**Signal Training Bulletin**

**COMMITTEE G: Education & Training**
**Communication & Signal Section, AAR**

# C-1 Direct Current Neutral Relay: General

*Approved October 1973*

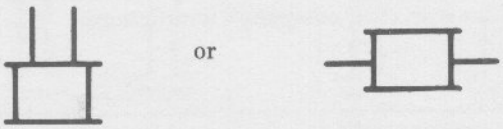
**Definition**

Relay: A device that is operative by a variation in conditions of one electric circuit, to affect the operation of other devices in the same or another electric circuit.

Relay, DC: A relay designed to respond to direct current.

Relay, Neutral: A relay which operates in response to a predetermined change of the current in the controlling circuit, irrespective of the direction of the current.

**Symbol:**




Single winding relay

**Description:** The relays described in this bulletin are referred to as vital relays. Because these relays are manufactured from precision components and meet high standards with regard to operating characteristics and dependability, they are suitable for use in circuits which directly control block signals, crossing protections, etc. Since lives and property of the public and railroad personnel are dependent on the safe and proper operation of this equipment, it is vital the relays be reliable.

Figure 1 illustrates two types of dc relays in common use in signal installations. Figure 1 (a) is a shelf or wall mounted, relay where electrical connections are made directly to binding posts on the relay. Figure 1 (b) is a plug-in relay. The wiring for this type is connected to a mounting base which permits easy, safe replacement of a relay without disturbing connections. Plug-in relays take up less space in the instrument housing.

The shelf or wall mounted relay will be used for illustrative purposes in these bulletins. Additional information on plug-in relays will be found in Signal Training Bulletin C-5.

The various designs, purposes and operating characteristics available in dc relays are often indicated by descriptive names. They are commercially classified as neutral, biased, polarized, flasher and others. Under several of these classifications there are a number of special purpose designs. For example, both neutral or polarized relays can be made slow pick-up, slow drop-away, etc.

The neutral relay was selected for the introductory bulletins since most all dc relays are basically of this type with modifications to permit special applications.

In this general introduction to dc relays the iden-

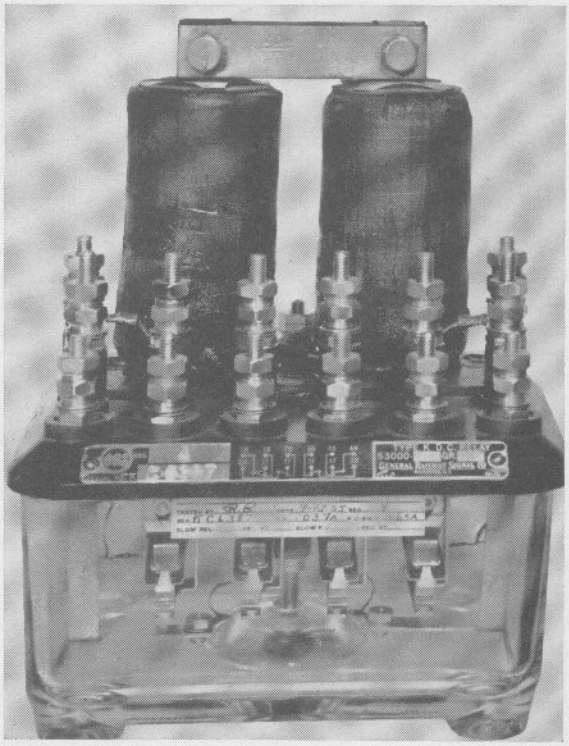


**Figure 1 (a)**

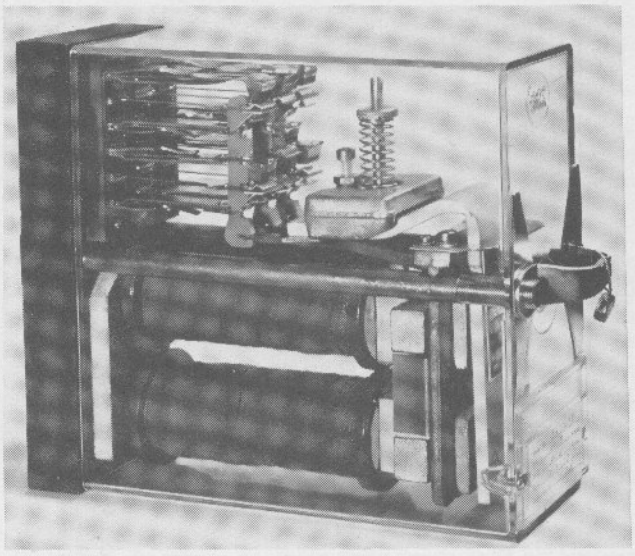


**Figure 1 (b)**


Figure 3 (a)

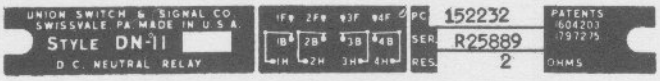



Figure 3 (b)

tification of the physical components is emphasized.

Figure 2 is a cut-away of one manufacturer's typical dc relay. The principal parts are identified in the illustration and will be frequently referred to in further studies of relays. Relays of other manufacturers will contain similar parts which may be arranged differently.

Note that all moving parts are enclosed in a sealed transparent compartment (glass or plastic).

Name plates, as illustrated in Figure 3, are mounted on the front of all dc relays and convey important information. See Figure 1 (a) for an illustration of where the name plate is mounted.

Note that on the plate, the style or type is identified, the position of the binding posts connected to the contacts are shown, the coil resistance is indicated along with other information such as manufacturer, ordering number, serial number, etc.

The binding post diagram illustrates the actual position of the posts on the top plate and is extremely useful. The name plate illustrated in Figure 3 (b) shows that this relay has four front, back and heel terminals. The circuit wiring plan will indicate the proper binding post by terminal number and contact symbol.

A label inside each relay compartment gives the exact operating characteristics on the relay. An example of a typical label is shown in Figure 4. An explanation of the operating characteristics is covered in Signal Training Bulletin C-4 Direct Current Relay Operating Characteristics.

**Purpose and Application:** This is the initial bulletin in the dc relay series and is intended to introduce the relay in general terms. Therefore, to explain the purpose of a relay it will be compared to an electric light switch. When the light switch is on, contacts in the switch provide a path for electrical energy from the ac source to flow through the lamp filament and energize it. Similarly contacts in a relay are inserted between a source of energy and a signal device. The main difference and advantage of the relay over the switch is that it may be controlled, automatically, eliminating the need for manual operation and removing the hazard of human error. Safety, of course, is of utmost importance in signaling.

The applications of dc relays in signaling are numerous and as further studies are made it will be recognized that there is no piece of apparatus more essential to signal operation.

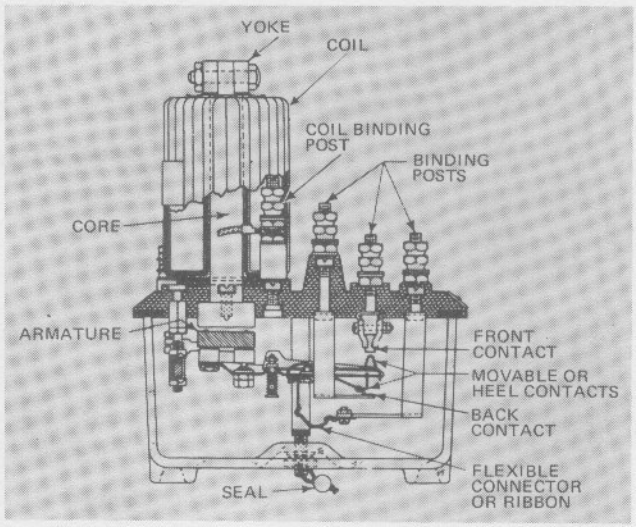



Figure 2

**General Information:** Many railroads have instructions outlining installation, maintenance and inspection procedures with regard to relays. It is most important that maintenance personnel become familiar with their company's instructions.

| DROP-AWAY | | PICK-UP | | WORKING | | SER: L 20989 |
|---|---|---|---|---|---|---|
| VOLTS | AMPS | VOLTS | AMPS | VOLTS | AMPS | OHMS 2 |
| | .054 | | | .206 | .103 | INSP. DATE Ab 5-12-73 |
| ~~SLOW REL.~~ | | ~~SLOW P.U.~~ | | | | ORDINARY ACT. |

Figure 4

**General Rules for Relay Maintenance:** At Regular Intervals:

A. Check binding post nuts and tighten if necessary.

B. Dust relay and determine that it is free of foreign material.

C. Check seals to see that they are intact.

D. Inspect to see that contacts are not pitted or burnt, all parts are in place, and the interior and exterior of the relay is moisture free.

E. Check the relay and its mounting for stability.

**Detailed Operation:** There are training bulletins for each commonly used type of dc relay and they include details of their operation.