to keep all apparatus and circuits clear of grounds. Installations constructed and maintained as outlined above will be troubled much less with lightning than if grounded arresters were used. We have, however, found it necessary and advisable to use lightning arresters around interlocking plants, because in such places the circuits are more or less tied together with common wires and grounded apparatus. It sometimes appears that there are certain locations where lightning troubles are brought about by mineral deposits under ground in that particular territory. However, I am not so sure about this.

Practice in India

S. N. Das
Tester, Block Signal Works, East Indian Ry., Calcutta, India

The term lightning arrester generally covers the complete outfit, i.e., the fuse, the arrester blocks, and the heat coil. The proper place for its insertion is, undoubtedly, at a point nearest to and before the point at which the wire enters a building, passes through any metallic surface, or takes a sharp bend; the idea being that the arrester block impedance to the high frequency lightning surges to earth should be much smaller and preferably negligible in comparison with that of any other path. The less the arrester block impedance to the high frequency surges, the greater its efficiency will be as protection of the instrument for which it is used.

A ground connection to the rails, in connection with lightning, is not

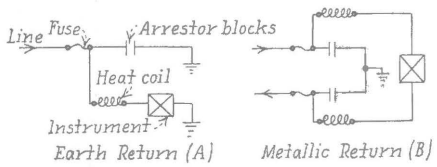
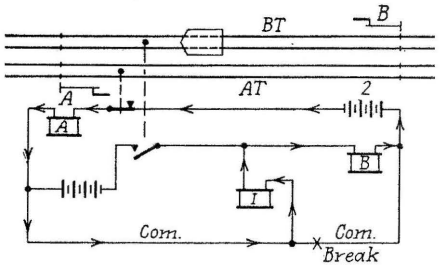


Fig. A Fig. B

essential. The question regarding fitting the arresters in series or in parallel with instruments is explained by the accompanying figures, taking both the cases of earth-return and metallic-return into consideration. In Fig. A, it will be seen that the arrester blocks are connected in parallel with the instrument, the earth connections completing this circuit, but if the protector as a whole is considered, then it might be said that the point of entrance of the line, the lead out for the instrument and the instrument itself are all connected in series, leaving, of course, the earth connections aside. In Fig. B, where there are two protectors, the arrester blocks are jointly across the instrument, but the protectors as considered above are connected in series. Actually the arrester blocks are always fitted across the instrument protected.

False-Clear Failures

"Where double-track automatic block signaling is controlled by line circuits using a common return wire, care must be taken when connecting indicators to the line control circuits to prevent a false-clear aspect if the common wire should break. In the example shown in the sketch, the common wire broke at X. With a train in BT, signal B remained clear because relay B was energized by the circuit indicated by arrows. How could this circuit be changed readily so as to prevent the possibility of such a false-clear failure?"



Prefers Individual Circuits

W. M. Whitehurst
Assistant Signal Engineer, Central of Georgia, Macon, Ga.

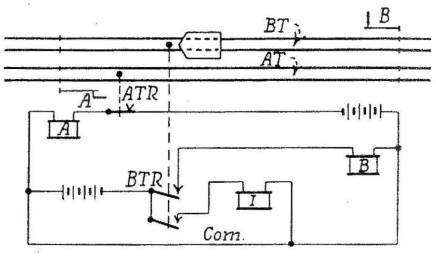
The opening of a circuit wire in any signal system resulting in false energization of an apparatus in the circuit denotes a fundamental error in circuit design. The results from the circuit in question points to the undesirability of multiple circuits in signal systems.

The ideal way to correct this circuit would be individual circuits for the signal control relay and indicator. However, a repeater relay at the indicator location, or placing the indicator coils and signal control relay coils in series, are possible solutions of the difficulty. Local conditions as to housing and line capacity would probably be quite a factor in determining just which method would be most readily adaptable to the change.

Offers Solution

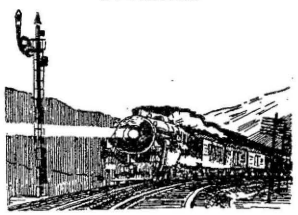
Maurice Peacock, Jr.
Mt. Airy, Pa.

The failure mentioned in this question may be prevented by providing individual control circuits for relays B and I, by inserting a front contact of track relay BTR in the control of relay B and another front contact of track relay BTR in the control of



Proposed solution

relay I. The path of the current which caused the false clear in the original circuit would thus be broken twice with the track section occupied.



Three Solutions

N. B. Coley
Signal Maintainer, Toronto Terminals Ry., Toronto, Ont.

There are several ways in which the indicator shown in the sketch may be connected to avoid false clear signal indications. Probably the easiest method would be to place the indicator in series with the control circuit for relay B. With reference to the sketch, it seems quite likely that relay B and the indicator will operate satisfactorily in series. Assuming that relays A and B are similar, the fact that relay B holds up with A and I in series makes it likely that the relay will pick up with only I in series. The question then is largely whether the indicator is of a type which will operate satisfactorily on the current

(Continued on page 192)

that would pass through this circuit.

If the series method is not feasible, the use of a push-button operated indicator connected as shown in the sketch will eliminate a continuous false clear indication of the signal. Should protection against the possibility of a push-button sticking closed (thereby making a false clear possible) be desired, a half-wave rectifier placed in series in either connection to the indicator will solve the problem.

The normal operating current for the indicator flows through the indicator to common. By using the half-wave rectifier to permit only this current direction, the flow of current causing a false clear, which is in the opposite direction, will be prevented.

Approach Locking on Dwarf Signals

"At interlocking plants where electric locking is installed, is it your practice to approach lock the dwarf signals so that these signals cannot be taken away from an approaching train without operating the time release, i.e., does clearing the dwarf signal break down the stick relay controlling the lock circuits?"

Depends on Location

S. W. Law
Signal Engineer, Northern Pacific, St. Paul, Minn.

At standard interlocking plants on the Northern Pacific, dwarf signals display only two indications, stop, when the arm is horizontal with red light displayed, and proceed at slow speed prepared to stop, when the arm is cleared to the 45-deg. upper-quadrant position with a yellow light displayed. These slow-speed signals do not have approach locking or break down the stick relay controlling the electric lock circuits.

At automatic interlockings, or electrically-operated automatic switches at the ends of double track, low color-light dwarf signals are used. These slow-speed signals also operate in two positions. When a train on a route governed by one of these signals enters the approach track circuit, the signal is cleared, and the stick relay circuit de-energized so that the route cannot be changed until after the signal has assumed the stop position and the time-element relay run down.

Describes Circuits

C. Robison
Signal Wireman, Canadian Pacific, Weston, Ont.

The circuit shown in Fig. 1 is used as indicating route stick locking on an interlocking in Canada. The original Saxby and Farmer mechanical signal levers have been equipped with tail lever circuit controllers, and Saco electric lever locks. With this equipment they are used to control search-light signals. The lever locks as installed on these levers prevent the final movement of the latch handles in either the normal or reverse positions of the levers, until current energizes the lock coil. Fig. 1 shows the circuit for supplying this current

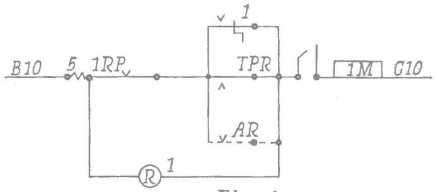


Fig. 1

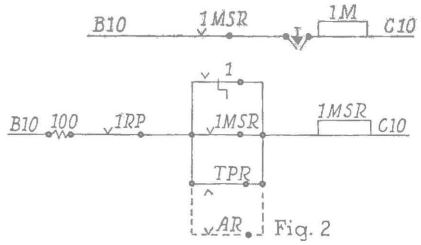


Fig. 2

Diagrams of circuits for approach locking

at the proper times. The time releases are of the clockwork type and are normally wound up. The signal control circuit is made through the normal contacts of the time release. The circuit as shown is used on the dwarf signals of this plant. The high signals use the same lock circuits, but with the addition of the circuit shown in dotted lines. As these signals are approach cleared, the route sticking feature of the circuit is not effective until the approach relay is de-energized. For indication locking, if the signal fails to return to normal, the signal repeater relay will remain de-energized, and prevent the operation of the lock, which will not permit the latch handle to be dropped under any circumstances, until the seal is broken and the lock armature manipulated by the means provided for emergencies.

The circuit shown in Fig. 2 accomplishes the same as Fig. 1, except that no means is provided for the dropping of the latch handle in the reverse position, as this circuit is provided for the normal position of the lever only. It is understood that the Saco electric lever lock is so operated that it either prevents the initial movement of the lever latch, or the final movement of the same, in either the normal or reverse position of the lever. With other types of electric locks, it is only necessary to prevent the lever returning to the full normal position, as that is all that is really required in either case. Fig. 2 shows how a stick relay would be used to control the lock circuit.

Yes

W. L. Dayton
Superintendent of Signals, Grand Trunk Western, Detroit, Mich.

It is the practice of the Grand Trunk Western to approach lock the dwarf signals, as well as the high signals, by causing the dwarf signal lever to break down the stick circuit. The stick relay will energize only through the train accepting the signal and occupying the track, or through the operation of a time release.

A number of reasons have contributed toward this. Rail laying, new ballast, and other causes, frequently result in through movements on the reverse main at an interlocking plant. Furthermore, even though a reverse movement is a slow one, it has been found expedient to place a time interval between the restoration of a signal and the changing of a route against an approaching engine or train. This is equally important where there are no derails, as over-running a signal might cause a collision at the diamond.

No

G. H. Caley
Electrical & Signal Engineer, N. Y. O. & W., Middletown, N. Y.

Where electric locking is installed, it is not our practice to approach lock the dwarf signals so these signals cannot be taken away from an approaching train without operating the slow release.