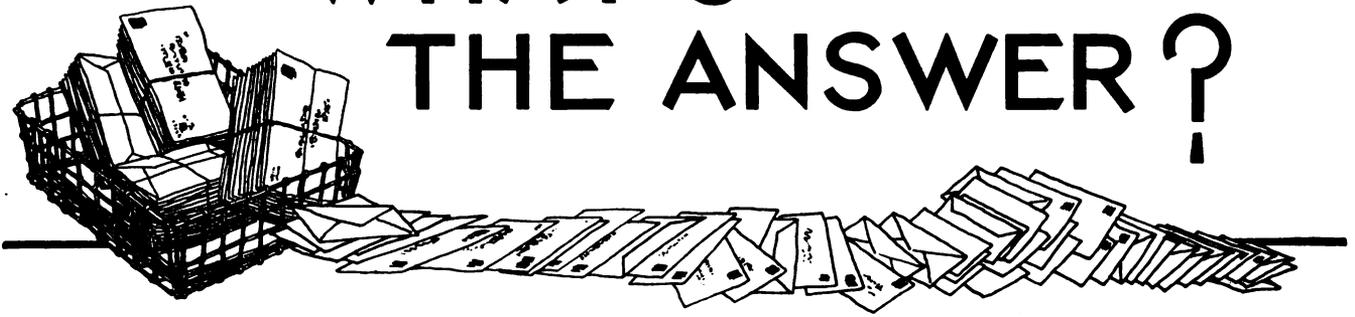


# WHAT'S THE ANSWER?



## The Light-Traffic Crossing

*"What form of protection is recommended for railroad grade crossings where the traffic is heavy on one line and extremely light on the other?"*

### Simple Arrangement Employs Ground-Lever Stand, with Pipe-Connected Derails On Secondary Road

By H. S. Loomis

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Various forms of interlocking are available for the protection of two railroads crossing at grade where interchange tracks are not involved, where the traffic is extremely light on one road as compared with that on the other, and where no attendant is desired. The earlier forms of interlocking for such situations were known as "cabin door" interlockings. This type was 100 per cent mechanical and was so arranged as to have the signals normally clear on the road of heavier traffic. In order to make a movement on the road of lighter traffic, it was necessary for a member of the train crew to enter a cabin in which the mechanical interlocking machine was installed and to close the door. The operation of the first lever locked the door in the closed position, thereby necessitating the restoration of the interlocking to its normal condition before this member of the train crew could be released from the cabin. This arrangement guaranteed that even though the interlocking were handled by members of the train crew of the lighter-traffic road, the interlocking had to be left with clear signals and crossing protection for the road of heavier traffic. In such installations time approach locking was provided by equipping the interlocking machine with a mechanical time device which was so interlocked as to guarantee a predetermined time interval elapsing after placing the signals on the primary road in the Stop position and before the crossing protection could be removed from the secondary road.

As electric signals and track circuits have come into use, various modifications of the original 100 per cent mechanical cabin-door interlocking have been developed. A simple arrangement can be provided using light signals on the primary road and a ground lever stand located at the intersection of the two lines and mechanically connected to derails on the secondary road, this ground lever stand being equipped with an electric switch lock and an indicator so as to make it impossible for a trainman on the secondary road to remove the derails from the secondary track after a train has once entered upon the approach section on the primary road. A clockwork time

### To Be Answered in a Later Issue

(1) *What special tools, meters, etc., are required for the maintenance of the coding equipment used in C.T.C. installations? What field tests can be made by the signal maintainer to insure that the code generating and translating equipment is in perfect order?*

(2) *A flashing-light highway crossing signal, incorporating two red lights mounted horizontally and flashed alternately, was placed in service on the Pennsylvania Railroad at New Bethlehem, Pa., on June 27, 1923. Were there any earlier installations of such signals?*

(3) *Where one or more functions or groups of junctions are to be controlled from one point, what factors govern the decision as to whether the control scheme should be of the direct-wire type (or a modification thereof) or of the C.T.C. coded type?*

(4) *What inspection methods and what equipment are most efficient for the purpose of locating track-circuit defects such as partial or complete short-circuits in bridge decking, hidden non-insulated gage rods, defective rail-joint insulation, defective tie plate and throw-rod insulation, intermittent breaks in concealed bond wires, defective fouling, etc.?*

release is provided to effect the release of the electric approach locking in the event of such release being made necessary as the result of some abnormal condition.

With approach lighting of the signals on the primary road and continuous oil lighting of the pot signals which would be connected to the derails on the secondary road, all electrical energy for such an installation can readily be supplied by primary battery. If an a-c. source of energy is available, a-c. floating battery is the alternative form of energy supply.

In the arrangement involving the use of a ground lever stand at the intersection, it is necessary to depend upon the train crews of the secondary road to restore the interlocking to its normal condition before leaving the location.

### Several Plans Suggested

By E. G. Stadling

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The automatic type of interlocking which has come into general use in recent years supplies a need where

the conditions do not warrant the expense of levermen such as are required with the older style of interlocking plants. However, the installation costs of even the simplest form of automatic interlocking is considerable and, therefore, there are today many grade crossings that are not interlocked. Probably all of these crossings are at points where the traffic on one or both lines does not justify the expense of an interlocking plant. For this reason some other form of protection that can provide safe train operation is desired.

In Indiana there are several crossings where the State Commission has permitted an installation that authorizes the trains on one line to proceed over the crossing without coming to a stop, but requires the trains on the other line to continue making the stop the same as they do at any unprotected crossing.

One satisfactory method is to install the ordinary swinging gate that will block either one or the other of the tracks and which gate is locked normally against trains on the track on which it has been decided all trains will stop. To this gate there can be attached pipe-connected derails for the track on which trains stop, these derails with targets attached to be left normally against traffic the same as the gate. To the same gate there is connected a circuit controller for the control of the home-signal circuits. These normally-clear home signals are on the track on which trains are permitted to pass without stopping; the signals are located one on each side of the crossing and about 500 ft. therefrom. The trains which do not stop at the crossing should have a restriction established for the speed at which they approach the crossing. Also the rules for operating the gate should provide that the gate be not operated to set the home signals against an approaching train that is but a short distance away.

Another special installation on the C. I. & L. is at a location where a freight track and some industrial tracks parallel the double track of another line which carries both passenger and freight traffic. The single track of a third company crosses all the above tracks at right angles and provides passenger and freight service. The tracks of these two roads are fully interlocked to provide complete protection to their passenger and freight trains, the plant being manually operated. The single-track line is electrically operated and is located in a city street; therefore, the trains on it are required to move at a considerably reduced speed. The intersection of the tracks of this electric line and of the C. I. & L. is within the limits of the interlocking. At this intersection a tilting target is located to govern the movement of trains on the tracks of the C. I. & L. This target is interlocked so that it cannot be cleared for C. I. & L. trains unless the derails and signals on the electric line are set against trains on that track. Furthermore, the rules require the trains or engines on the C. I. & L. to come to a stop at the crossing, and the target is not to be cleared for such movements over the crossing until they have stopped. One of the reasons for installing this method of protection was the fact that the crowded condition of the industrial tracks prevented any rearrangement to secure clearance for individual signals on the C. I. & L.

### Refers to Signal Section Committee Report

By P. M. Gault

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Before attempting to recommend any form of protection for railroad grade crossings, it is necessary to know much more about the local conditions that is stated in the question, namely, that traffic is heavy on one line and

extremely light on the other. In 1930, Committee II of the Signal Section made a very complete report on the subject, "Factors which govern in determining the type of interlocking which should be installed," which, in my opinion, is a very excellent report. If one would analyze each crossing with respect to the factors set forth in this report, he would be in position to make proper recommendations for its protection.

C. A. Christofferson, signal engineer of the Northern Pacific, says that his road does not discriminate between heavy- and light-traffic crossings in the matter of selecting suitable protection. Both lines are signaled in the same manner, the only discrimination being between slow- and high-speed traffic, in the placing of insulated joints for the setting points.

## Contact-Testing Methods

*"What is the best method of testing relay front contacts? Back contacts? Please illustrate, and give the formulas involved in the method that you consider most suitable."*

### Three Tests

By W. M. Overly

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We test relay contacts, both front and back, to determine whether or not they are in condition to continue to give unfailing service. This can be determined by subjecting the contacts to certain tests. Being interested in the performance of contacts in service, I believe in making all tests possible under actual service conditions. This is best done by testing the contacts as they function in the circuit. As this means testing in the field, methods requiring calculations should be avoided, as the values used are too small for practical use.

In testing, we wish to determine: First, whether the contact is clean; second, whether the contact resistance is the same each time the contact is closed; third, whether the contact will remain in good condition for a reasonable time.

Regarding the first test: The resistance of a contact in good condition will not exceed a certain value. This value has been fixed for different types of contacts as follows: 0.03 ohm for metal to metal, 0.18 ohm for metal to carbon, and 0.40 ohm for carbon to carbon. The most satisfactory method of measuring contact resistance is by using a direct-reading ohmmeter with a scale that is graduated to read in hundredths of an ohm. If an ohmmeter is not available, the tester, the connections for which are shown in Fig. 1, may be used very satisfactorily.

A 300-mil scale is used. A different scale may be used by changing resistance *D*. Close switch *A*, and the needle will deflect to approximately full-scale reading as indicated by *A*, Fig. 2. Touch test clips *B* and *C* together and the needle will deflect back to position *B*, Fig. 2. The deflection *B* depends on the length of the test leads, and should be noted or marked on the meter. Next, place the test clips on the terminals of a metal-to-metal contact known to be in good condition and mark point *C* on the meter. Similarly, mark points *D* and *E* for deflections of metal-to-carbon and carbon-to-carbon con-