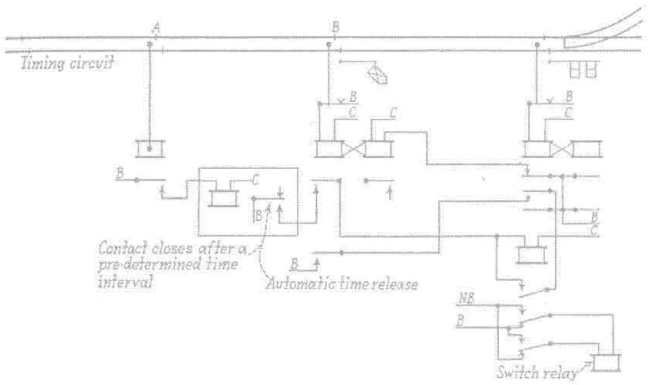
More dependable operation would be obtained by using manual control for movements from the main line to the branch line, and automatic control for all other movements. The manual control could be placed in the hands of the operators at the nearest open telegraph office, or, if all branch-line trains came to a stop at some nearby point before approaching the junction switch, a push-button could be located at such a point, where a member of the crew of branch-line trains could operate it to line up the switch for a branch-line movement. By the use of a time relay to prevent an instantaneous change of routes, and by using a dual-control switch machine, such a plant would give safe and dependable service.

A Proposed Scheme

P. P. Ash
Chief Signal Draftsman, Louisville & Nashville, Louisville, Ky.

It is possible to throw the branch-line switch by means of a timing device whose operation depends upon the speed of the train. In the scheme I have in mind a slow train would cause the switch to be thrown, while a fast train would not affect the position of the switch. The



Speed-control circuit for the operation of the junction switch. Slow trains throw the switch at A

timing control should be located far enough from the switch so that the switch will be thrown in ample time before the train is on the approach-locking circuit. Once the train has entered the approach-locking circuit, the switch can not be moved, because the detector locking will then prevent it from so doing. The switch-operating circuit will, of course, be held open also while the train is on the track circuit between the home signals. The sketch shows a speed-control circuit which may be incorporated in the design of such an installation.

Suggests Use of Push-Button

W. M. Whitehurst
Circuit Draftsman, Central of Georgia, Savannah, Ga.

The use of a time-element device for clearing any route automatically, would no doubt prove to be a disappointment. Those who are familiar with signal systems and their application to train operation, realize the necessity of anticipating every possible kind of train movement. If a time-element device were used to line up the diverging route, occasions would certainly arise when the diverging route would be lined when not desired. This condition would not occur many times before the operating officers would object to the project.

Several installations on the Central of Georgia, covering similar problems (converting to "automatic" control, installations which were formerly controlled by interlocked desk circuit controllers), are operating successfully, utilizing a push-button, operated by a member of the train crew, for lining up diverging routes. This is probably the simplest and surest way of complete control in such instances.

In designing circuits for such an installation, it is necessary to prevent the clearing of the diverging route by a following train when the train ahead is in a position to accept the "high-arm" route. This condition indicates the desirability of having an indication, for use of the diverging-route crews, that a train is, or is not, in a postion to accept a Proceed indication from the "high-arm" signal. Some stopping point not too far distant could be utilized in giving the necessary information and control to the crews, who expect to use the diverging route.

Plan Is Feasible but Has Objectionable Features

A. R. Whitehorn
Commercial Engineer, General Railway Signal Company, Rochester, N. Y.

It is entirely feasible to install a time-element device so that trains moving only at certain (presumably low) speeds will automatically reverse the switch and in turn clear the lower signal. This would be the simplest and possibly the most economical arrangement, but it has the objection that an eastbound train, using the main line, might unexpectedly pass over these definitely established points at low speed and reverse the switch. This would necessitate a stop at the switch to restore it to its normal position by hand, thus causing delay. To avoid this necessitates a deliberate action on the part of the engineman, which adds to equipment and first cost. Therefore, it becomes a question of how much additional expenditure can be justified to overcome this objection.

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Dwarf Signal Locking

"Should some form of locking, i.e., approach, time or stick locking, be applied to levers controlling dwarf signals in regular power interlocking plants?"

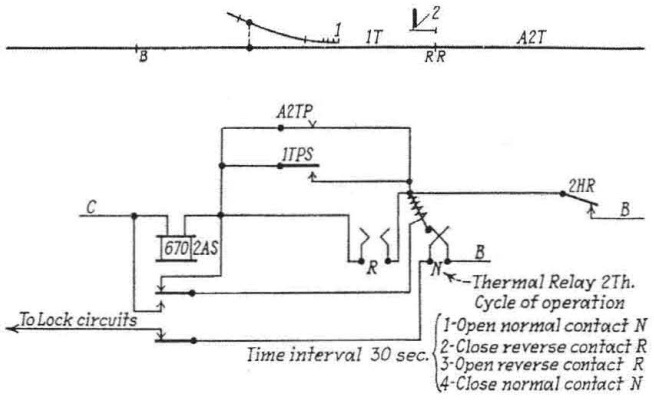
Should be Ineffective if Signal Has Not Been Cleared

C. F. Stoltz
Signal Engineer, Big Four, Cincinnati, Ohio

The purpose of an interlocking plant is to permit convenient and expeditious operation of track and signal functions. However it may be accomplished, interlocking must preclude the possibility of any of these functions being operated inadvertently or otherwise, so as to jeopardize traffic. The early interlocking plants made provision against the inadvertent movement of these functions, with the exception of the one covered by this question. There was no means of preventing a leverman from restoring a signal to display the Stop indication and then immediately changing the route over which the signal had invited a train to proceed. Such protection is quite as desirable and necessary as that otherwise provided and the absence of such locking has resulted in some of the most disastrous accidents.

This locking can be accomplished by a mechanical time lock on the signal lever, or by approach, time, or stick locking, the time interval of which is obtained through

a clock-work time release, master release lever, time-element relay, or thermal relay. The locking may be applied to the signal levers or to all switch levers in the respective routes, or to relays that control the operation of switches without the use of lever locks. The mechanical time lock, although a step in the right direction, imposes a time interval at all times, which is objectionable, as it will unnecessarily delay the manipulation of the



Locking circuit used on Big Four

machine. The use of electric locking would also impose delays unless accompanied by the use of an approach track relay. It should also be ineffective unless the signal for the route to be protected is actually cleared. This may be accomplished by selecting the control of the stick relay through a normal contact of the signal mechanism or control relay instead of through a lever contact.

The track circuit approach, or the signal, should be used where practicable to bridge out the time delay unless the approach is occupied by a train. The use of this approach circuit will eliminate delays in restoring the signal to its normal position if the signal is restored after a train has cleared the approach circuit.

The sketch indicates the practise on this road, where all features of complete locking are used. At such locations where approach circuits are not available, approach locking may be omitted, and a time element may be substituted in its place for all movements for which the signal has been cleared.

Time Locking Used on All Modern Dwarf Signals

A. R. Whitehorn

Commercial Engineer, General Railway Signal Company, Rochester, N. Y.

In the early development of mechanical interlocking, dwarf signals were usually operated by wire connections, and were used for the purpose of governing train movements of secondary importance. No convenient means of providing time locking was available at a reasonable cost, and unless a special condition existed which called for such protection, time locking not provided.

The power dwarf signal and light dwarf signal have naturally brought about changes which better justify time locking, and, consequently, much has been done toward standardization. To my knowledge, all dwarfs on the later projects have this feature and a great many of the older installations have been modernized in this respect.

While the A. R. A. rule governing the use of dwarf signals is very definite in specifying their use for slow-speed movements, the tendency, on account of clearance and adaptability factors is to make more extensive use of them for main-track movements, especially in congested terminals, and some use has been made of them for three and four indications, the primary reason for this being economy; in such cases time locking should be provided, on account of the speed of the trains which they govern.

I am sure it would be difficult today to find a signal engineer who would agree to accept an installation without some kind of time locking on dwarf or slow-speed signals, whether it be approach, time (mechanical or electrical) or stick locking.

Equally Important for Dwarf and High Signals

H. L. Engelhardt

Safety Engineer, California Railroad Commission, San Francisco, Cal.

In my opinion it is just as essential to provide either approach or time locking for levers controlling dwarf signals as it is to provide such locking for high signals. My reasons for this are: (1) It limits the towerman to a predetermined time in which he can line up the route for a conflicting movement. The time provided by this limit enables the engineman, when suddenly confronted by a change of signal indication from Proceed to Stop, to bring his engine or train to a stop before there is a possible interference. (2) In cases where the signal indicates the position of a derail, it will permit the engineman to bring his train to a stop before reaching the derail.

As to whether approach or time locking should be applied to dwarf signals should depend on local conditions. Time, or so-called "stick locking," is generally used for the reason that in many cases track circuits can not be used in the approach to the dwarf signals. Approach locking is, of course, more desirable than time or stick locking, in that the lever may be restored to the normal position if the approach circuit is unoccupied, whereas, with time or stick locking, if a signal is cleared in error, the lever cannot be restored to its normal position until the time release has functioned.

It is compulsory in the State of California to provide such protection. This is covered by Section 16 (a) of General Order No. 33-A, which reads as follows: "Either time locks or approach locking shall be provided in connection with all home signals."

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Signal Alinement

"What is the best system of procedure when alining three-unit color-light signals so as to direct the beam properly?"

Shop Focusing of Repaired Units Is Important Factor

R. R. Wood

Signal Inspector, Missouri-Kansas-Texas, Denison, Tex.

There are many methods of alining color-light signals. The following description pertains to the method followed on the M-K-T: On straight track the top, or high-speed, unit should be alined to give the best possible light for at least one mile. This can be accomplished by moving the unit so that the telescope cross-hairs will cross the track at rails about 4,000 ft. distant. The middle unit, which is usually for a diverging route, should be alined about the same as the top unit. The lower unit, for low speed, should be