a signal mast with back-to-back mounting, be directed? Please use sketch to explain.*
- (5) *Where circumstances warrant, what form of trap-circuit protection do you use at railroad crossings involving interlockings, automatic interlockings or in automatic signaling territory where no interlocking is in service?*

battery, based on the costs of battery renewals, there is little difficulty in showing a decided economy on the average track circuit, when old relays are replaced by the improved types.

When it is observed that the old type 4-ohm relay required 0.120 amp. working current, delivered to the relay, and the new design requires less than 0.070 amp. at the relay, utilizing a very inefficient transmission line (rails, bonding shunted by ballast and ties), little is left to the imagination to see the saving on energy requirements. Every railroad has some track circuits which are extremely low in ballast resistance and, as is usually the case, these are located in yards where they are on shunt during a large portion of the day. These are very expensive circuits as regards energy consumption, because the ballast leakage-current demand cuts down the amount of resistance that can be inserted between the battery and rails, which results in extremely high current drain when the track is occupied.

On certain track circuits in service today, ballast conditions are so poor that the difference in the energy de-

mands of the two relays in question would show a saving sufficient to pay for the cost of the modern relay in less than two years. Roughly, the energy demand is reduced to about 60 per cent by a replacement, and it is no laborious task to determine the savings effected on each maintainer's territory, based on reducing the battery consumption 40 per cent, since practically every maintainer has a very complete record of track battery replacements.

The improvement of shunting characteristics, resulting from the fact that greater resistance can be inserted with the modern relay, is another decided benefit with the lighter stream-lined equipment, which is gaining in popularity.

Many Advantages Cited

I. A. Uhr

Signal Engineer, St. Louis-San Francisco
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Many times the statement has been made that the relays are the heart of the signal system. If this is a fact, then, as advancement is made in relay
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design, a corresponding advancement is made in the art of signaling. An attest of this statement is readily supported by noting the changes in modern interlocking and signaling practices since the improved modern relays have been available.

Many noteworthy improvements have been made in the construction of relays. The materials in the old relays were made in the forms and shapes desired with no thought of preparing them to secure the best results. In modern relays all material is carefully treated. The treatment of the iron has greatly improved the magnetic qualities so that residual magnetism does not build up with the age of the relay and, as a consequence, the operating characteristics, such as the pick-up and drop-away, remain more nearly constant.

The treatment of materials used in the contact assembly has greatly improved the contact performance, and the design is now such that there is better compression of back contacts and greater slide or wiping action in front contacts. A new relay can re-

main in service at least twice as long as an older type, without being shopped.

Modern relays are moisture and dust proof and also more compactly assembled. When any changes are made in existing installations more relays can be placed in the old housing. The terminal post arrangement has been improved so that all posts are in front. They can, therefore, be readily inspected and circuits more readily traced through the relay.

In substituting a modern relay for one of the older type, the resistance of the coils of line relays can be about twice that of the older relay. When a change is made in track relays the pick-up and working characteristics of the modern relay are so near the same values that the current consumption can be greatly reduced. The savings which can be made are fully explained in the June, 1935, issue.

Finally, modern relays give long service at much lower consumption of energy. They are more dependable, efficient and economical and have more sensitivity to train shunts.



Facing-Point Locks on Switches

"On main-line high-speed automatic block-signal and train-control territories, is it necessary to install a mechanical facing-point lock separate from the switch stand on facing-point switches?"

Added Protection Desirable

W. M. Post

Assistant Chief Signal Engineer
Pennsylvania, Philadelphia, Pa.

The question assumes, I take it, that a facing-point lock is necessary on facing switches in main-line high-speed automatic block-signal and train-control territory. I believe this protection is very desirable, if not absolutely necessary, whether in or out of train-control territory.

In my opinion there should be a lock rod in addition to the operating rod so that the switch will be secured to the switch stand by two connections when set for the main track. It is not necessary, nor do I think desirable, to have a separate lever for operation of the facing-point lock. It is better done by a switch-throwing and locking mechanism.

I quote the specification for use of locking switch stands in effect on the Pennsylvania:

USE OF HAND-OPERATED MECHANISMS

1202. Locking switch-stands shall be used:

- (a) With circuit controller
 - (1) In automatic block and controlled manual-block territory.
 - (2) In manual-block territory, at switches protected by distant switch signals (track circuit or line controlled) or distant switch indicators.
- (b) Without circuit controllers:
 - In manual block territory only where local conditions warrant mechanical switch locking, and when approved by the general manager.

1203. Switch-stands, without the locking feature, shall be used for operating all switches except where the locking switch-stand is required or warranted, as outlined in paragraph 1202.

Especially Valuable at Grade Crossings

R. D. Moore

Signal Engineer, Southern Pacific
San Francisco, Cal.

On the Southern Pacific we have been somewhat concerned about switches located in close proximity with highway crossings, owing to the possibility of a train striking an automobile and the automobile in turn striking the switch stand and opening the points. To provide some measure of protection against this hazard, we

have, in a number of cases, equipped such switches with a switch-point lock.

As there are possibilities of very serious derailments occurring under the circumstances cited above, I believe that these locks are well worth installing, particularly on switches located close to road crossings. Grade crossing accidents are numerous, and one can readily visualize what might happen if an automobile were thrown against a switch stand.

Plating and Bracing Important

P. M. Gault

Signal Engineer, Missouri Pacific
St. Louis, Mo.

In my opinion the addition of a facing-point lock to a hand-throw switch does not result in enough increased protection to warrant the additional expense. In our automatic-signal territory we endeavor to keep our switch circuit controllers adjusted so that, with the switch point open $\frac{1}{4}$ in. and with the stock rail against the braces, the governing signal will be in the stop position. In order to maintain an adjustment of this kind, it is essential that gage plates, gage rods and braces all be tight and free from lost motion.

In my opinion any money which is available for the improvement of switches should be spent along the lines of additional plating and bracing, and not for facing-point locks or other "gadgets" which may be of doubtful value, when it comes to the question of making the track 100 per cent safe for high-speed trains.

Not Economically Justifiable

W. J. Eck

Assistant to Vice-President, Southern
Washington, D.C.

The installation of facing-point locks would not be economically justified when we consider the very few accidents which have occurred in the past at facing-point switches, resulting from the lack of a lock, as compared with the total number of trains operated over such switches daily.

Throw Rod Should Be One Piece

F. B. Wiegand

Signal Engineer, New York Central
Cleveland, Ohio

I assume from the conditions outlined in the question that the separate lock is intended to insure that the switch points are in the proper position. On this basis my experience
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