A. **Purpose**

This Manual Part recommends vital circuit design guidelines for relay based flashing-light applications for grade crossing warning devices.

B. **General**

1. The vital circuit design guidelines provided in this Manual Part shall also apply to equivalent vital electronic and/or software applications.

2. The vital circuit design guidelines provided in this Manual Part represent one method of design for flashing-light circuit applications. Some aspects of the circuit design may vary depending on the design practices of the individual railroad.

C. **Circuit**

1. An example of the flashing-light circuit is shown in Figure 163015-1. The circuit is activated by the crossing control relay (XR) being de-energized. This places operating battery on the flasher relay (EOR) and lights. When the EOR becomes active, it shall cause the lights to alternately flash. When the XR is energized, battery is removed from the EOR and operating energy is removed from the lights.

2. The option of power off circuits utilizing ac power may be used for lighting purposes. If ac power is lost or interrupted, the flashing-light load is transferred to dc battery. The power transfer relay (PTR) is a dc relay that uses a rectifier as an integral part of the relay. The PTR must provide a positive drop away when the ac lighting voltage drops below a predetermined voltage. This provides protection against low ac voltage or power failure. The PTR front contacts must close when the coil voltage reaches pick-up value. Threshold voltage of the PTR is adjusted by use of an adjustable resistor as shown in Figure 163015-2.

Remove Figure 163015-02, add HD contacts on EOR (8 places), remove automatic rectifier and battery in 163015-01
Figure 163015-1 Example of the Flashing-Light Circuit
The following figure to be deleted:
Figure 163015-2 Example of Adjustable Resistor