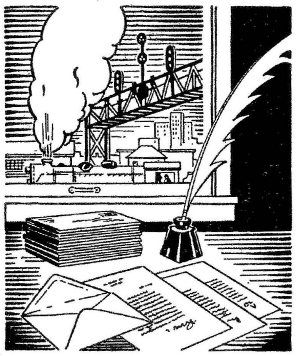


What's the Answer?

Contributions Paid for in Cash or by a Subscription to Railway Signaling

If You Have a Question That You Would Like to Have Someone Answer, Or If You Can Answer Any of the Questions Shown Below, Please Write to the Editor.

To Be Answered in a Later Issue

(1) In testing a new interlocking prior to placing it in service, which of the following methods do you consider the most reliable: (a) An operating test of each individual function under all normal conditions or (b) detailed checking of each branch of all circuits according to the circuit plan? Why?

(2) At an interlocking equipped with time-element relays, how frequently should the accuracy of each timing function be checked? How do you measure these time intervals?

(3) What self-restoring annunciator circuits are available, that is, arrangements which do not require acknowledgment or push-button manipulation by the operator?

(4) How should an automatic signal be focused or alined, when it is located on a long curve, so as to give a satisfactory indication at a distance as well as at close range?

(5) A 30-mile section of double-track a-c. signaling is supplied by a 4,400-volt, 60-cycle, single-phase power line fed from one end. The average power requirement is 250 watts per mile at 50 per cent power factor. Capacitors are to be installed at three places on the 4,400-volt line for power-factor correction. What is the most economical arrangement of these units?

(6) Have any oils or other compounds been successfully used on rails to prevent rusting and to improve wheel contact for shunting track circuits not frequently occupied, such as at crossovers, turnouts or highway crossing signals on branch lines?

Trap Circuits at Railroad Crossings

"Where circumstances warrant, what form of trap-circuit protection do you use at railroad crossings involving interlockings, automatic interlockings or in automatic signaling territory where no interlocking is in service?"

Three Different Solutions

Franklin George
Signal Wireman, Canadian Pacific, Weston, Ont.

On the Ontario district of the Canadian Pacific, the circumstances at several railroad crossings warrant the use of special trap-circuit protection. Two of the circuits in use are described in the following paragraphs.

The circuit illustrated in Fig. 1 is used in connection with manually-operated interlockings involving railroad crossings. It is relatively simple and efficient, and may be used on either a-c. or d-c. track circuits. Also, it can be reset manually, in case it fails to restore itself to normal automatically.

Quite often a track circuit becomes shunted by track men working on or around the track, and occasionally by a poorly insulated push car or motor car. Such a circumstance is readily remedied by the operator by means of the time release, but this expedient is applied only where the operator has an unobstructed view of the crossing frogs.

In this circuit, one rail at each end of the trap circuit is without broken-rail protection. However, this is not a particularly dangerous condition, being in restricted-speed territory. It must be remembered that the pick-up rail is not of sufficient length to allow a car or light engine to stand completely on it. The operation of the circuit may be easily traced in Fig. 1.

Figure 2 illustrates a typical circuit used at a fully-automatic interlocking governing a railroad crossing. Speed restrictions exist at such points although the circuit does not require a restriction, except for short light-weight equipment. Track Sections A and C must be of sufficient length to insure proper shunting. On more recent installations, two No. 8 stranded conductors have been provided in the signal cables, from each home signal to the instrument houses at the crossings, in order to provide adequately for the circuits TS1 and TS2.

The purpose of the lights, TE and TPE, which are mounted on the track side of the instrument case at each home signal, is for observance by signalmen, sectionmen, or any one who operates any type of motor car or hand car of questionable shunting capacity or faulty insulation. As they leave the interlocking, they must observe this light and if it is burning they must unlock the box at the light and operate a push button, provided the crossing is not occupied. This push button restores the circuit to normal if everything is in proper working order. If the light is not extinguished by operation of the push button, the maintainer must be notified immediately.

The operation of the circuit in Fig. 2 may also be readily traced. However, the essential feature of this circuit is that track section A or C must be operated last in order for BTR to pick up so as to guarantee that the crossing is not occupied by a short train. If relays BTR, CTR and ATR are energized, relay ABC-TP will also be energized, the necessary signal control circuits being cut through the latter relay.

The circuit illustrated in Fig. 3, so far as I know, has not been used. However, I believe it is feasible. This set-up is fully automatic although it can be provided with a push-button feature similar to that used in Fig. 2. The trap-circuit operation involves a 10-volt circuit, thereby eliminating the necessity for carrying track-circuit current through relay contacts or over any great length of line conductor. In this circuit all of the track is protected against broken-rail hazards, and only two track relays are required. Although the operation of the circuit depends on the operating characteristics of the track relays and the slow-release feature of relay 1ATXR, with modern relays these can be depended upon.

This circuit can be varied according to Fig. 3B, which involves two-wire shunt-protected circuits. It will be noted that relay 1TR must be the last one to operate in order that relay 1ATPS will pick up. With 1TR de-energized, and ATR energized, 1ATXR will also be energized. Then when 1TR is energized, current will flow through the front contacts of 1TR, ATR and 1ATXR, the latter remaining energized momentarily on account of its slow-release feature, allowing 1ATPS to by-pass 1ATXR, which is about to release, and thus "stick" up.

Normally, relay 1ATPS remains energized through its own front contact until either of track circuits 1T or AT is occupied; 1ATXR normally is de-energized. All signal circuits are broken through relay 1ATPS.

Another variation of this circuit, shown in Fig. 3C, requires but one repeater relay instead of two, relay 1ATXR being eliminated. However, in this case the signal control circuits must be broken through both 1ATPS and 1TR relays in series to obtain full protection. Of course, this might require more line wires.

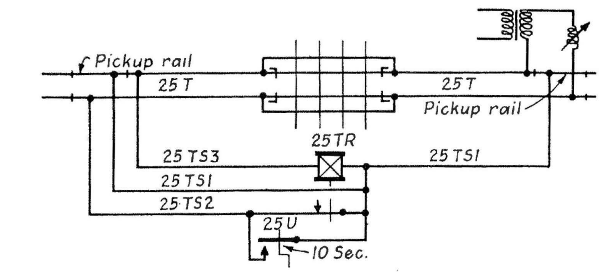


Fig 1 - Used on A.C. or D.C. manually operated restricted speed interlockers.

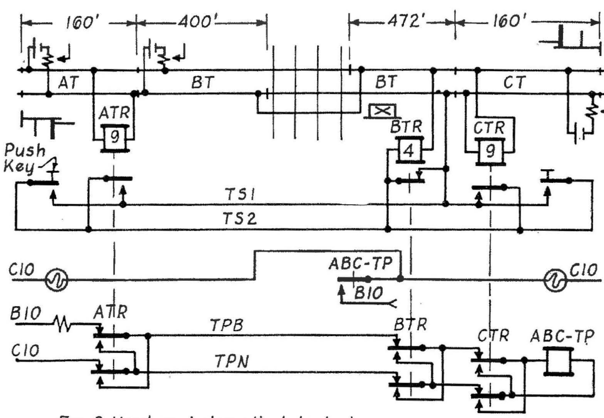


Fig. 2 Used on Automatic Interlockers.

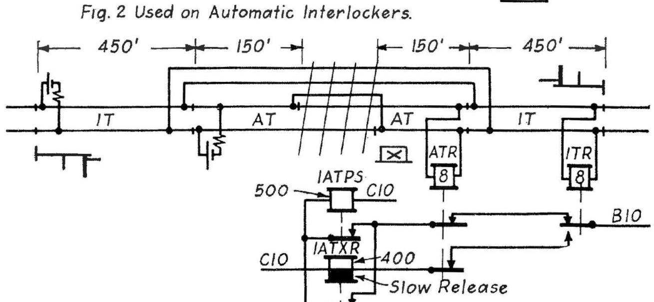


Fig. 3a

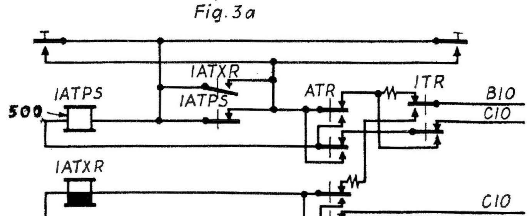


Fig. 3b

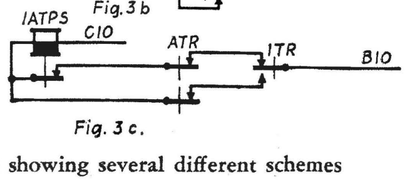


Fig. 3 - Using two track circuits and 10-Volt trap circuit

Fig. 3c.

Figures 1, 2 and 3 showing several different schemes

Improved Trap Circuit

W. R. Smith
Toronto Terminal, Toronto, Ont.

A common failing of certain trap circuits in use today is that they are unable to restore themselves automatically to normal after the track relay has been dropped by track tools or anything other than the actual presence of a train on the track circuit. For this reason these circuits must make use of push-buttons or time releases manually operated to restore the trap after such an occurrence. When this takes place in automatic signal territory and where the train crew must operate the restoring device, a train delay occurs.

To improve upon this condition the accompanying circuit has been designed. The fact that with two track circuits involved, the shunting of *both* at the same time is necessary to operate the trap feature makes this circuit an improvement over those existing ones in which the shunting of *one* track circuit drops the trap relay. The odds against both track circuits being de-energized at once except by a train movement, where d-c. track circuits are in use, would likely make push-buttons or time releases unnecessary.

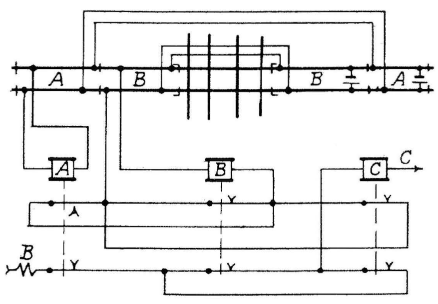
The possibility of both relays being

(Continued on page 650)

de-energized at once because of a power failure, when a-c. track circuits are in use, will not detract from the value of this circuit if track relay A is made slow pick-up in order that track relay B may restore itself before A picks up.

In this design two track circuits are employed and three normally energized relays are used. Two of these are track relays and the other a line relay. The operation of the circuit is as follows:

A train entering track circuit A will drop relays A and C, and when entering track circuit B, will drop relay B. When the train clears track circuit A, relay A will be restored to normal, but relay C will not pick up because track relay B is de-energized. Track relay B cannot pick up with A up and relay C down. This protects a train while in the dead section of track. As the train proceeds and enters track circuit A again, B track relay will pick up through A down. After completing the move out of track circuit A, stick relay C will pick up through relays A and B. Thus all relays will be left in the normally energized position.



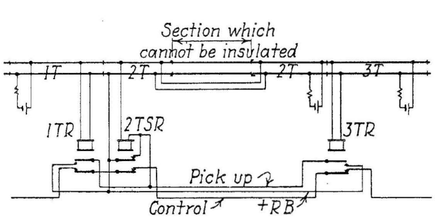
Self-restoring trap circuit

Insulate if Possible

P. P. Ash

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

The best proposition is to avoid the use of a trap circuit by insulating the track even though this may involve extra expense. However, where circumstances permit no choice in the matter, a trap circuit of the form shown will usually be satisfactory.



Non-directional stick-relay trap circuit

The circuit illustrated involves the use of three track circuits 1T, 2T and 3T. This circuit is non-directional, being operative for trains in either direction. A train on entering 1T drops track relay 1TR and then drops stick relay 2TSR upon entering track circuit 2T. The stick relay 2TSR remains down until the train leaves the circuit by either track circuit 3T or 1T, which again energizes stick relay 2TSR through a back contact of either 1TR or 3TR.

Circuit 2T should be of sufficient length on either side of the dead section to secure good shunting. The control circuit for the signals or other functions should be broken through all three relays.

Starting Motor Cars in Winter

"What means do you use to start a 'balky' motor car in cold weather?"

Common Troubles Cited

A. G. Turner

Signal Maintainer, Oregon Short Line, Minidoka, Idaho

The first thing to remember about a "balky" motor car is that its power is derived from the combustion of gasoline, which must be compressed in the cylinder with approximately the right proportion of air, and that the electric spark must be of sufficient strength to ignite the mixture. The spark plug is an excellent indicator of the conditions existing in the cylinder.

If, upon being removed, the spark plug is found to be in good condition and very wet with gasoline, too much fuel is being admitted, and the remedy is evident. If the plug is dry and does not smell of gasoline, the trouble is too little gasoline and this may be caused by one of many things, of which the most common are, carburetor out of adjustment, carburetor screens or jets clogged; water or ice in the carburetor, gas line or gas tank; vent on top of gas tank obstructed and valves in motor stuck open or leaking.

The most common ignition troubles are exhausted batteries, improperly connected batteries, ignition switch in wrong position, defective spark plug, defective spark coil, spark-coil vibrator contacts or magneto breaker contacts out of adjustment or pitted, timer contacts out of adjustment, broken wires, condenser failure, etc.

Sometimes when all other conditions are right, a motor will still refuse to start because the oil in the cylinder and bearings is so stiff and sticky as to absorb all of the power from the explosions in the cylinder when the engine is cranked. When this condition exists there is but one remedy and that is to warm the cylinder by external means.

Prepare for Winter in Advance

W. Abell

Signal Maintainer, Canadian Pacific, Golden, B. C.

It is unwise to await the arrival of the sub-zero weather before dealing with a "temperamental" motor car. While the weather remains warm and conditions are favorable, the car should be thoroughly overhauled, cleaned and put in the best possible condition.

Excessive carbon deposits should be removed from the piston, rings, cylinder head and from around the ports or valves. All valves and wiring should be carefully inspected. Particular attention should be given to the ignition system, as a hot spark is always required in cold weather.

Where batteries are used, keeping these in a warm place while not in service will greatly increase their efficiency. Where the car is magneto equipped, be sure that the magneto is free from excessive oil and dirt, that the points are properly adjusted, and that the magnets are of sufficient strength to develop the required magnetic field. Lastly, be sure that the timing is correct.

As for the actual starting of the car on a cold morning; a water-jacket full of hot water will be all that is required, if the engine is water cooled. With an air-cooled engine the cylinder can, if necessary, be warmed by pouring hot water over it. In short, a car that is conscientiously maintained and properly adjusted will not be "balky."

Poorly-Kept Car is "Balky"

W. B. Neff

Signal Maintainer, Nickel Plate, Claypool, Ind.

Based on past experience, my opinion is that the so-called "balky" motor car in any kind of weather is a poorly-kept car. If a motor will not run after three or four turns of the crank, on a cold day or night, or if it is

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