

Signal Training Bulletin

COMMITTEE G: Education & Training Communication & Signal Division, AAR

C-7 Polarized Relay- Neutral

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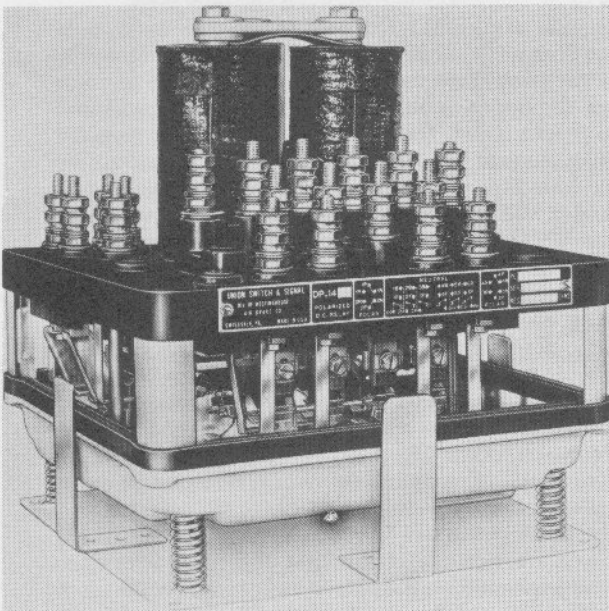


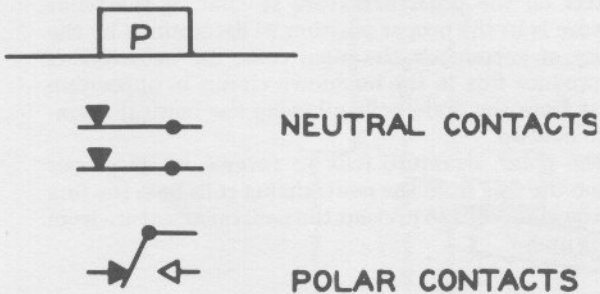
Figure 1(a) — Style DP-14 polarized dc relay.



Figure 1(b) — Type K polarized dc relay.

Definition: A neutral relay equipped with polar armatures and contacts.

Symbol:



Description: Polarized relays have a permanent magnet similar in shape and appearance to the core of the neutral relay. It is installed to the rear or in front of the two relay coils. One end of this permanent magnet is in contact with the yoke. The other end is equipped with a polar armature placed so as to operate alternately against the two neutral pole faces. The polar armature is suitably supported and is free to move toward either neutral pole piece. Contacts attached to either end of this polar armature are in turn connected to binding posts. A polar relay is normally equipped with four sets of neutral contacts and two or four sets of polar contacts.

Figures 1(a) and 1(b) show two types of polar relays.

Purpose and Application: Polarized relays are designed to furnish three bits of information on two-wire circuits.

(1) When the polar relay coils are energized from the line circuit with normal polarity, the normal polar contacts will be closed.

(2) When the line polarity is reversed the reverse polar contacts will be closed.

(3) When the line circuit is de-energized the neutral contacts will be closed on the backs.

If the circuits are designed so that both normal and reverse line polarity are utilized and/or the absence of line energy is detected, then one polarized relay may be used to control the three aspects of a signal.

Note: Circuits will normally be designed so that vital circuits are broken through the neutral front contacts and the normal or reverse polar contacts.

There are times when polarized relay contacts are installed in switch point checking devices. Circuits are normally designed so the relay polar contacts will be in the normal position when the switch is normal and will be in the reverse position when the switch is reversed.

Again a neutral front contact will be used in series with a polar contact for vital circuits.

General Information: When battery leads are attached to a polarity changing device, which under certain conditions reverses the direction of the current in the line circuit and the polarity on the control wires, the circuit is known as a polarized circuit. The operation of a relay used in this type of circuit depends on its operation from the direction of the current flowing through its coils, and is known as a polarized relay. The polar contacts close in one direction or the other, usually right or left, depending upon the direction of the current through the coils.

Detailed Information: On polarized relays the polar armature is suitably supported and is free to move toward either neutral pole face. Contacts are connected to either end of this polar armature. These contacts in turn connect to binding posts, closing or opening circuits, depending on the position of the polar armature. The polar contacts reverse their position whenever the polarity of the circuit through the coils is reversed.

Figures 2 and 3 illustrate typical operation.

When current flows through the coils of the relay, one of the pole faces becomes a south, and the other a north

magnetic pole; the lines of force flow from one pole through the air gap between the poles and into the other, and there is attraction between unlike poles. If both poles were similar they would repel one another and there would be no magnetic field between the pole faces.

The polar armature being part of the permanent pole magnet does not change its magnetic pole; therefore, the top of the permanent magnet remains one pole and the bottom the opposite pole. Because like poles repel and unlike poles attract, the polar armature will be repelled by a like neutral pole face and attracted by an unlike neutral pole face. The polar armature being pivoted in the center will cause the polar contacts to move and make contact with one set of binding posts keeping the contacts on the opposite side open.

By reversing the flow of current through the coils of the relay, the neutral pole faces will change to opposite magnetic poles. During this action the neutral contacts will open and close again. As the polar armature still retains the same pole there will be attraction where previously there was repulsion, and repulsion where there was attraction. The polar contacts will move in the opposite direction and close the contacts that were open, and open those that were closed.

Some polarized relays have a special feature in which there exists a positive check that the polar armature agrees in position with the polarity of energy on the main coils before it is possible for the neutral armature to pick up.

This is accomplished by an arrangement of holddown pole pieces which take the flux from the main cores to the bottom of the neutral armature. This effectively prevents the pickup of the armature until the holddown flux is neutralized by locally energized coils in the holddown magnetic circuit.

The neutralizing coil current is pole-changed by contacts on the polar armature so that, if the polar armature is in the proper position as determined by the polarity of current on the main coils, the neutralizing coils produce flux in the holddown circuit in opposition to that from the main coils allowing the neutral armature to pick up.

If the polar armature fails to reverse to its proper position the flux from the neutralizing coils help the flux from the main coils to prevent the neutral armature from picking up.

Figure 2

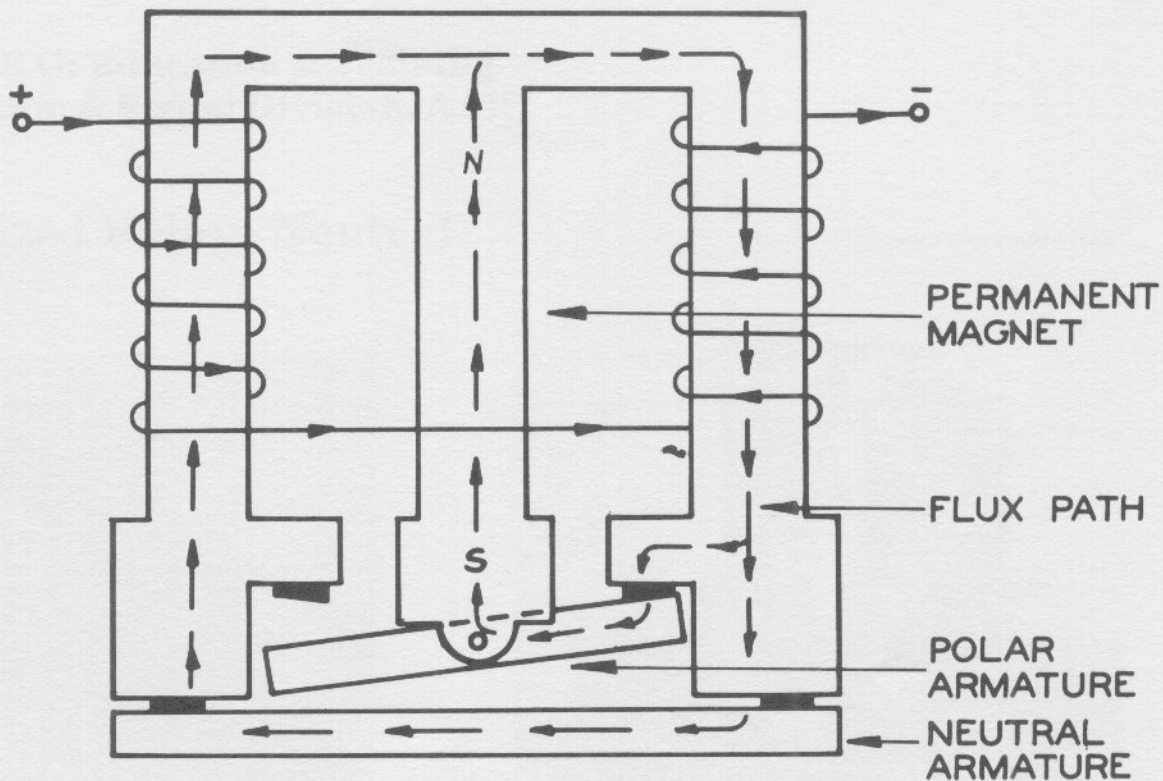


Figure 3

