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 lightweight 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 ITR must be the last one to operate in order that relay 1ATPS will pick up. With ITR de-energized, and ATR energized, 1ATXR will also be energized. Then when ITR is energized, current will flow through the front contacts of ITR, 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 unless either of track circuits IT 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 ITR relays in series to obtain full protection. Of course, this might require more line wires.

Improved Trap Circuit

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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)
Startign 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 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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