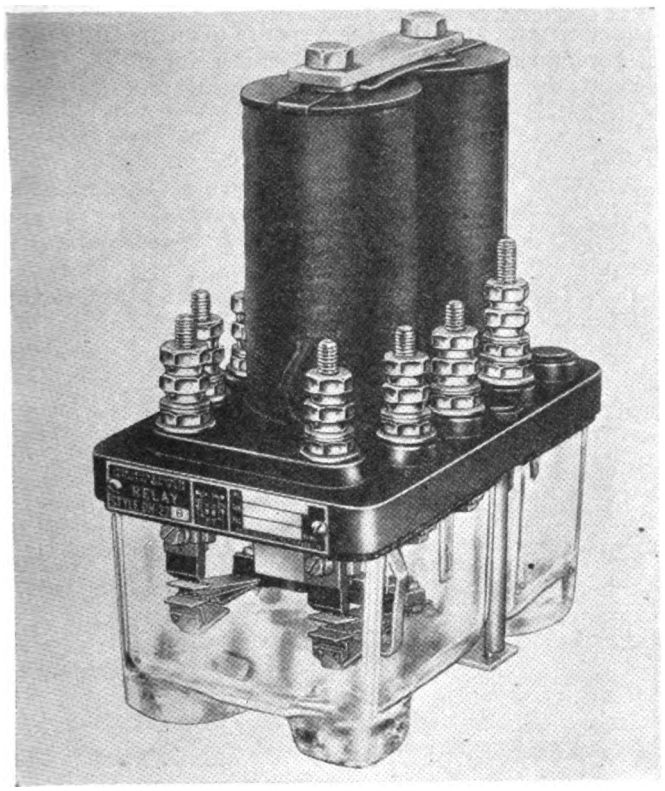
of sealing gasket, and a ledge over the door shields the joint between the case and door from water when the door is closed. A 2-in. flexible metal conduit extends from the rear of the case into a waterproof parkway-cable junction box, which is part of the base-of-mast casting. Gate arm clearance is said to be in excess of ¾ in. between the gate arm bearings and any passing part, including the hub.

Biased Neutral Relays

THE Union Switch & Signal Company, Swissvale, Pa., recently has made available two new two-point biased-neutral relays, designated as the Styles DN-22B and DN-22BH. Both relays are so constructed that their



The Style DN-22B biased neutral relay

armatures will pick up on current of one polarity only. Otherwise, design is based on the well-known DN-22, and the external parts and dimensions are the same. In the case of the DN-22B, operating characteristics are also the same. Both relays fully meet A.A.R. design requirements. The DN-22B is said to be suitable for a number of circuit applications, such as are suggested by Fig. 1,

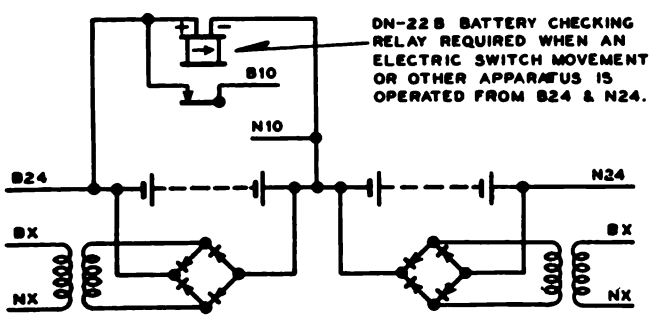


Fig. 1—The DN-22B used as a battery-checking relay

2 and 3. The relay can be used also in track circuit application, and in such service offers the same quick response to shunting as is associated with the DN-22. The DN-22BH relay has been designed especially for long, steady-energy track circuits, and offers definite advantages in this service as explained later.

The armature-bias feature is obtained by providing a permanent magnet at the lower edge of the armature. When the armature is in the released position, part of the flux from the permanent magnet passes lengthwise through the armature and exerts an extra downward pull, in addition to that of gravity, on the armature. When energy of the correct polarity is applied to the coils, the coil flux thus produced will be in opposition to the permanent magnet flux in the armature. The coil flux in the armature will increase to a point where the upward pull exerted on the armature will exceed the downward pull of the permanent magnet flux and gravity, at which time the armature will pick up. If energy of the wrong polarity is applied to the coils, the coil flux thus produced will then thread the armature in the same direction as the magnetic flux, thus preventing the armature from picking up. An advantage of locating the permanent

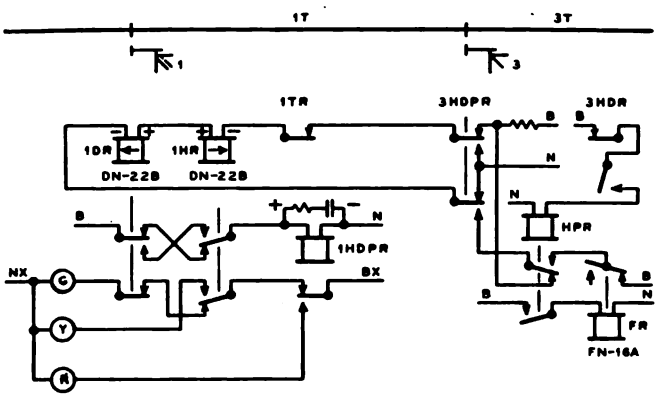


Fig. 2—The DN-22B relay used on polarized line circuits

magnet under the armature, as it is in the DN-22B and DN-22BH, is that in the de-energized position, the armature is held down by the permanent magnet. This is said to be of considerable benefit in maintaining back contacts closed under conditions of severe vibration.

The accompanying illustrations show a few of the numerous applications in which the DN-22B can be used. Other applications are shown on A.A.R. Signal Section typical drawings 8001A, 8005A and 8007A, included in the advance notice of the 1947 meeting, page 156A. Fig. 1 shows the DN-22B relay used as a battery-checking relay in installations having a split battery, in which polarized circuits are fed from one section of the split battery and switch movements or other loads are connected across the whole battery. The biased-neutral relay, acting as the battery-checking relay, prevents reversal of the polarized circuit should the battery feeding the polarized circuits become disconnected.

Figure 2, illustrates how, on polarized line circuits, two DN-22B relays can be connected in series, but with opposite polarities, so that one relay responds to one polarity and the other relay to the other polarity, in order to function in the place of the usual polarized relay. One road is said to be testing such a combination in an arrangement that provides for four indications with only two line control wires. To accomplish this, the DN-22B that controls the yellow indication is also alternately picked up and released over the contacts of an FN-16A flasher relay to provide a flashing yellow aspect. Figure 3 shows how the DN-22B can be used in installations using polarized relays, such as the DP-14, to obtain a check that the

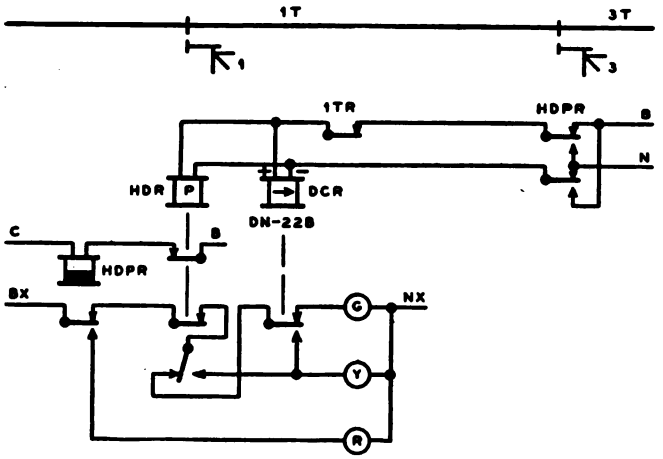


Fig. 3—The DN-22B for checking that the polar armature of a DP-14 relay responds correctly to polarity applied

polar armature responds correctly to polarity applied to the relay.

In the design of certain circuits, such as for the operation of motor car indicators and for special approach lighting or approach-energization problems, the biased neutral feature may be found useful.

The DN-22BH relay is modification of the DN-22B described above. The chief difference is said to be the use of a larger air gap, to provide an unusually high ratio of drop-away to pick-up. The resistance of the relay is matched to the track circuit in such a manner that the relay will operate safely under a much wider range of ballast resistance than previous standard d.c. relays having two ohms or four ohms resistance. Using 0.5 ohm coil resistance, the DN-22BH is applicable to d.c. track circuits up to the 6,000-ft. length, with capacity bonding and ballast resistance as low as two ohms per 1,000 ft.

The DN-22BH is the result of a careful study to produce the nearest practicable approach to the ideal track relay for steady-energy circuits. When used to replace standard four-ohm relays, the shunting sensitivity of circuits will be increased as much as 72½ per cent with ballast resistance as low as two ohms per 1,000 ft., and primary battery of 0.6 to 0.9 volt as the source of supply (5,000-ft. track circuit). Broken-rail protection is obtained with considerable margin for all track circuits up to maximum length of 6,000 ft.

Broken-down joint-insulation protection is secured through the bias on the armature which makes the relay responsive to polarity of one direction only. Staggered polarity on alternate track circuits is thus made practicable to obtain benefits not available with previous standard d.c. relays. In addition, the biased neutral feature is said to reduce vulnerability to the effects of foreign current by 50 per cent, due to the response of the relay to one polarity only.

The ratio of "drop-away" to "working" is 80 per cent minimum as compared to 53 per cent minimum for conventional d.c. relay. In order to secure this high percentage "drop-away" in terms of "pickup" and "working," the relay has been built with a special air gap and has only two contacts. If more contacts are required, or if relatively large currents or inductive loads are to be handled the manufacturer recommends that a repeater relay be used. In this manner, high percentage "drop-away" can be retained for very long periods.

In service, drop-away minimum can be established at 85 per cent of new relay drop-away or 68 per cent of "working" value compared to present conventional four-point, four-ohm track relays having minimum permissible service drop-away of 35.5 per cent "working." This improvement of almost 100 per cent in drop-away ratio provides the exceptional and very desirable improvements in shunting sensitivity and broken rail protection.

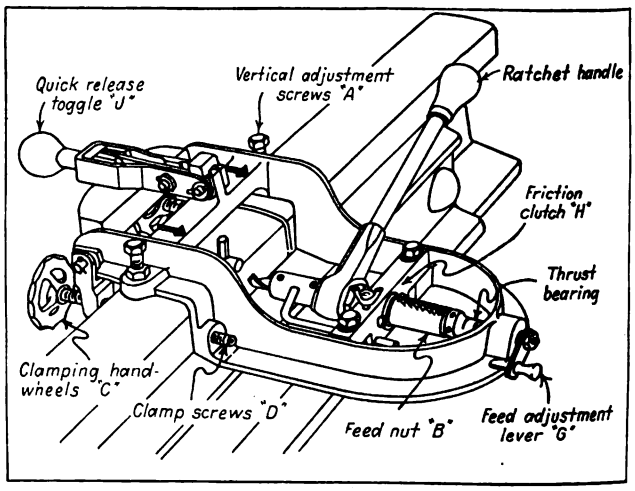
In order to obtain the favorable operating characteristics of the DN-22BH, the cost of operation, as represented by primary battery life, is somewhat higher than for conventional d.c. relays. However, for 4, 5, and 6,000-ft. circuits the *occupied* current is less, due to higher series resistance.

The 0.5 ohm two-point relay with "working" current 0.320 amp. and "drop-away" at 0.256 amp. and with biased neutral armature for response to one polarity only, is recommended by the manufacturer for all d.c. track circuits as a standard track relay, using repeater relays where more contacts are required.

Further information on these new developments may be had by writing to the manufacturers. In doing so, please mention *Railway Signaling*.

New Lightweight Drill for Rail-Head Bonds

THE Ohio Brass Company, Mansfield, Ohio, has developed a new lightweight, hand-operated, rail-head drill to meet the need of signal maintenance force crews. Named the Headrill, this new handy tool is equipped with a toggle clamping device which attaches low on the rail head, regardless of lipped condition. The toggle is said to provide a quick release for immediate clearance in the case of an approaching train. A level for uniform location, a depth indicator for control of hole depth, and an automatic feed for uniform drilling are included.



New lightweight, hand-operated, rail-head drill

The Headrill is intended as an emergency tool only. It can be carried on walking inspection or it can be an every-day-part of the ordinary equipment, to be available when needed to install a bond. The standard 5/16-in. Maximum depth hole can be drilled in about three minutes with slight effort. A Hammerhead bond can be installed in six or seven minutes. Accuracy of the drilled hole in both diameter and depth is equal to the A.A.R. requirements, or better.