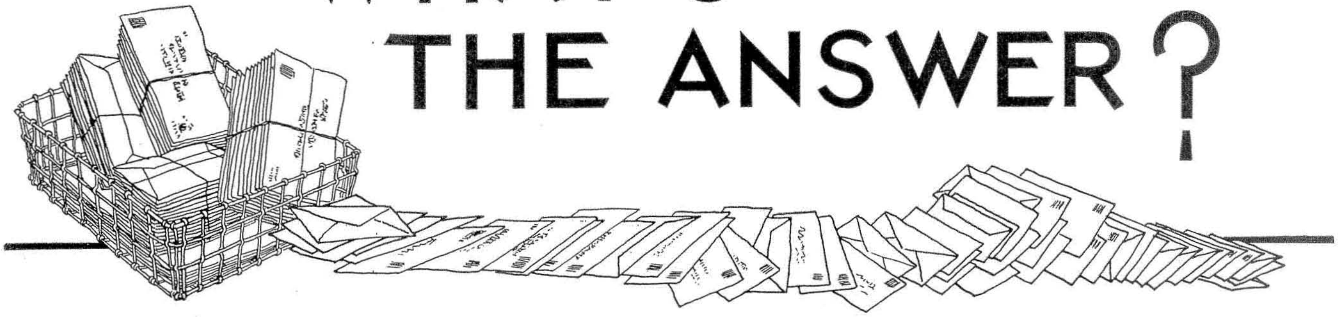
WHAT'S THE ANSWER?



Light-Out Protection*

"In light signaling what has been done to prevent signal failures that are caused by lamp failures? What are the advantages and disadvantages of the various methods that have been tried or contemplated?"

On the Central of New Jersey

By F. W. Bender
Signal Engineer, Central Railroad of New Jersey, Elizabeth, N. J.

In the case of color-light signals, we use an 18-watt, 10-volt lamp with a PS-16 bulb, base 1825, filament construction 202, and L. C. L. 2½ in. These lamps, which burn continuously and at the voltage for which they are rated, are replaced every 60 days. Where the night voltage is reduced 50 per cent of the normal rated voltage, we renew the continuously burning lamps every 120 days. Where the signal is approach lighted, we do not renew the lamp until there is a marked reduction in the candle-power, due to the age of the lamp. These approach-lighted lamps give about five years' service.

In the case of semaphore signals, we use a 3.5-volt, 0.3-amp. lamp with an S-11 bulb, base SC bayonette, filament construction C-2, L. C. L. 1¼ in. These bulbs are lighted by four cells of Edison Type-500-S, primary battery. The lamp is renewed when the battery is renewed. This means that with an average current consumption of 0.25 amp., we are getting 2,000 burning hours. Where two lamps are lighted by one bank of four cells, the two lamps are renewed after every second battery renewal. Where four lamps are lighted by one battery, the lamp will be renewed after every fourth battery renewal.

We also use the 13.5 volt, 0.25 ampere lamp with an S-11 bulb, base SC bayonette, filament construction C-2, L.C.L. 1¼ in. These lamps burn at 10 volts. Where they are continuously burned at night we get about two years' life. Where they are approach lighted, they give approximately five years' life. We do not renew the lamps until there is a marked reduction in candle-power, due to the advanced age of the lamp.

In highway crossing signals, we use a 12-16 volt, 21-c. p. lamp with an S-10 bulb, base SC bayonette, filament construction C-2, L. C. L. 1¼ in. These lamps are burned at about 12 volts, and we renew them every 18 months.

A man in a supervisory capacity rides an engine at night once a week, making an inspection of every switch and signal light, and any light that is dim or out of focus

*For other answers to this question see page 228 of the June, 1930 issue and page 418 of the November, 1930 issue.

To Be Answered In A Later Issue

(1) What are the controlling factors in deciding whether a proposed installation of car retarders is economically justified? What is the approximate minimum number of cars classified per day that will justify an expenditure for retarders in a yard?

(2) When installing the three-wire coded control line circuits for a centralized traffic control system, should the line control wires be in cable or should they be open wires? Should strength or conductivity be the controlling factor in deciding on the material and size of the wire, and is weatherproof protection desirable?

(3) What are the advantages or disadvantages of the STOP signs for automatic highway-crossing signals as recommended by the American Railway Association Joint Committee on Highway Crossing Protection as explained on page 62 of this issue as well as on page 216 of the June issue for 1930?

(4) In designing an automatic interlocking for a railroad grade crossing is it necessary or desirable to provide a separate storage battery for the power supply at each home signal? Assuming that commercial alternating current is available for floating the storage batteries, what arrangement of batteries do you suggest?

(5) Under what operating conditions should consideration be given to the installation of centralized traffic control for only the direction of train movements, with few or no switches being power operated?

(6) With proper consideration as to the number of switches in each group, the number of sources of alternating-current power supply and other factors, which is more economical: electro-pneumatic, or straight electric operation of outlying switches?

(7) Are signal maintainers and track forces permitted to use track-shunting devices on their motor cars, in order to determine what indication an approach-lighted signal is displaying? If not, what arrangements are provided in order that the signals may afford protection for users of motor cars?

is immediately reported and steps are taken by the maintainer to give it the necessary attention. Although we have many thousands of lamps, our number of lamp failures is small.

The following rules govern train operation where a signal is improperly displayed due to a light out: "A signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as the most restrictive indication that can be given by that signal, except that when the day indication is plainly seen, it will govern, and when sufficient lights in a color-light signal are displayed to determine a Proceed indication of the signal, it will indicate Proceed at slow speed prepared to stop. Conductors and enginemen using a switch where the switch light is imperfectly displayed or absent, must, if practicable, correct or replace the light. Imperfectly displayed signals must be reported to the superintendent from the next open telegraph office at which the train stops."

How to Determine A-C. Polarities

"When connecting up relays, transformers, etc., in a-c. signal installations, what is the best method of determining the correct (relative instantaneous) polarities to assure correct operation?"

Arbitrary Marking of Transformers and Power Lines Throughout

By E. B. Pry
Superintendent of Telegraph and Signals, Pennsylvania, Pittsburgh, Pa.

Any scheme of designating polarities that is adopted must be a practical arrangement that can be used by the men in the field without a lot of complicated measurements and computations. We have found the following practice to work out quite satisfactorily:

Starting from the feed or power line we take one wire, say the left-hand wire looking west, and consider it the positive wire. Leads are taken from this wire and connected to the left-hand side of the primary of the line transformers. The left-hand side of the secondary is then taken as the positive wire and all instruments are connected so that the left-hand binding post of each set of coils is positive.

As all transformers are not necessarily wound the same, a check is made to determine the polarity by connecting the secondary in series with the primary by taking a tap from the right side of the primary to the left side of the secondary. If the total voltage between the left side of the primary and right side of the secondary is equal to the sum of the voltages of two windings, the left-hand side of the transformer is positive, while if the total voltage is equal to the primary minus the secondary, the right-hand side of the secondary is positive and should be connected accordingly.

When testing the polarity of high-tension transformers, the secondary is connected in series the same way and the primary coil of another transformer is connected from the left side of the primary to the right side of the secondary of the transformer under test. Voltage readings are then made on the 110-volt secondary of the second transformer. If the line voltage is 3,300 volts, the secondary voltage of the second transformer should be 113 volts if the left side of the secondary under test is positive. If the left side is negative, the voltage will be 106 volts.

Most of the transformers now used in the signal department have the polarity marked on them, which eliminates a large amount of testing, although it is found desirable to make checks on the polarity from time to time. If necessary to connect the secondaries in series or multiple, one pair of wires is connected and the meter or test lamp is used to check the polarity with the other pair before they are connected.

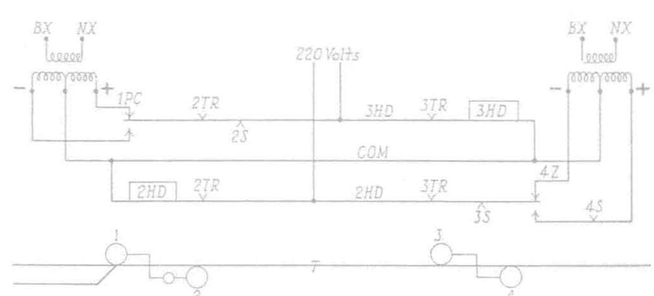
To check the polarity of relays, a double-element test relay with positive and negative binding posts marked on both elements is used. When hooked up in this manner, the relay will pole, say, counter-clockwise. One element of this test relay is then connected to the local positive and negative busses, and the other element, in the case of a track relay, is connected to the positive and negative track wires. If the relay does not pole in the proper direction further check is made to determine which element is receiving the wrong polarity. With other than a track relay, a pair of wires from the last location where the polarity is known is used for one element, the other element using energy from the location under test. If the relay does not pole in the proper direction, the location under test is checked further and the necessary corrections are made.

Arbitrary Marking of Transformer Leads Insures Correct Connections

By H. A. Hudson
Signal Supervisor, Southern, Asheville, N. C.

It is important that instantaneous polarities be known when a-c. track circuits are used. When three-position track relays are connected, the polarity can be checked by jumpering around both insulated joints; and if the polarities are staggered, the relay will assume the Caution position, or, under certain conditions, it may pump. The same method may be used to check the polarities of track circuits for two-position relays, and will give the same results, excepting that the relay will assume the de-energized position if the polarities are staggered. The above method will be satisfactory if the voltages of the adjoining track circuits are nearly equal. If, however, one of the circuits is much heavier than the other, it may be necessary to cut it down temporarily in order to get the test.

For the sake of uniformity, it is customary to make the right-hand lead of a line transformer positive, and the left-hand lead negative. On single-track installations,



Cross protection for the line circuits

where reversing transformers are used, it is possible to obtain almost perfect cross protection for the line circuits by using opposite polarities on the two control wires that parallel each other on the pole line. This