

## Signal Training Bulletin

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

## C-22 Interlocking Relay

Approved November 1978

**Definition:** A relay having two independent magnetic circuits with their respective armatures so arranged that the dropping away of either armature prevents the other armature from dropping away to its full stroke.

**Symbol:**



FLAGMAN CONTACT

**Description:** Figure 1 shows interlocking relays of two different manufacturers.

An interlocking relay consists of two relays mounted side by side on the same base, with an interlocking mechanism between the two armatures. When one side of the relay is de-energized and its armature drops to close its back contacts, it actuates the interlocking mechanism which will prevent the other armature from closing its back contacts when it is subsequently de-energized but will allow the normal front contacts to open. Some relays are equipped with special front contacts which are adjusted to remain closed when the relay is de-energized and interlocked to prevent the closing of its back contacts. These special contacts are called flagman contacts. The back contacts may be heavy duty (HD).

**Purpose and Application:** The relay performs a dual function:

(1) To activate the warning devices when a train approaches the crossing.

(2) To cause the crossing warning devices to cease operation after passage of a train over the crossing. This prevents operation as the movement recedes from the crossing.

This relay is used to control highway crossing signals for train operation in either direction on the same track.

**General Information:** Interlocking relays must be inspected, adjusted and sealed in accordance with railroad's requirements.

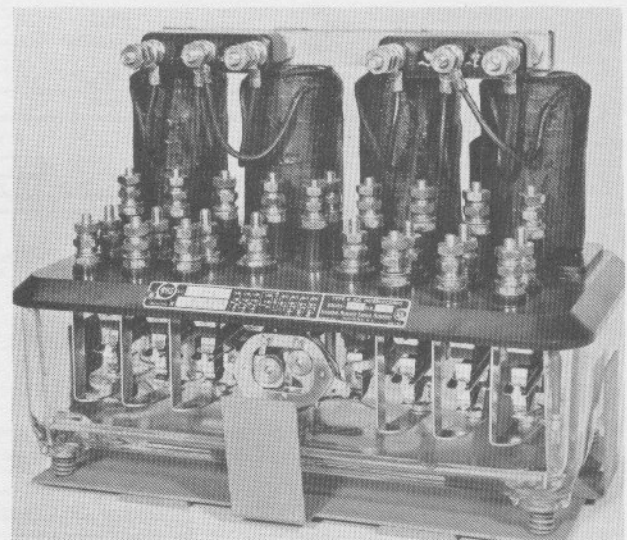


Figure 1 - Type K dc interlocking relay.

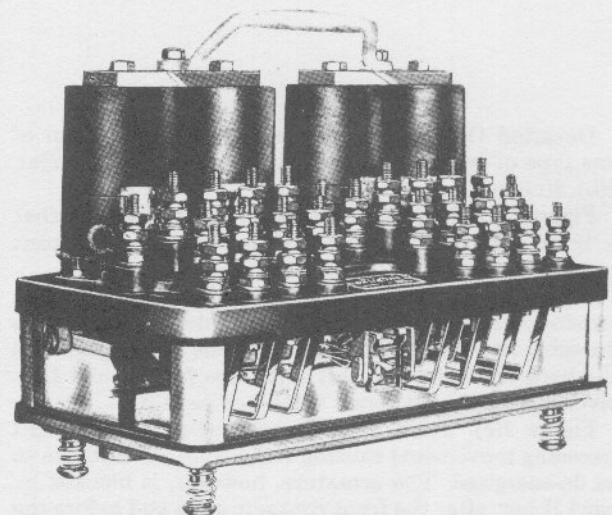


Figure 1 - Style DX 13 dc interlocking relay.

Figure 2 (a)

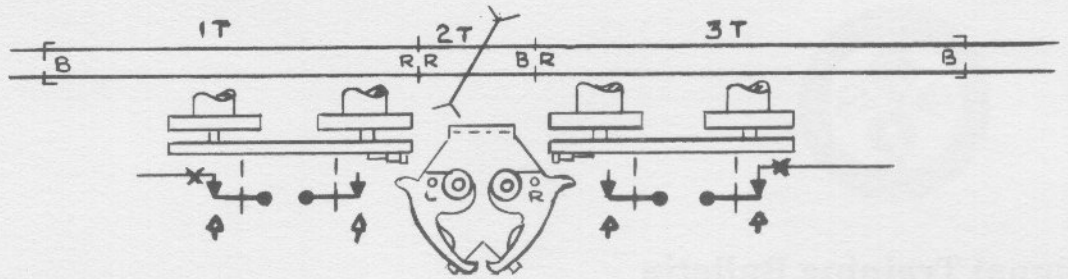


Figure 2 (b)

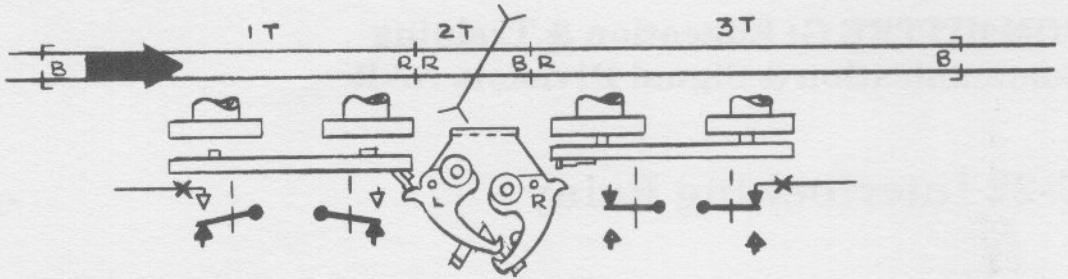


Figure 2 (c)

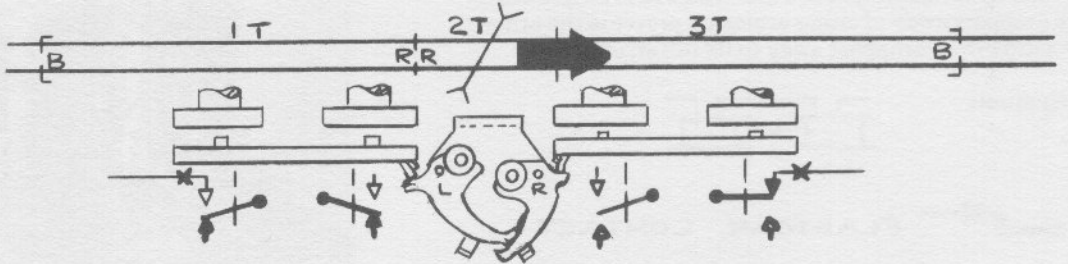
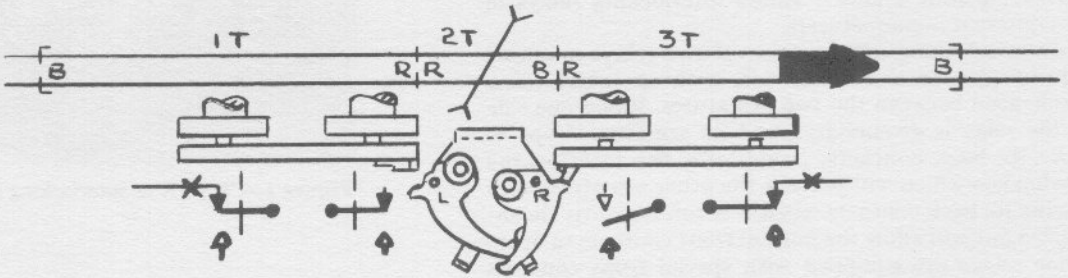


Figure 2 (d)



**Detailed Operation:** The sequence of operation of one type of interlocking relay is shown in Figures 2(a), 2(b), 2(c) and 2(d).

Figure 2(a). Relay is in normal energized position, that is both armatures are in the up position with front contacts closed.

Figure 2(b). Train enters track circuit on the left, causing relay coils on that side to be de-energized, thus dropping the armature which opens the front and closes the back contacts. The left armature forces pawl L to pivot to a position where it will block pawl R.

Figure 2(c). Train enters track circuit on the right (receding movement) causing relay coils on that side to be de-energized. The armature, however, is blocked by pawl R just after the front contacts open and before the back contacts close. Where flagman contacts are used, the front flagman contact would be held closed.

Figure 2(d). Rear of train has cleared track circuit on

the left and the center track circuit, the relay coils have become energized and the front contacts have closed. Pawl L, however, is locked against pawl R in such a manner that with the left armature picked up L will not return to its normal position nor release R thereby holding the right armature in mid-position. With relay in this interlocked position, the back contacts are open and where flagman contacts are used, flagman contacts would be held in closed position. When the rear end of the train clears the track circuit on the right and the armature on the right picks up, R will move to the right to release L and both pawls will return to their normal position.

Figure 3(a) shows a circuit for highway crossing signals using the interlocking relay back contacts.

Figure 3(b) shows a circuit for highway crossing signals using the interlocking relay flagman contacts.

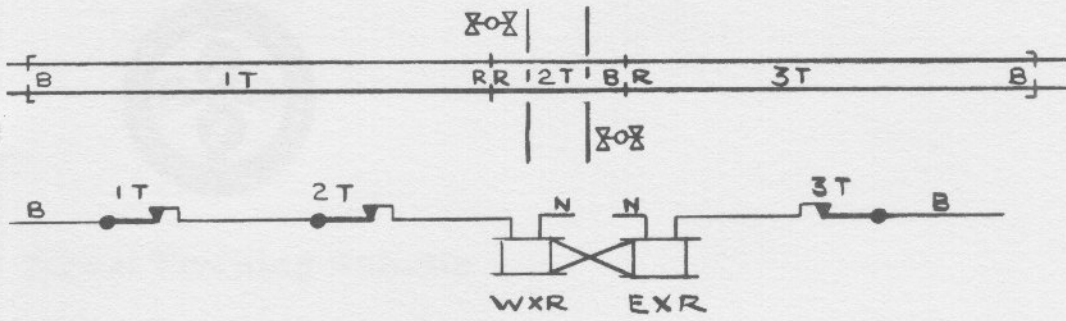


Figure 3 (a)

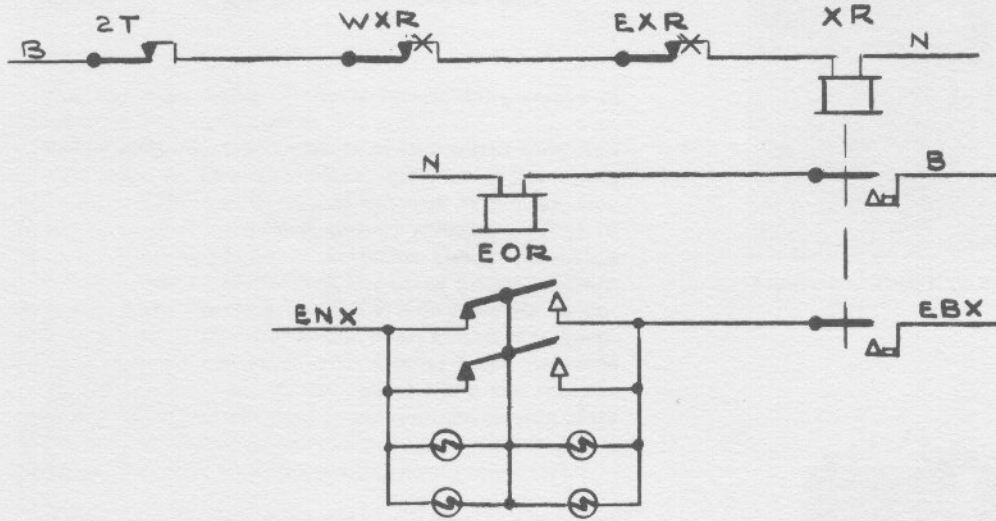
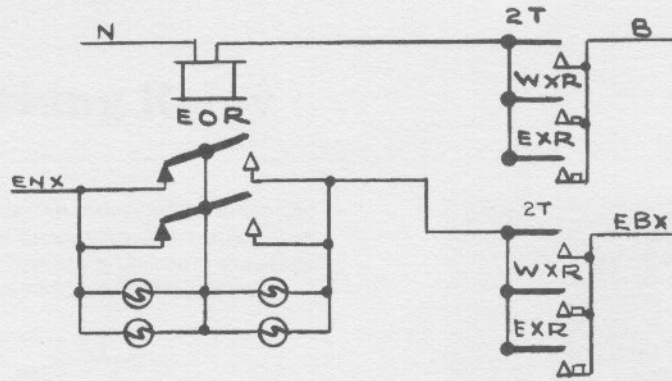


Figure 3 (b)