

amp. For a 20-volt battery 0.002 amp. would mean a 10,000-ohm ground.

This relay is so arranged that when connected directly across a direct-current bus, neither side of which is grounded, it is in equilibrium. If a ground occurs on either bus, this state of equilibrium is destroyed; whereupon, the center-pivoted armature is

ground connection as a protection against false operation of signaling functions while the detector-relay armature is "stuck" in either of its indicating positions.

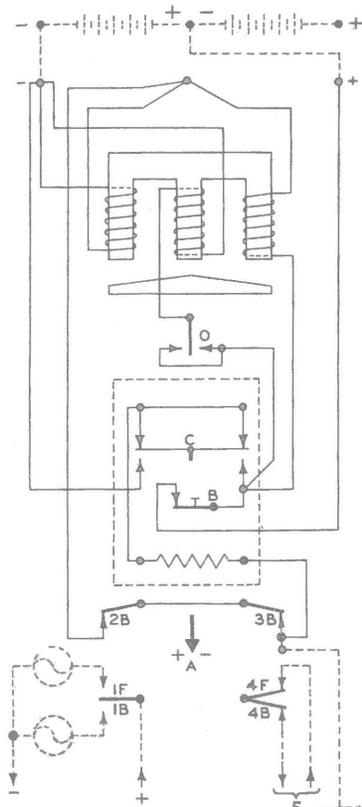
A pointer attached to the armature tells at a glance the polarity of the grounded bus, while contact No. 1 provides a means for controlling either one of two polarity lights at some point where this information is considered of value.

In addition, the split contact No. 4 is useful where it is desired to indicate a ground, on either bus of any one of a number of batteries, to the leverman by lighting a lamp on the track diagram. A series relay may be controlled over this contact on each ground-detector relay for this purpose.

The continuous vigilance and in-

stantaneous action of the ground detector relay are particularly valuable in the location of grounds on those circuits infrequently connected to the bus. When the leverman is instructed to note the routes set up when the indicator on the track diagram lights, the maintainer secures much aid in locating the ground.

Periodic tests may be easily and quickly made to determine whether the relay and indicating circuits are in perfect working order. For this purpose a small bakelite case has been mounted just in front of the relay coils. This case houses a two-position test switch, a reset button switch, and a fixed resistor that allows the minimum unbalancing current to flow during tests. The G-R-S Type-K ground detector relays are available for any voltage battery or bus.



Detail circuit for ground-detector

- A. Visual indicator
- B. Reset button
- C. Plus and minus test switch
- D. Ground indicating lamps.
- E. Contacts for series circuit
- O. Operating contact.

attracted to the one of the pole faces whose coil is not shunted by the ground circuit. In case of a simultaneous ground on each bus, the relay indicates that bus having the lower-resistance ground.

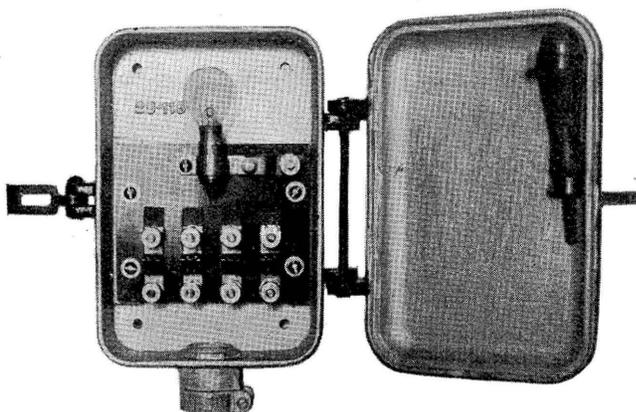
Solid wires on the accompanying wiring diagram are a part of the Type-K ground detector relay, while dotted lines are external or field wires. This circuit shows clearly how, if an effective ground causes the armature to be attracted to one pole face, the auxiliary coil on the center leg of the magnetic structure is energized through the operating contact *o*; thus the armature "sticks" in its operated position until manually reset by operating the button switch *b*.

Contacts *2B* and *3B* are adjusted to break after the operating contact *o* has made, so as to remove the normal

## Test Equipment for Highway Crossing Signals

THE T. GEO. STILES Company, Arlington, N. J., has developed a special test cabinet designed for testing highway crossing signals on a daily schedule by track walkers or other persons designated to do so, other than regular signal maintenance forces. For this reason, the apparatus is arranged in a separate cast-iron case to be mounted on a signal mast or at any other convenient point in the vicinity of the crossing. The case or cabinet can be locked by a standard

light, this condition indicates an incorrect condition. Each of the control circuits can thus be tested by placing the plug in the various springs and if improper operation is indicated, the fact can be reported at once to the signal maintainer. The test circuit can be so arranged that there will be no interference with the automatic block signal operation, or to give unnecessary operation of the highway crossing signals. Furthermore, the test equipment is so designed that the plug must be returned to its normal position before the door of the case can be closed, thereby eliminating any chance for interference with the normal operation of the circuits. The case is 5½ in. wide,



Test box for daily inspection of crossing signals

switch padlock. Procedure would be as follows: Unlock the case, take out the plug from its normal position and insert it in the first test spring. Then press the lamp test button. If the lamp is lighted full power, this is an indication that the circuit is complete and operating correctly, but if the lamp is not lighted or gives inadequate

8-<sup>3</sup>/<sub>8</sub> in. high, and 2½ in. deep, outside of cover to the back.

The cabinet contains four sets of open heavy phosphor-bronze springs, a miniature lamp socket and lamp-testing contact spring, all mounted upon a Formica block. The nonmetal test plug is carried by spring clamps in the cover.