New Developments

RETAINED-NEUTRAL NEUTRAL RELAY

The new Style DN-26 retained-neutral neutral relay recently developed by the Union Switch & Signal Company is designed so that it will retain its armature in the energized position when the associated control circuit is pole changed. This retaining function is performed by a special magnetic structure in which energy is transferred magnetically through a third core to the armature during the time of polarity reversal. The new relay will also bridge short open circuit periods during which there are no polarity changes, and a slow pick-up feature assists in preventing signal flashers at locations where light engines move at high speed over insulated joints.

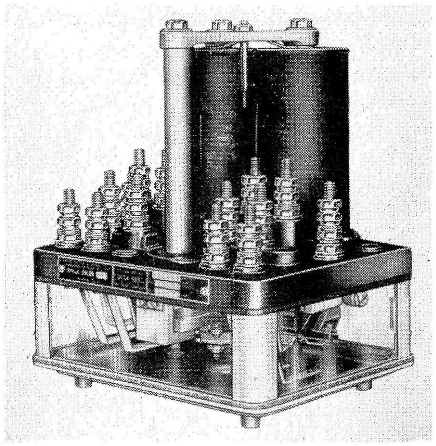


Fig. 1—The relay is designed so it will retain its armature energized when the associated control circuit pole changes

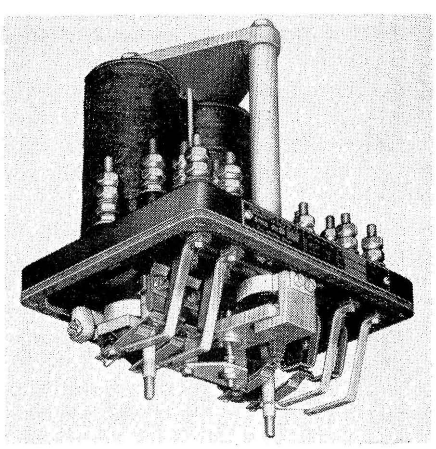


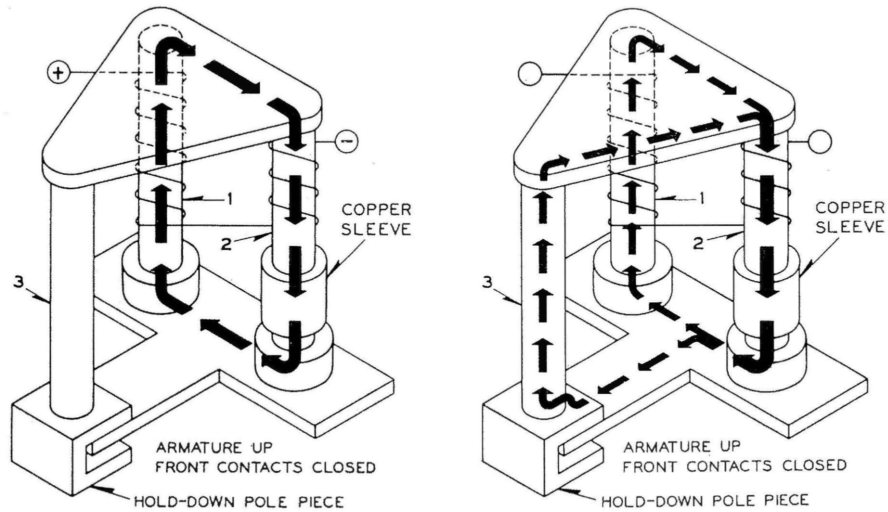
Fig. 2—The new style DN-26 retained-neutral neutral relay shown with its cover removed from place

Mechanical design of the DN-26 is rugged. There are no small-diameter cores that are subject to breakage due to accidental rough handling during shipment or installation, and the coil arrangement is as simple as that used on any other neutral relay. No secondary windings or holding coils are used, thus reducing the number of binding posts on the top plate and simplifying the wiring.

The DN-26 is compact: overall dimensions are only 7⅝-in. wide, 6¼-in. deep and 9-in. high. It is equipped with 4F-4B low-voltage dependent contacts, like those of the DN-11, i.e., silver to silver-impregnated carbon front contacts and silver to silver back contacts. Silver to silver-impregnated carbon back contacts can be furnished when required. Efficiency of the DN-26 is approximately the same as the DP-20 or DP-21 relays having four neutral contacts.

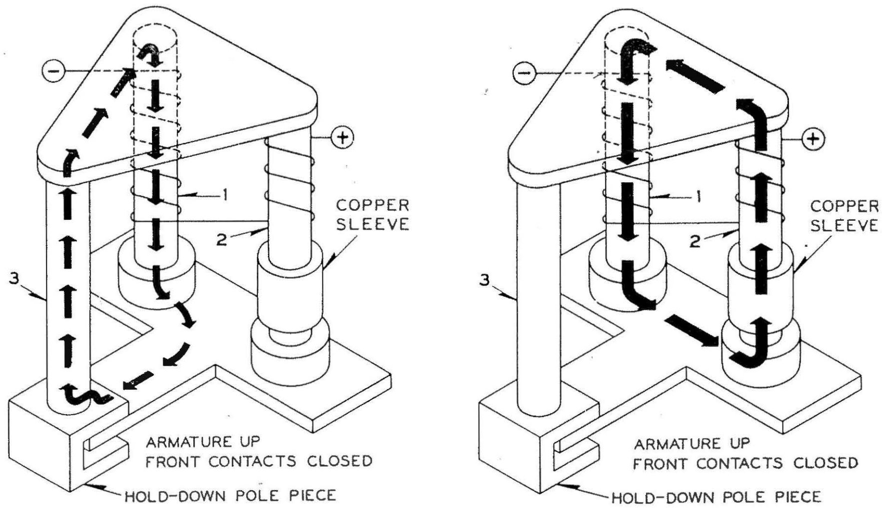
The relay as shown in Fig. 3A is in the energized position, and it is assumed that the operating current is controlled over contacts of a pole-changing relay. In this condition the magnetizing force in core 1 produced by its coil is equal to the magnetizing force in core 2 produced by its coil. Flux passes through cores 1 and 2 as the arrows indicate. Due to the balanced condition of the magnetizing forces, no flux passes through core 3. The armature is retained in the usual manner by the gap flux at cores 1 and 2.

Assume now that the pole-changing relay releases to reverse the polarity of the circuit. During the time the pole-changing relay is transferring its contacts, the circuit to the relay coils is open. The magnetizing force in core 1, due to the coil on core 1, immediately drops to zero. The magnetizing force in core 2 is sustained, however, due to the current induced in the copper sleeve on core 2. An unbalance of magnetizing force now exists. The magnetizing force in core 2, therefore, causes a decaying flux in core 2, which divides between cores 1 and 3 as shown by the thin arrows in Fig. 3B. The armature is, therefore, retained in the energized position by the combination of gap flux at cores 1, 2 and 3.



Left—Fig. 3A-Relay energized with normal polarity. Right—Fig. 3B-Control circuit opened, decaying flux holding armature up

When the back contacts of the pole-changing relays close, so that current of opposite polarity starts to flow in the circuit, the magnetizing force in core 1 is re-established in the opposite direction more quickly than in core 2 due to the retarding effect of the copper sleeve on core 2. An unbalance of magnetizing force is again established. This results in the increasing flux condition shown by thin arrows in Fig. 3C in which the magnetizing force in core 1 causes a flux to pass through core 3. Note that this flux in core 3 is in the same direction as the decaying flux as shown in Fig. 3B, and the armature is still retained in the energized



Left—Fig. 3—Control circuit reclosed with opposite polarity applied to relay, rising flux holding armature up. Right—Fig. 3D-Relay energized with reverse polarity

position by the combination of gap flux.

As the relay current increases to the final steady-state conditions as shown in Fig. 3D, the magnetizing force in core 2 gradually becomes equal to the magnetizing force in core 1, and the flux in core 3 gradually decreases, as a balance of magnetizing force occurs. When the pole-changing relay subsequently picks up to restore normal polarity to the control circuit, the armature will again be retained in the manner just described. All flux directons will be the reverse of those shown in Fig. 3A.

It will be noted that with this design the Style DN-26 relay is inherently slow release. The DN-26 relay is also slow pick-up. The slow pickup characteristic is obtained through the use of a hold-down pole piece associated with auxiliary core 3. When the armature is in its de-energized position, it rests on the hold-down pole piece. When energy is first applied to the relay coil terminals, the presence of the copper sleeve causes the flux in core 2 to build up slowly and, therefore, compels the flux in core 1 to pass through core 3, its hold-down pole piece, to the underside of the armature; thereby, creating a force which will hold the armature down. As the operating current becomes stabilized, the flux in core 2 gradually increases until it equals that in core 1; and the hold-down flux in core 3 decreases, permitting the armature to pick up to close the front contacts.

An improved method of controlling a double-track automatic block signal system, using the Style DN-26 relay is illustrated in Fig. 4. It provides all the basic advantages of a circuit using a polarized relay, without sacrificing any of the advantages obtained with a neutral relay. Moreover, the DN-26 inherently is immune to a.c. capacity or inductive coupling and is not likely to be damaged by any ordinary line surges.

In automatic block signaling, two timing problems are encountered in regard to movement of light engines or short wheel base vehicles over insulated joints, which may result in undesirable signal flashes or circuit operations. These problems are often referred to as "joint hopping". One problem exists at cut sections and the other at signal locations. At cut sections the solution depends upon keeping the minimum pick-up time of the HR relay (DN-26) equal to or greater than the maximum shunting time of the advance track relay minus the minimum pick-up time of the rear track relay. The solution at signal locations depends upon keeping the minimum pickup time of the HR relay (DN-26) to the rear equal to or greater than the maximum shunting time of the advance track relay plus the maximum release time of the HR relay (DN-26) minus the minimum pick-up time of the rear track relay. The Style DN-26 relay is adequately slow pick-up in both situations. Because of this characteristic, the track relay contact that is often used to break the line circuit at signal locations is not necessary. Consequently, a two-point Style DN-22BH track relay may be used instead of a four-point Style DN-11 track relay. The quicker release values avaliable with the Style DN-22HB relay measurably increase "joint hopping" protection. It can thus be seen that the improved circuit shown here not only solves, to a great extent, the "joint hopping" problem but, through the use of the Style DN-22HB relay, also provides for longer track circuits and increased safety. Power consumption is comparable to other automatic block signaling circuits.

The armature retaining feature provided in the Style DN-26 relay makes it particularly useful in a number of special situations encountered with polarized circuits. For example, in C.T.C. territory a neutral relay is sometimes connected in a polarized circuit to control an indication such as a block-occupied indication. In such instances, the Style DN-26 relay prevents

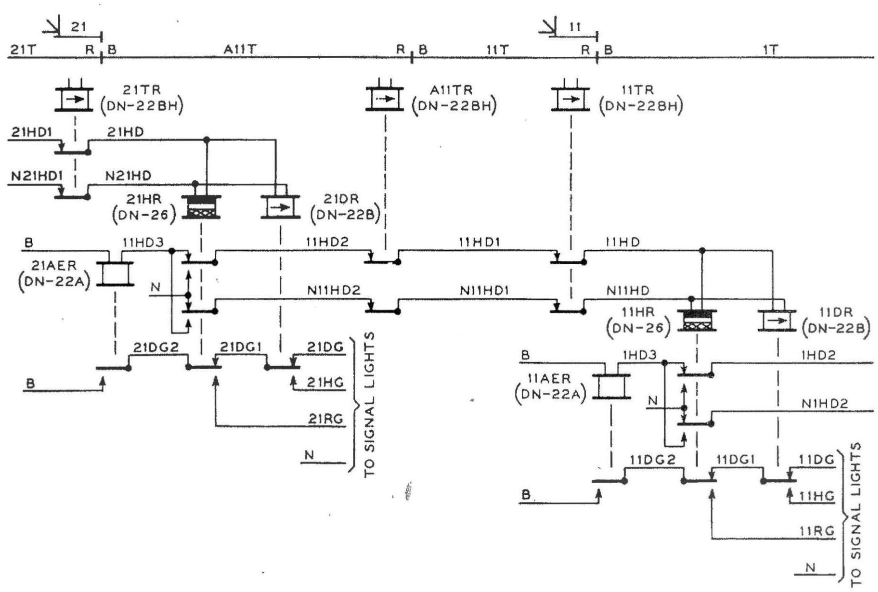
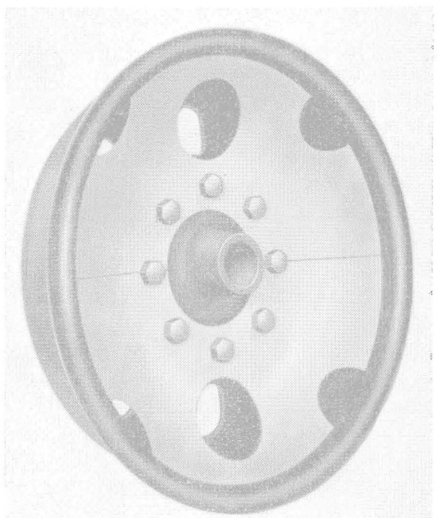


Fig. 4—Typical circuit using style DN-26 retained-neutral neutral line relay and Style DN-22B biased-neutral line relay

sending in an unnecessary code as would be done if the neutral relay momentarily released during pole change of the line circuit. The Style DN-26 relay may also be used to advantage in combination with polarity responsive devices such as polarized relays and searchlight signal mechanisms. Other applications include approach locking, approach lighting, and annunciator control.

MOTOR CAR WHEEL-SILENCER

A wheel-silencer for use on track motor cars has been developed and placed on the market by Fairbanks-Morse & Company, Chicago. The device is designed for use on all demountable hub steel wheels on motor cars of all manufacturers. Each wheel silencer consists of a disc in two sections which can be attached to a wheel without removing the hub or wheel plate. With this sound-deadening disc on all wheels, the men riding a car have an advantage of an increased hearing range—which is a necessity for improved safety while on the rails.

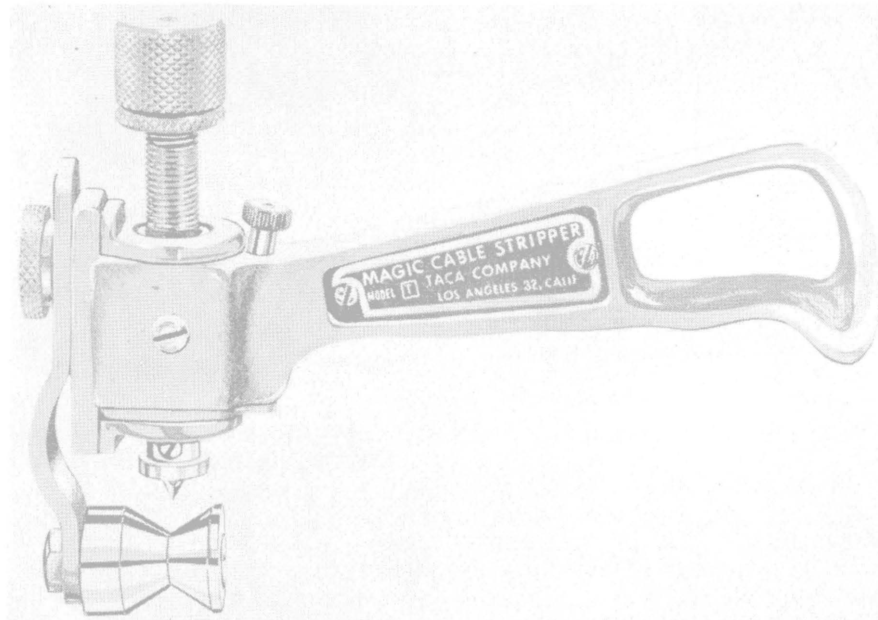


The device is designed for use on all demountable hub steel wheels

CABLE STRIPPER

A NEWLY-designed cable stripper for stripping the sheath from lead, armored, rubber, plastic and other kinds of cable is being made by the Taca Cable Stripper Manufacturing Company, 4307 Raynol Avenue, Los Angeles, Cal. The yoke and roller-swivel arrangements permits either circumferential or straight cuts to be made at any predetermined point on the cable, the entire operation being accomplished with one hand and without efforts on the part of the operator.

Sections of sheath from the center of the cable or at the ends for terminals are safely and easily removed without injury to the wires. The strippers are made in several models to meet the stripping requirements for various kinds of cable, and weigh approximately 7 oz. for the small size to 10 oz. for the larger size. They are precision built for long life, trouble-free operation and are unconditionally guaranteed.

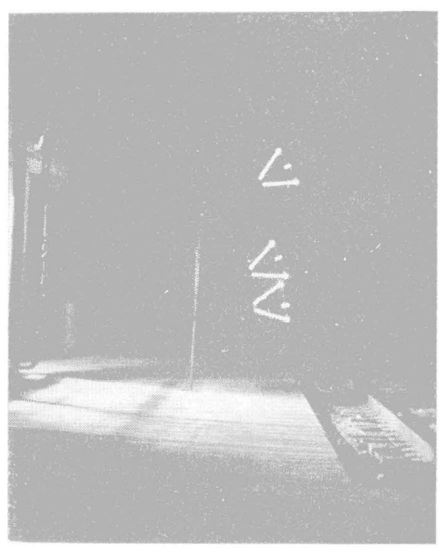


The yoke and roller-swivel arrangements on the cable stripper permit either circumferential or straight cuts to be made at any predetermined point on the cable, the entire operation being accomplished with one hand

ILLUMINATED TRAIN-ORDER FORK

A NEW form of illuminated train-order delivery equipment has been developed and placed on the market by E. G. Grams, Willmar, Minn. In this new equipment, the two arms of forks for handing up train orders are made of transparent plastic, known as lucite. A characteristic of this material is that the entire length of a rod is illuminated when light is directed into one end of it.

A 6-volt electric lamp at the base of each fork causes the entire length of both the forks to be illuminated, so as to be seen readily at night by enginemen and train crews on locomotives and cabooses when picking up train orders. Ordinarily the 6-volt lamps would be fed through transformers from the 110-volt a.c. commercial source. If no such power is available at an office, the lamps can be fed from batteries. The lamps are turned on automatically when the handle of a train order fork is inserted in the holder on the stand. The accompanying picture is a night view showing three train order forks in a stand ready for the orders to be picked up.



Night view of order forks. The arms of the forks are made of transparent lucite