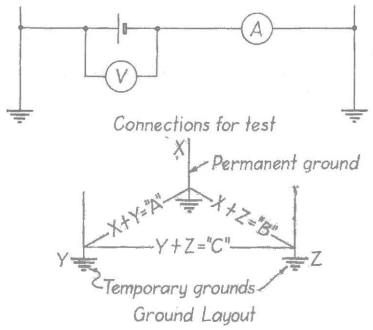
one auxiliary ground rod is driven 25 ft. away and the other 50 ft. away, all three in the same line. We find that this method of testing is very simple and much more accurate than the volt-ammeter method. It is also a great deal faster.

Three-Point Method Convenient

G. A. Washburn

General Signal Inspector, Chesapeake & Ohio, Richmond, Va.

A convenient method of measuring the resistance of a ground with ordinary instruments is as follows: Designating the resistance of the permanent ground X, establish two temporary grounds, Y and Z. Connect the battery, an ammeter and a voltmeter, as shown in the diagram, successively between X and Y, X and Z, and Y



and Z, recording the readings of volts and amperes, taken simultaneously in each case. Using Ohm's law R=E/I, compute the resistance from each pair of readings, which will be the sum of the separate resistances of the two grounds involved. Designating the resistances X plus Y, "A"; X plus Z, "B"; and Y plus Z, "C," the separate resistance of the permanent ground X is then computed, using the formula, X equals ½ (A plus B minus C).

With the voltmeter connected as shown, the results obtained for A, B and C include the resistance of the ammeter and the wire leads, but this usually can be neglected. If the resistance X of the permanent ground is found to be low and more accurate results are desired, the resistances of the meter and leads may be determined and deducted from the values A, B and C. It is important that the voltmeter and ammeter readings be taken simultaneously, for accurate results. The distance between grounds should not be less than 6 ft., and the test will be more accurate if the temporary grounds have approximately the same (or lower) resistance as the permanent ground. We have found this method to be very good where a ground-ohmmeter is not available.

False Operation of Crossing Signals

"What is the best circuit arrangement to use in order to prevent false operation of a crossing signal for a train pulling out of a passing siding switch located in the ringing section receding from the crossing, or for switching moves?"

For Siding and House Track

E. J. Schaefer

Atlantic Coast Line, Wilmington, N.C.

The accompanying circuit diagrams show two situations and two different methods of crossing signal control, which are designed to eliminate false operation. Figure 1 illustrates a passing track which ends in the receding control section. The reversal of the switch energizes relay WSR, which is held up by relay 1TR after the switch is returned to normal. A train leaving the siding cannot operate the crossing signal owing to relay WSR, through which 2TR is temporarily energized. Of course, this circuit applies to direct track-circuit control of the signals at the crossing. Reversing the procedure, a train approaching the crossing will flash the signals until the switch is reversed, after which they will not

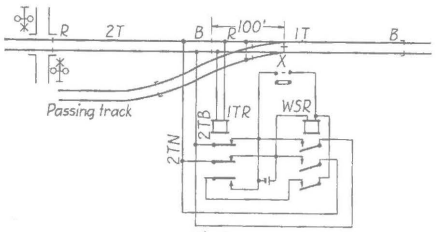


Fig. 1

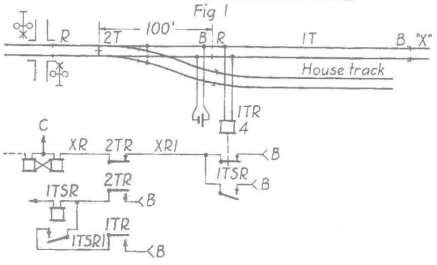


Fig. 2

operate while the train is pulling in the clear.

Figure 2 shows a house-track switch in the approach section. Assuming that a train normally cuts off at "X" for the usual switching and that one move is to be made into the house track, the signals will operate upon the approach of the engine, in the usual manner, and continue to flash until the engine is in the clear on the house track. However, on its return, the signals will operate only so long as the engine occupies section 2T. After the engine backs up and clears section 2T, relay 1TR holds up 1TSR through the latter's own front contact, which prevents the signals from operating during the receding movement on account of relay 1TSR cutting around 1TR on the control of the interlocking relay.

*For more discussion on this subject see page 98 of February issue.

▼ ▼ ▼

Signaling at Spring Switches

"In your opinion should some special signal or color-light arrangement, the equivalent of a high switch stand, controlled only by the position of the switch, independently of the automatic block signals, be used at spring switches? What are the advantages of such an arrangement as compared with using ordinary automatic signal protection with or without a switch target?"

Special Signal Advantageous and Justifiable

H. E. Brashares

Assistant Superintendent of Signals, Great Northern, St. Paul, Minn.

In the use of a spring switch, it is of necessity required that the presence of such be easily recognized by trainmen in order to obtain all the benefits possible and to protect against accidents. They must know when their train may trail through it; that it is not advisable to back up after trailing part of their train through it; and whether a speed restriction applies. For these reasons a spring switch must be plainly marked night and day.

When an automatically-operated facing-point lock is used, it is further required to indicate that such lock is in proper operating condition to unlock for a "trailing-through" movement and that the switch is properly locked for a facing-point movement. Both of these are highly important conditions. One may wreck the switch while the other may wreck the train.

With these things in mind it seems to me that a special signal is advantageous and justifiable. It must, in addition to giving the information required, be impossible of confusion with automatic signals.

An arrangement which has proved very satisfactory includes a two-color light signal in a trailing direction at a point to the right of the track and just

opposite the heel of the switch point, so that it governs train movements on the main line as well as those out of the siding, and does not interfere with the handling of the switch stand. If the switch is in automatic-signal territory and an existing signal is in a good location to afford proper facing-point protection for the switch, no further signal is provided for facing-point movements. If not in automatic-signal territory a second two-color light-type signal is installed at the right of the track at a point 10 to 20 ft. in approach to the switch.

The two colors used in these signals are "lunar white," indicating "a spring switch in normal operating condition" and "red" for "stop." The switch has the same automatic-signal protection as any other switch in automatic-signal territory, and the special signals or switch lights are controlled merely through the circuit controllers checking the locking mechanism and the point detector.

The advantages of such an arrangement* are that the spring switch is plainly designated, there is no chance for confusion with other signals, and when the switch signal shows "red" it is a direct result of a condition in the switch and nothing else. The chief advantage of this last point is, that the possibility of a "red" switch signal is reduced to a minimum by confining its control specifically to the switch itself rather than by making it subject to the many things which may cause an automatic signal to display "red."

This does not require a special definition as to the "red" indication of this special switch signal, as it is the same as any other "red," requiring examination of switches, and if any question arises as to its meaning, no dangerous condition can result.

*Editor's Note—See article on page 547 of RAILWAY SIGNALING for November, 1934.

Target and Marker are Necessary

J. H. Oppelt

Signal Engineer, Nickel Plate, Cleveland, Ohio

The development of the spring switch to its present state of ruggedness and efficiency has made it a valuable device for the use of first class railroads. The application of the facing-point lock has made it safe. The writer, for a number of years, advocated the use of a facing-point lock with these switches and hesitated to recommend their installation without the lock. It was not until after we had successfully developed and installed a motor-driven lock that the less costly mechanically-operated lock was introduced.

Now that the switch has been locked, proper signaling should be applied to inform the enginemen whether or not he can safely operate over it. There seems to be no good reason why standard signaling can not be applied in a manner similar to that used at any interlocked or remote-control switch. Even though the switch is completely signaled, the use of a switch target is advisable as it provides an indication for the use of trainmen when necessary to hand-operate the switch. The switch target, together with a standard marker to indicate the fact that the switch is spring-operated, makes unnecessary the use of any other special signal.

The facing-point movement is, of course, the more important insofar as operating over the switch is concerned. For the trailing movement, signal indication is also necessary to indicate the position of the lock or, more properly, the adjustment of the lock. If the lock should not be in proper adjustment, damage might occur when making a trailing movement through the switch. The trailing movement is usually restricted to the speed permitted through the turnout. Nevertheless, if it is a main-track movement, as at an end of double track, the standard high signal should be provided. If it is a movement from a siding, a dwarf signal should be used.

Rely Upon Automatic Signals

T. H. Kearton

Superintendent of Signals, Chicago Great Western, Chicago

For the protection of spring switches, we use the automatic signals with no other special signal or color-light arrangement.

For the ordinary spring switch, we use a target switch stand, but with the S-1 facing-point-lock arrangement, we do not use a target stand.

These arrangements have been satisfactory and I see no occasion or advantage for using any special signal arrangement independent of the automatic block signals.

Letter "S" Designates Spring Switch

C. A. Taylor

Superintendent of Telegraph & Signals, Chesapeake & Ohio, Richmond, Va.

I cannot see any advantage to be gained by providing a special signal or color-light arrangement, equivalent to a high switch stand, at a spring switch located in automatic block signal territory, especially where the automatic block signal governing facing point movements over the switch is located in close proximity to it.

We have quite a number of spring switches located in automatic block signal territory, and it has never been our practice to provide any special signal which would be controlled by the switch points only, as we feel that adequate protection is provided by the automatic block signal which, when displaying an indication for a train to proceed, insures that the switch point is facing up properly, as well as denoting the condition of the block in advance. The only special marking that we place at such switches is the application of the letter "S" to the switch stand or placed on a tie adjacent to the stand, so located as to be in view of the enginemen when approaching the switch from either the facing or the trailing direction. This marking is applied to inform the enginemen and the train crew that they are passing over a spring switch.

Individual Signal is Desirable

W. H. Stilwell

Signal Engineer, Louisville & Nashville, Louisville, Ky.

In my opinion, the daylight type color-light switch target, or its equivalent, controlled by the position of the switch, independent of the automatic signals, is desirable for use on spring switches. It is particularly desirable if the home signal governs over two or more spring switches, or if for any reason the home signal is not located at the switch.

We recognize that the home signal protects movements over the spring switch the same as over other switches. However, there is reasonable assurance that a hand-thrown switch is properly closed or properly set for the siding and the ordinary switch target will readily indicate its position to a slowly-moving train. The spring switch is not inspected after each operation, and there is no assurance that the last train through did not foul it with something that would hold the point open a half inch or more. The standard switch target will not indicate this condition, but the daylight color-light target will.

An engineman, even when running at restricted speed, can not inspect switch points from his cab. It, therefore, follows if a train is stopped by a signal which governs over a spring switch and which displays a "stop, then proceed" indication, and no special target is used on the switch, the switch must be inspected on the ground before movement over it can be made with complete safety.