through the plate. I have had some very unusual experiences with broken rails, one occurring this past winter when I was called out and found there were 12 broken rails on my territory and that in every case, after a train had gone over them, the rails had closed up at the breaks, clearing the signals. The natural tendency in cold weather is for the rails to pull apart at the break, but on this particular night, with the temperature at 20 below zero, the unusual occurred. The signals in this territory had to be set until the broken rail were found and changed, the dispatcher being notified to put out a slow order, because snow was piled up over the tracks and with the signals clearing in spite of the breaks it was almost impossible to know just where all the breaks would be found until all the track had been inspected. The test given previously to compare broken rail protection afforded by two relays in similar track circuits is really all that can be done.

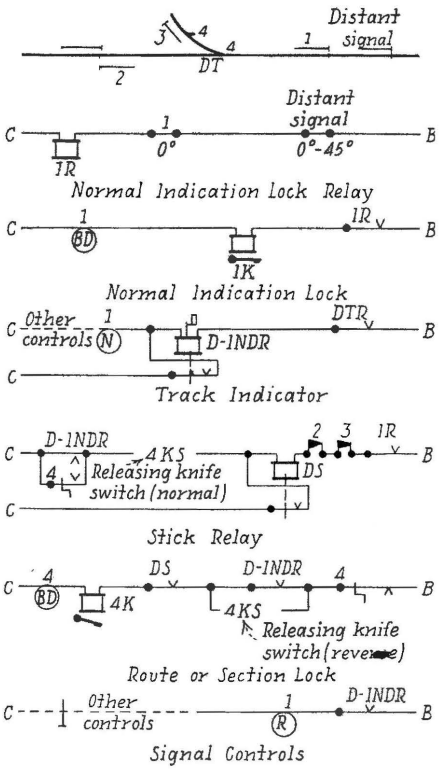
Special Locking Release

"At interlockings where levermen have been replaced by operators, who are now required to hand up train orders to train crews, what changes, if any, have been made in the controls so that the operator will not have to operate the time release if he does not return to the machine in time to place the home signal lever normal while the train is passing?"

Track Indicator Picks Up Stick Relay

H. W. CHEVALIER
Chief Draftsman, C. M. St. P. & P., Milwaukee, Wis.

The Milwaukee has used, at several locations, an automatic pick-up of the route stick relay by the passage of a train to prepare circuits for the release of the route and section locking. Actual release of the mechanical locking is not provided until the signal lever has been restored to normal. The accompanying sketch illustrates the general design of the various interlocking circuits with regard to this feature only; the complete circuits, involving all features of interlocking protection, of course, would be much more complicated.



Track layout and electric locking circuits

Assuming the interlocking to be unoccupied, the clearing of signal 1 initiates the following action: 1R is de-energized, the controls of 1K are broken, D-INDR remains stuck up, DS is de-energized, and the controls of 4K are broken at DS. If the operator desires to take the signal away before the train has traversed the route and throws the signal lever to the normal indicating point, the following action occurs: The signal controls are broken at the signal lever band, the home signal goes to stop and the approach signal to approach, 1R picks up, 1K picks up, D-INDR remains energized, DS remains de-energized, and 4K remains de-energized; in order to pick up 4K to release the switch, relay DS must be picked up by operation of the time-release, and the time-release restored to normal. The time-release is not equipped with a latch and stands normally run down.

Assuming that the operator has displayed a proceed signal and is on the ground to deliver train orders, automatic preparation for the release of the plant when the operator returns and restores the signal lever, after the train has cleared the plant, is provided in the following manner: Passage of the train drops DTR, D-INDR drops, the signals go to their normal position, 1R picks up, and DS picks up automatically over a back contact on D-INDR and a front contact on 1R; when the operator returns and places the signal lever towards the normal position, 1K picks up with lever between "B" and "D" positions; when the operator completes the motion of the lever to normal, D-INDR picks up, DS remains stuck up, the controls for 4K are closed by D-INDR, and 4K is energized, releasing the switch lever.

4KS is a double-pole double-throw releasing knife switch located in a metal smash box with a glass front cover secured with a seal. This knife switch is to be used only when there is a track circuit failure within the interlocking limits or failure of D-INDR to function. When this occurs, all signal levers controlling signals governing over the route must be placed normal, the seal of the smash box broken, and the knife switch reversed. This will bridge the break in the 4K circuit at D-INDR and will release 4K, provided clockwork time release 4 is normal, in run down position. To assure the restoration of 4KS to normal after the plant is in normal condition, the circuit for the pick-up of DS is carried through a normal blade of 4KS. When DS is again de-energized, it will not pick up automatically upon the passage of a train. This should call the leverman's attention to the oversight and cause him to place 4KS normal.

Uses Normally Open Stick Relay

H. E. BRASHARES
Assistant Superintendent of Signals, Great Northern, St. Paul, Minn.

The approach and route locking circuit in general use at our interlocking plants utilizes an open circuit stick relay for the approach, picked up through a half-reverse contact on the home signal lever lock in series with a back point of a stick indicator, repeating the track circuit through the home signal zone of the plant, which also, through its front contact, provides the route locking. The stick indicator, of course, controls the home signal circuits to prevent clearing behind trains and its pick-up circuit is also cut through a half-reverse contact on the home signal lever.

The only change required in this circuit, to take care of the condition mentioned in the question, is to extend the pick-up contact for the open-circuit stick relay so that it makes through the half and full reverse positions of the home signal lever.

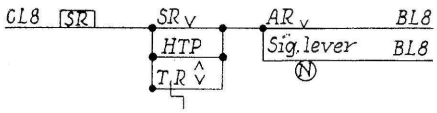
(Continued on page 48)

This arrangement permits the open-circuit stick relay to pick up after a train passes the home signal with the lever in the full reverse position, while the stick indicator does not pick up until the towerman places the lever in the half reverse position. This unlocks the lock and permits the lever to return full normal.

Stick Relay Provided

R. EBERSPACHER
Office Engineer, Southern Pacific,
Houston, Tex.

Our practice for many years has been to use a normally picked up stick relay that is dropped out by reversing the home signal lever with the approach circuit occupied. The stick relay is restored, on a through move-



Stick relay control circuit

ment, by the train running through the home circuit, as the approach relay picks up while the home circuit relay is still down. It is only necessary to operate the time release when the signal has been cleared for a movement through the plant and the movement is not completed.

Cable Support on Bridges

"Where cables are to be run on railroad bridges or viaducts, what method of construction do you use to support and protect the cables?"

Varying Practice

F. W. FURNAS
Signal Inspector, Elgin, Joliet & Eastern
Joliet, Ill.

We use several methods for supporting and protecting cables, varying according to the construction of the viaduct or bridge, and as to whether it is over a navigable stream, a railway, or a highway. Over highways or non-navigable streams, we attach brackets to the bridge girders and suspend a messenger cable with rings or insulated cabling straps for supporting the cable. As often as required, the cable is treated with cable paint. Over railroads, the construction is the same as for highways or non-navigable streams, except that metal baffles are used for protecting the cable and messenger where the locomotive exhaust strikes.

A few years ago we installed a vertical lift bridge with a distance of 220 ft. between towers. Brackets were attached to the top and side of each tower and the signal and telephone and telegraph cables were carried between brackets on ½-in. messenger, with long and short cabling rings. The brackets were extended far enough from the towers to prevent the cables from swinging into the bridge when it was in the raised position.

Switch Foot and Connecting Rod Arrangements

"In your opinion, what design of switch foot and connecting rod arrangement for a switch circuit controller is the most effective in checking improper position of the switch point 'due to obstructions'?"

Connection Ahead of the Point

H. C. DUNN
Huntington, W. Va.

My opinion is that the best switch foot and connecting rod is a switch foot that fastens to the switch point in such a way that the connecting rod is held to the center line (top of head to base) of the switch point and at least 6 in. ahead of the point, this rod to be anchored in a bearing form so that all movements of the rod are actuated from this center. Some rods are bolted solid to the switch foot extending down under the base of the switch point approximately 4½ in. from the center line. This is not so good, because any switch point that does not have a very heavy front rod to stiffen it will twist when obstructed, no matter where the obstruction is placed, whether at the head, at the center of the web or at the base. This twist is due to the fact that the switch operating rod is connected below the center of the switch point and tries to make a full stroke even though obstructed, the result being a very small twist in the switch point which in turn causes the circuit controller rod to move only ⅛ in. when it should move ¼ in. My reason for a long reach (6 in.) ahead of the switch point on the switch foot is that an obstruction in a switch is nearly always placed 6 in. from the end of the switch point, while the switch operating connection is approximately 13 in. from the end of the point. When you make circuit controller adjustments, you actually have a ⅜-in. adjustment when the switch is obstructed ¼ in.

Another suggestion is to use a front rod connection doing away with the point lug or foot. However, this front rod scheme of connecting the controller is not as good as my first suggestion, especially on power switches. I have had switches that would not move the circuit controller rod ⅛ in. when obstructed ¼ in. What we need, in my personal opinion, is a connection that will follow a broader adjustment in the controller when repeating a small obstruction in the switch.

Prefers Self-Adjusting Type

MAURICE PEACOCK, JR.
Philadelphia, Pa.

In my opinion the design of switch foot and connecting rod arrangement for a switch circuit controller which consists of a connecting rod and two self-adjusting sockets is the most effective in checking improper position of a switch due to obstructions. Since the sockets have a spring arrangement, they maintain their own adjustment, thereby taking up all the lost motion. Of course, there is a particular design of socket for both ends of the connecting rod, according to what the conditions are. Now, if there was a switch obstruction and this design was used, there would be no lost motion and, of course, the circuit controller would operate properly.