

outlying switch, thereby permitting the same arrangement as at a passing track switch. If no signal or track cut is located near a switch, an extra insulated rail joint is required to secure the shunt and break protection. However, locations requiring the extra joint are comparatively rare, in territory outside of yards.

We feel this practice not only gives the desired protection, but results in considerable battery savings over a large territory by having the shunt on the relay and not on the battery.

Shunt Is Enough

R. D. MOORE

Signal Engineer, Southern Pacific,
San Francisco, Calif.

Our standard practice in automatic signal territory is to shunt the track only, with switch circuit controllers.

While a switch circuit controller that breaks the line circuits, in addition to shunting the track, appears to afford a greater degree of protection than one that shunts the track only, the benefit, in my opinion, is insufficient to justify the expense and complications involved. In addition to increasing the expense of installation required to bring the line circuits to the controllers, the maintenance expense is increased. There is also the danger of open or grounded circuits, due to running underground to the controllers.

Where the controllers merely shunt the track, the installation becomes a very simple matter, and by proper construction and maintenance this method is quite reliable. While the "shunt" box is on the open circuit principle, we have adopted certain practices that assist in guarding against open circuit failures. For shunt controllers, we use the vertical rotary type, and the contact springs are adjusted to automatically close should the spring board cap become broken or loose. That is, the top contact springs are bent downward and are held open against spring tension so that they follow the spring board downward without assistance.

We normally use two sets of contacts in each controller, and in wiring them, the two sets are kept separate and not connected in multiple. A separate wire runs from each top contact to one rail and one wire from each bottom contact to the opposite rail. With this method of wiring, the maintainer is able to press the sets of contacts together separately and determine if all wires leading to the rails are intact. This test is made with a voltmeter connected across the

track, and if pressing the contacts together does not shunt the circuit completely, it indicates either an open circuit or high resistance.

To guard against resistance, due to corrosion or loose connections, the binding post and contact spring are soldered together after assembly. This insures a solid connection.

Separate Track Circuit

B. J. SCHWENDT

Assistant Signal Engineer, New York
Central, Cleveland, Ohio

It is our practice where bolt locking is not in use, to provide a separate track circuit at the turnout or cross-over. The line control wires are broken through the relay operated by this track circuit. The switch circuit controller, in addition, shunts the main and special track circuits.

Where bolt locking is in use, we eliminate the special track circuit and provide a WR circuit and break the line controls through the WR relay. In addition, the main track is shunted by the switch circuit controller.

The reason for this is to improve signal performance as the result of the elimination of grounds, which commonly occurred in the old arrangement where we attempted to

break the line control circuits through the switch circuit controller direct.

In some odd cases we eliminate the special track circuit and depend entirely upon the switch circuit controller shunting the main track circuit.

Shunt Protection Considered Adequate

L. S. WERTHMULLER

Assistant Engineer, Missouri Pacific
St. Louis, Mo.

It is the practice on the Missouri Pacific to use shunt protection for facing-, as well as trailing-point switches except where it is necessary to select different routes through the switch, in which case normal and reverse switch-repeating relays are used. While I understand quite a few of the railroads carry their signal circuits through the switch circuit control contacts, and others do this as well as shunting the track circuit, our experience on the Missouri Pacific has been that we have very dependable operation by using the four contacts in multiple for shunting the track circuit. We use two independent No. 6 wires to each rail and we have never found where more protection would be afforded by breaking the signal control circuits through the contacts.

A. P. B. Circuits

"Do you design your A. P. B. circuits so that, if a train going from station 'A' to station 'B' should desire to back up to station 'A' for some cause, in place of going to station 'B' after it had passed the first pair of double signals, with another train about to leave station 'A', it would be impossible for these two trains, now traveling in opposite directions, to pass signals at 45 degrees entering the same block at identically the same moment?"

Flag Protection Provided

G. C. SCHINDLER

Assistant Engineer, Chicago & North
Western, Chicago

The design of A.P.B. circuits which we use would permit a train which left station "A" and had passed the first pair of double signals, to reverse its movements to return to station "A", to pass the signal at 45 degrees at the same instant that a second train leaving station "A" passes the leaving signal at 45 degrees. However, under our rules and operating practices, a train leaving station "A" to proceed to station "B" establishes a definite direction, and if then the train desires to reverse its movement, which would be contrary to the established direction, the reverse movement

could be made only under full flag protection against any possible train from station "A."

Covered by Operating Rules

A. HUNOT

Chief Draftsman, Missouri Pacific,
St. Louis, Mo.

More than 99 per cent of the train movements between station A and station B will be through movements.

As operating rules on our railroad provide the same restriction for movement of trains after passing a signal displaying a caution indication as for movement of trains after passing a stop and proceed indication, we have made no circuit changes to prevent the two caution indications described.