

in place of the snubbing resistor and contacts in accordance with the instructions which appear with the circuit diagram, Fig. 2. It is furnished for 8-, 8-10, 10- and 20-volt Model-2A, d-c. signals.

## Power-Transfer Relay

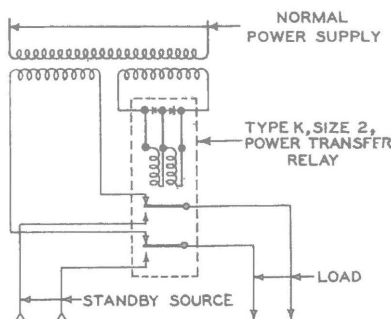
THE General Railway Signal Company's Type-K, Size-2, power-transfer relay provides a dependable and economical means for maintaining the efficiency of a signal system upon extreme voltage fluctuations and interruptions in the normal power supply. When referred to primary or line voltage values, the ratio of the release to the pickup is exceptionally high and of the order of 85 to 90 per cent over a temperature range of 150 to  $-19$  deg. F.

The accompanying circuit shows how this power-transfer relay is connected to the secondary or low-voltage side of the transformer, while the copper-oxide rectifier, an integral part of the relay, is mounted as shown in the illustration of the relay.

Based on a nominal line potential of 110 volts, the pickup and release values, at 85 deg. F., are 74 volts and 86 volts respectively. This is true for either the 8, 9, or 10-volt relay provided the transformation ratio is 110 to 8, 9, or 10 respectively. Of course,

During one half of each cycle, current flows through one relay coil and that leg of the rectifier in parallel with the second relay coil, while during the second half of each cycle, current flows through the second relay coil and that leg of the rectifier in parallel with the first relay coil.

Notwithstanding this alternating action, the relay is absolutely quiet in operation, since the inductance of each leg of the circuit causes the current flowing therein to have a direct-current component and a superimposed alternating-current component



Circuits for the new transfer relay

having an amplitude less than, but of practically constant percentage relation to, that of the direct-current component.

Less than 0.25 watt is consumed by this relay, which feature is of value since a power-transfer relay is energized practically all the time.

Once the armature of this relay starts to pick up or to release, it follows through to the stops. There is no possibility of the armature "floating"; therefore, the universal contacts mounted on articulated fingers are not subjected to unnecessarily severe service as is the case where the contacts can float slightly away from their seats while carrying a load sufficiently great to cause destructive arcs.

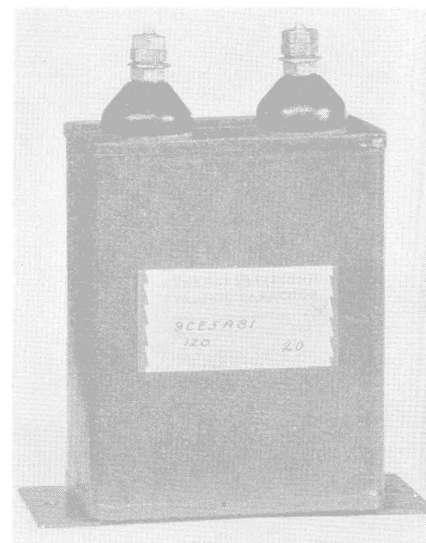
## Capacitor Units

THE TYPE-CE capacitor, for maintaining high power factor on signal power-transmission lines, has been announced by the General Electric Company. It is Pyranol filled, small and compact, hermetically sealed, and insulated according to A.A.R. Signal Section requirements. The Pyranol insulating and cooling medium is non-explosive and non-inflammable, and the capacitor can safely be installed in the housing with signal devices. The new unit is provided with feet for convenience in mounting, and the porcelain bushing-type terminals afford excellent creepage insulation. A metal nameplate securely attached to the

case insures a permanent reference record, and the case is finished with weather-resisting lacquer.

Four convenient ratings are provided, with uniform dimensions and terminal arrangement so that any desired capacitance may be obtained with combinations of these standard sizes.

Maintenance of high power factor is best accomplished by the installation of capacitors on the low-voltage side of each signal power transformer since, when so installed, transformer losses are reduced, and the line current is reduced to a minimum. The voltage drop, proportional to the line current, is likewise reduced to a minimum. This improves operating

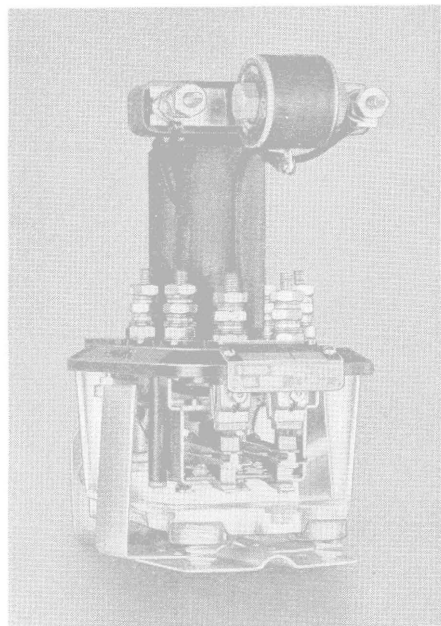


General Electric Pyranol capacitor

conditions by raising the voltage toward the end of the line, so that a more uniform voltage is provided for all signal devices. The cost of power is reduced to such an extent that in many instances the saving pays for the installation in a year. Reducing the voltage drop makes it possible to add more load to the line or to increase the permissible transmission distance.

## Ground Detector Relay for Instantaneous and Automatic Detection

THE General Railway Signal Company announces that a Type-K relay is available for instantaneously and automatically detecting grounds on positive and negative low-voltage buses fed from either single or center-tapped batteries where the ground current flow is not less than 0.002

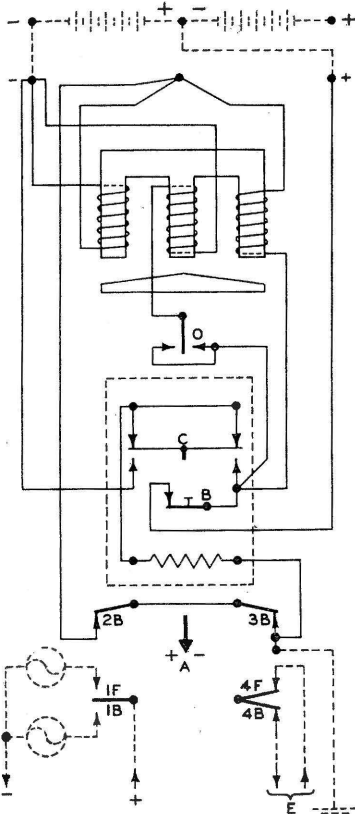


Type-K size-2 power-transfer relay

if the primary or high-voltage potential is greater or smaller, while the secondary or low-voltage potential corresponds to the rated voltage of the relay, the pick-up and release values will be proportionately higher or lower.

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



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

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-

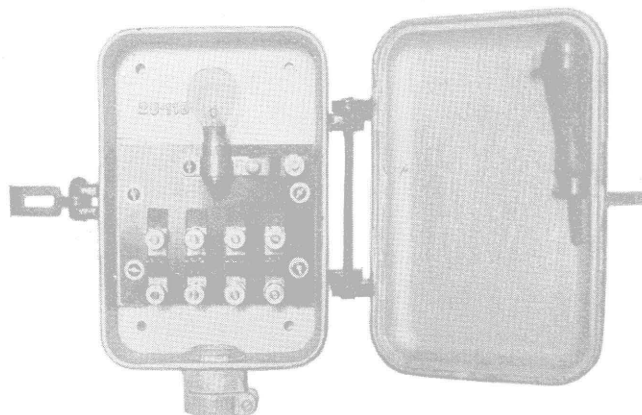
stantaneous action of the ground detector relay are particularly valuable in the location of grounds on those circuits infrequently connected to the bus. When the leverman is instructed to note the routes set up when the indicator on the track diagram lights, the maintainer secures much aid in locating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

## 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

8⅜ 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 monei-metal test plug is carried by spring clamps in the cover.