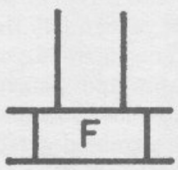
COMMITTEE G: Education & Training
Communication & Signal Division, AAR

C-11 Flasher Relays

Approved October 1973

Definition: Flasher relay: A relay so designed that, when energized its contacts open and close at predetermined intervals.

Symbol:



Description: The flasher relay shown in Figure 1(a) consists of either 2N-2R or 4N-4R lamp contacts, rated at 5 amperes per contact. All contacts are made of a special alloy material with non-sticking characteristics.

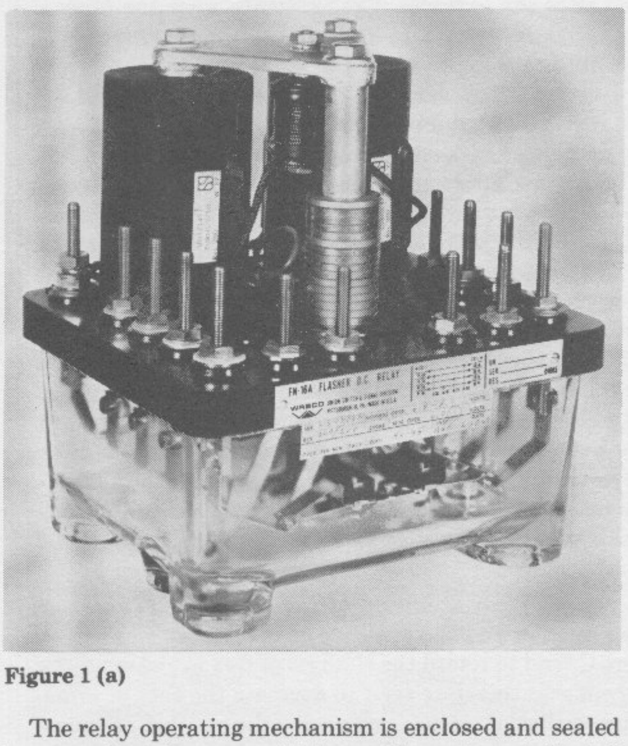


Figure 1 (a)

The relay operating mechanism is enclosed and sealed in a one-piece glass case which provides a view of all vital internal parts. Terminal connections are shown on the name plate attached to the front of the relay. Relay coils are placed outside of the case. Copper washers, located on the common core, may be added to or subtracted from to adjust flasher timing without breaking the relay seal.

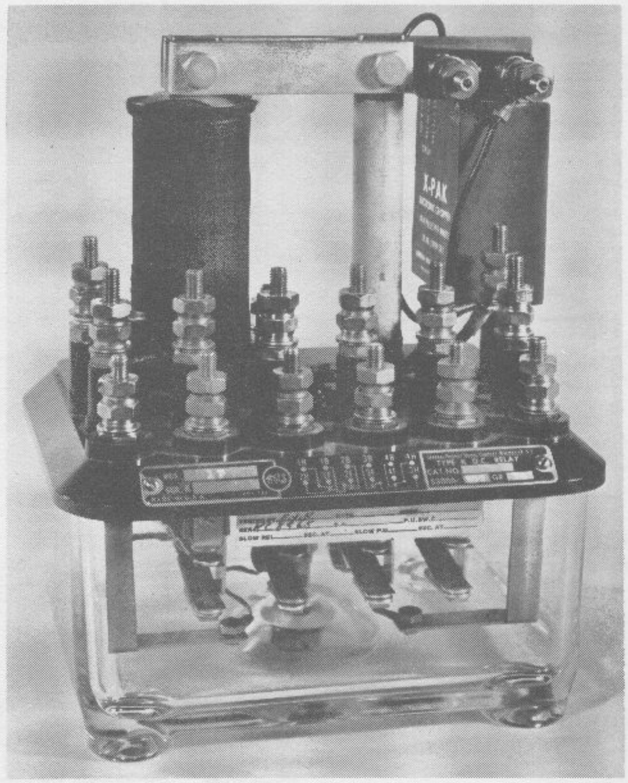


Figure 1 (b)

The armature is biased by a counterweight so that one-half of the lamp contacts are normally closed when the relay is de-energized. Thus, in highway crossing signal installations, if for some reason the relay fails to operate, one steady red indication will be displayed by each signal.

The flasher relay equipped with solid state controller as shown in Figure 1 (b) is a neutral relay equipped with a single operating coil for rapid pickup, and four dependent, front-back, heavy-duty, nonfusing lamp-control contacts. Equal front and back contact pressure is maintained while the relay is in operation; full back contact pressure is maintained while relay is inoperative to provide for a steady red indication to be displayed by each signal if the relay is not operating.

The relay contacts are enclosed in a one-piece glass case which provides view. Terminal connections are shown on the name plate attached to the front of the relay. The relay coil and solid state controller are placed outside of the case.

The solid state controller drives its associated neutral relay at a constant rate of 40 to 45 flashes per minute so therefore provides no means for manual adjustment.

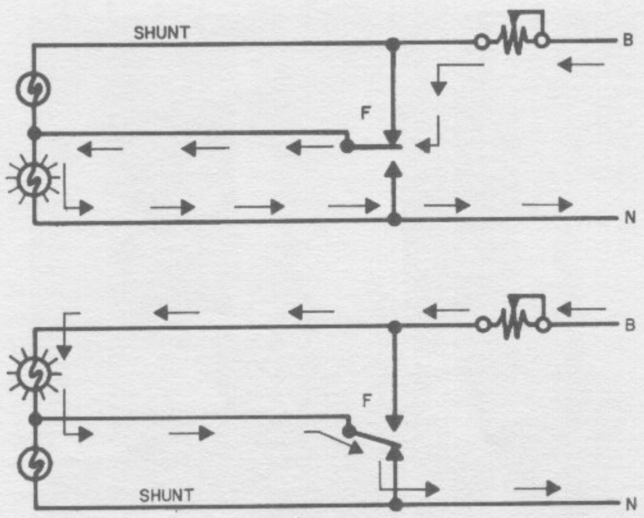


Figure 2 (a) illustrates a shunt type circuit for a light. Arrows indicate current flow.

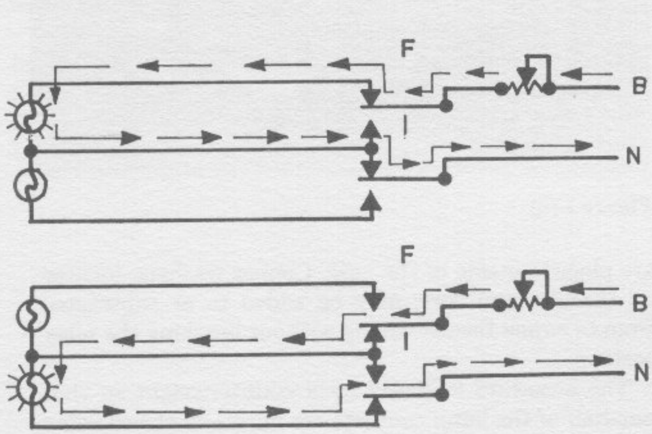


Figure 2 (b) illustrates a make and break type circuit for a light. Arrows indicate current flow.

Purpose and Application: Flasher relays are used for the operation of highway grade crossing lights and for providing flashing aspects of wayside signals, control board lamps, etc. They should be adjusted to give not less than 30 nor more than 45 operations per minute for crossing signals and 45 to 75 operations per minute for wayside signals and control boards.

Flasher relays can be used either for shunt control or for make and break control of lamp circuits. The shunt control of lamp circuits results in a longer life of contacts, and therefore is the type normally recommended and used.

General Information: The flasher relay, like all vital relays, is sealed. Therefore, with the exception of normal visual inspection, it requires little field maintenance. One test, peculiar to the flasher, is a periodic check of the number of flashes per minute. This test is conducted by authorized personnel and the frequency at which the test is performed is in accordance with the individual railroad instructions. The flasher relay shown in Figure 1(a) has provision for adjusting the flasher rate, externally. This adjustment for the relay in the field involves adding or removing copper washers on the common core. When washers are removed the flasher rate is increased. When washers are added the flasher rate is decreased.

The solid state controller drives its associated neutral relay at a constant rate of 40 to 45 flashes per minute through a voltage range of 8 to 16 volts dc. The solid state controller establishes and maintains this flashing rate, holding a practically constant ratio of on-off time. The flashing rate is determined solely by the circuit constants of the solid state controller and is not affected by the relay.

Detailed Operation: The relay, illustrated in Figure 3, operates in the following manner. Core C serves as a common path for the flux produced alternately by the coils A1 and B1. The armature is centrally pivoted so that it can oscillate between the two pole pieces to open and close the contacts. The armature, once the relay is de-energized, returns to its normal position by means of the counterweight. With the armature in its normal position, control contact Y1 is closed, shunting coil A1. All wiring for contacts Y1 and Y2 is internal and there is no need or provision made for external connections.

When energy is applied to the coil circuit, the current in coil B1 sets up a flux in the magnetic circuit comprised of core B, backstraps, common core C, and the armature.

This results in the armature being attracted to the pole piece of core B, thereby opening contact Y1 which removes the shunt from coil A1 and closing contact Y2 which applies a shunt to coil B1. The resultant current in coil A1 sets up flux in the magnetic circuit comprised of core A, backstrap, common core C and the armature, so that the armature is then attracted to the pole piece of core A. Thus the armature is caused to oscillate between the pole pieces of core A and core B and provide the desired timing intervals for flashing of the signal lamps.

The alternate shunting of the coils by the contacts and rectifier and the presence of the copper washers on core C tend to retard the changes of flux in the magnetic circuit and therefore tend to decrease the rate of armature oscillation. Hence, increasing the number of copper washers on core C decreases the rate of oscillation, while decreasing the number of washers on core C produces an increase in the rate of oscillation. This arrangement provides a simple effective means for field forces to control the flasher rate within the limits specified by the AAR. In addition, an adjustable magnetic shunt bar is

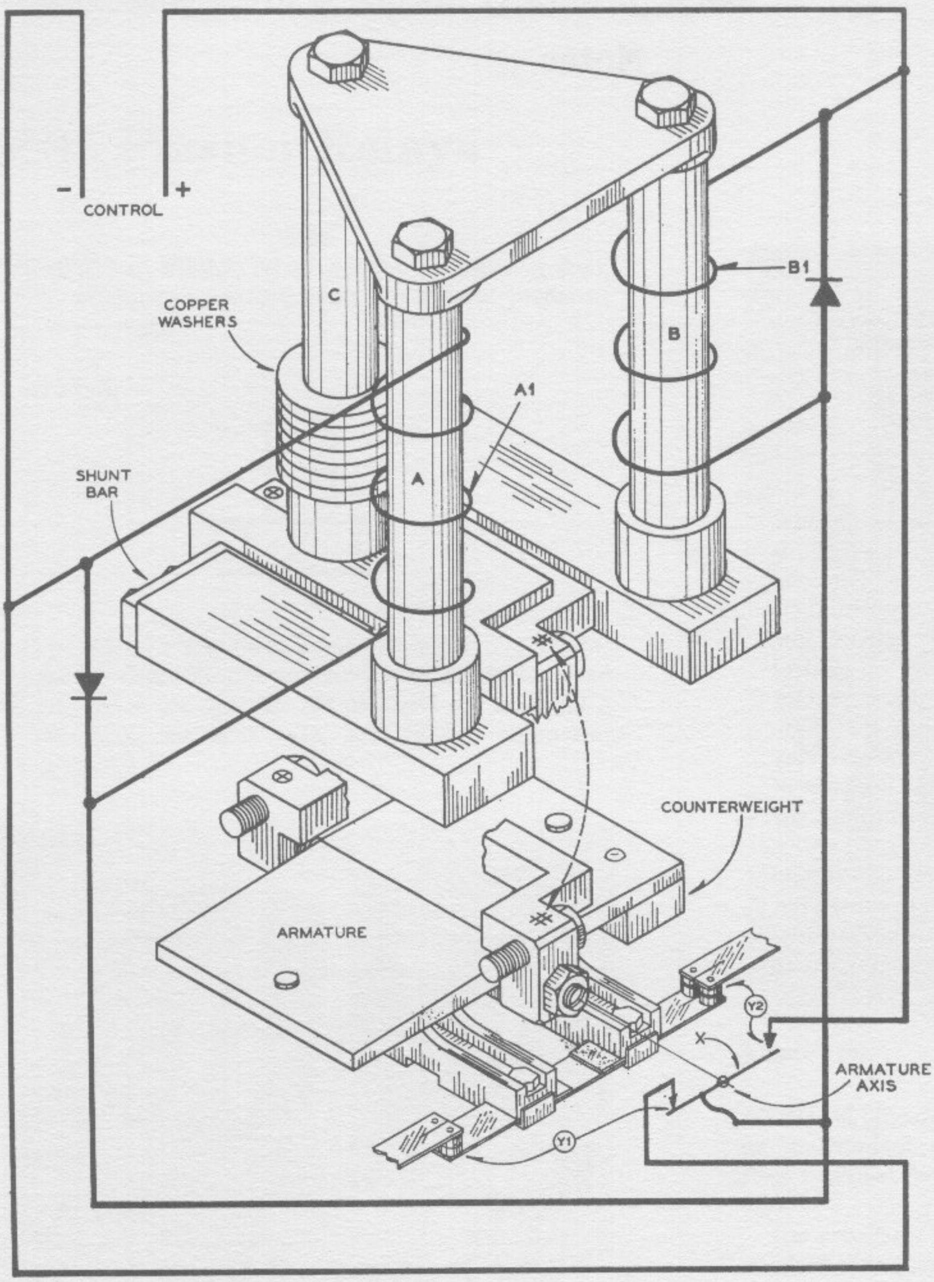


Figure 3

provided to permit shop forces to regulate the armature oscillating period so that on time for both normal and reverse lamp contacts is obtained.

The rectifier mounted on the backstrap of the relay also suppresses radio interference which is created by the opening and closing of the operating contacts.

Figure 4 shows the wiring connections for another type relay and solid state controller combination. The solid state controller includes an internal current limiting resistor with three external terminations to provide the correct operating current to the relay.

The solid state controller flasher may be operated

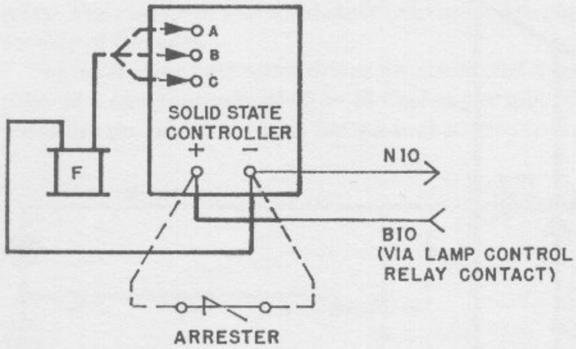


Figure 4

from full wave rectified energy. However, to ensure stable performance, an independent energy source is required that has a ripple of less than one volt. The solid state controller drives the neutral relay which is equipped with a single operating coil for rapid pickup. Four dependent, front-back, heavy duty, lamp control contacts are nonfusing. Equal front and back contact pressure is maintained while the relay is in operation. Full back contact pressure is maintained while the relay is inoperative. Two input terminals provide a means of mechanically mounting and electrically coupling the solid state controller to the relay.

When operating at 8 to 10 volts, the relay coil should be connected to terminal A of the solid state controller; at 10 to 12 volts, the coil should be connected to terminal B; at 12 to 16 volts, the coil should be connected to terminal C.

Notes