of the time interval the line-up changed back to the main line and the signals cleared. The first operation in this test was made with the locomotive passing over the receiver at 30 m.p.h. As standard train-control equipment was being used, the speed would have made no difference, as it could have been operated at 70 m.p.h. just as easily as at 30.

As to the practicability of such a system, there is little question. It could be installed at passing-track switches where difficulty of starting, after making a stop to open the switch, often holds a train back at least one station, if on short time. The crew will not take the chance of stalling and delaying perhaps a fast passenger train because of doubt as to getting into the clear after a stop to handle the switch.

The system could be used at junctions of branch lines with main lines where an interlocking could be operated entirely automatically for main line movements and for movements from branch line to main line, and with the push-button in cab control for movements from main line to branch line. It would give all the advantages of interlocked passing-siding switches and junction switches with standard equipment. The locomotive equipment would be very simple and low in cost. In my opinion this manner of operation on railroads deserves more consideration than it has apparently received up to the present time.

System Available

S. M. Day
Principal Assistant Engineer, General Railway Signal Company, Rochester, N. Y.

We know of no trial installation of a system of cab control that enables the engineman to operate a junction switch from his seat as the train approaches the switch. However, a practical system is available, and we will be glad to have anyone contemplating the installation of such an arrangement get in touch with us.

Other Methods Preferred

Leroy Wyant
Signal Engineer, Chicago, Rock Island & Pacific, Chicago, Ill.

I have seen plans of such a system of cab control for switches and understand that some tests have been made of an actual trial installation. There is no doubt in my mind but that it can be made to work entirely satisfactorily. However, I do not consider there is much need for its general application at present. The amount of money that would be required to install it on a sufficient number of locomotives to be of any economic value could be used to much greater advantage in applying spring switches and operation of switches from a remote point. As a matter of fact, an ordinary inexpensive spring switch will eliminate at least 75 per cent of the time lost at the average passing track switch.

It would be quite interesting, to those not familiar with railroad operation, to observe with what clock-like precision an engineman can pull up to and enter a siding switch, many times without bringing the train to a complete stop. However, in leaving a siding there is considerable delay, especially with long freight trains, due to an engineman having to estimate the position of his caboose with respect to the switch. Frequently the caboose is a quarter of a mile away from the switch before an engineman is satisfied that he can increase his speed. The spring switch eliminates this delay.

This brings up the general question of the need for a more extensive application of centralized traffic control as one important means of solving the "railroad problem." I have recommended from the beginning, and actively sponsored the application of C.T.C. without power operation of ordinary passing track switches on the basic logic described above, that spring switches will eliminate the most annoying delays at passing tracks, and for a given sum of money so many more miles of C.T.C. can be installed if the power switches are omitted, that the most benefit to a railroad would be gained so doing.

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Call-On Signals

"What is your practice as to the use of call-on signals at interlockings? Does the call-on unit on a home signal mast give an engineman authority to proceed beyond interlocking limits, or is such authority given by a track-circuit-controlled automatic signal located at the leaving end of the interlocking limits?"

Automatic Signal at Leaving End of Interlocking Limits

W. J. Eck
Assistant to Vice-President, Southern, Washington, D. C.

The indication given by the call-on signal on the Southern Railway is "Proceed at Slow Speed Prepared to Stop" and gives the engineman authority to proceed to the next signal whether located just beyond the interlocking limits or some distance away. To facilitate traffic, it is desirable to have a track-circuit-controlled automatic signal located at or near the leaving end of the interlocking limits and such a signal is provided at many of our plants.

Practice on the Pennsylvania

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

On the Pennsylvania the basic principle observed when it is desired to close a train in on an occupied track with traffic, in an interlocking, is that the train must first be stopped.

Where position-light signals are used, a "Stop and Proceed" signal can be displayed by reversing the signal lever, then pushing a button which will light the marker light on the home signal under the horizontal row of lights, giving the same aspect as displayed by an automatic signal when the block is occupied. This marker light can be displayed only when the route is set with the traffic. The indication given is "Stop then Proceed in accordance with Rule 509 or 660." Rule 660 reads as follows:

660. (Double, three or more tracks.) In automatic block system territory, when a train is stopped by a "Stop-and-Proceed" signal that governs its movement into or within an interlocking, it may proceed at once not exceeding 15 m. p. h. to the next signal expecting to find a train ahead, broken rail, obstruction, or switch not properly set.

If there is no signal at the leaving end of the interlocking and the track circuit beyond the interlocking, in the normal direction of traffic, is occupied, the "Stop and Proceed" signal is displayed when the signal lever is reversed without pushing the button.

Where semaphore signals are used at interlockings in automatic signal territory a "Caution Slow Speed" signal can be displayed when the track is occupied in the normal direction of traffic by reversing the lever and pushing a button observing Rule 507 which reads as follows:

507. Signalmen must not admit a train to an occupied track between the home signal and the next signal in advance without first stopping the train.

If there is no signal at the leaving end of the interlocking, and the track circuit beyond the interlocking in the normal direction of traffic is occupied, the "Caution Slow Speed" signal can be displayed by reversing the signal lever and pushing the button.

In manual and controlled manual block territory the following Rule applies:

Where there is a home signal located in the rear of a block signal, and both signals are controlled by the same block station, the signalman must not admit a train to the route between these signals while it is occupied, without first stopping the train, and then only by signal aspect indicating "Proceed at not exceeding 15 m. p. h. with caution, prepared to stop short of train or obstruction" or by train order.

Editor's Note: For a description of the practice on other roads, with reference to call-on signals, see editorial on page 306 of the November issue.

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Preventing Frost Trouble

"What trouble has been caused by frost on contacts and commutators of signal equipment on your road? How has this trouble been overcome?"

Felt Covers Used on Signals

D. M. Noell
Signal Supervisor, Canadian Pacific, Toronto, Ont., Canada

On the Canadian Pacific, we have had signal failures due to frost forming on motor commutators and on wig-wag operating contacts. After experimenting with various remedies for the prevention of frost, the following methods proved to be very successful.

The 2A signal mechanisms are cleaned thoroughly before frost comes, and the wire entrances are sealed as nearly air-tight as possible. A tray of pure glycerin is placed in each case to absorb the moisture that forms within the case. The mechanism is not opened in cold weather unless absolutely necessary on account of trouble. This method has practically eliminated all failures on the westward signals, but, after an extreme temperature change, it was found to be insufficient protection for eastward signals. As the early morning sun shines directly on the eastward-signal mechanism cases, the air within the mechanism becomes warmer than the internal parts of the mechanism, and consequently the moisture condenses on them and freezes in the form of white frost, if the internal parts are at or below freezing point, as would be the case after a severely cold night. To counteract such extreme temperature changes in the mechanism, heavy padded covers were made to cover, completely, the entire mechanism, with the exception of the shaft end. These pads are held in place by leather straps and buckles and can easily be removed. These pads were put on the eastward signals in addition to the treatment given westward signals.

On the Style-DW automatic flagman, the wire inlet is sealed at the top and at the bottom of the mechanism. As this mechanism case has more space than the 2A signal case, two trays, about six inches long by four inches wide and one-half inch deep, are placed on the bottom and are half filled with pure glycerin. The success of this glycerin treatment depends on the amount of surface of glycerin exposed for the absorption of moisture. The glycerin is removed when it has absorbed about one-fourth of its original volume. This method has proved very satisfactory for wig-wags, regardless of the location.

Tried Methods

J. M. Mateer
Signal Maintainer, Atchison, Topeka & Santa Fe, Joliet, Ill.

Frost has caused trouble on contact No. 1, which handles the battery saving circuit on T-2 top-post signals. Frost forms on the contact when the signal is at clear, and when the signal goes to the stop position the frost rolls up under the contact and leaves the circuit open. In an effort to prevent this trouble, I have plugged up all openings in the signal case so as to keep out moisture. I made openings at the bottom of the mast so as to let cold air circulate up the mast to mix with any warm air which might come up the pole from the signal cellar.

The contact pressure is adjusted to 1.5 lb., whereas 1 lb. is ordinarily considered enough. The contacts are carefully cleaned. Pale semaphore oil is applied and then wiped off with a clean cloth. A paper sack is placed over the contacts, and the signal is never opened during cold weather unless trouble develops.

Lamp Used in Switch Machines

L. A. Guthrie
Signal Engineer, Canadian National, Winnipeg, Man.

We have experienced considerable difficulty from frost, and while we have not been successful in overcoming our troubles up to the present time, we have lightened them to some extent by the use of calcium chloride and glycerin placed in a small container in the relay cases, switch circuit cases, mechanism cases, etc.

In power-operated switch-and-lock movements, we have also experienced more or less trouble from the accumulation of frost. However, we have been able to overcome this condition by using a 2-candlepower carbon lamp, fed from a 110-volt circuit, continuously burning, there being sufficient heat from this lamp to counteract dampness. Of course, this arrangement can only be used where power is available.

In bottom-post mechanism cases we have been able to more or less relieve this trouble by packing the base of the case with a heavy piece of felt to prevent dampness coming up from the foundation. I would not say that this has entirely overcome our troubles from frost, but it has helped considerably.

Felt Covers and Glycerin

J. Connors
Signal Maintainer, Canadian Pacific, Galt, Ont., Canada

We have General Railway Signal Co. 2A mechanisms on my section, and previous to the winter of 1928 and 1929 we had considerable trouble with frost when the