Part 6.1.45

Recommended Design Criteria for Flasher Relay,
Shelf or Wall Mounting
Revised-Reaffirmed 2017-2021 (5 Pages)

A. Purpose

This Manual Part recommends design criteria for an electro-mechanically or electronically controlled tractive-armature flasher relay for operation on direct current.

B. Design

1. Flasher relay should be furnished with four sets of dependent normal and reverse contacts.

2. All moving parts shall be enclosed in a case that, with the exception of the screened breather in the bottom, shall meet NEMA 2 requirements for dirt and moisture protection. The sides of the case shall be of a material of such transparency that the parts within the case shall be readily visible for inspection. Case shall be so secured that a minimum clearance of 1/8 in (3.175 mm) exists between it and all moving parts.

3. If a breather opening is provided in the base of the case, it shall be screened and adaptable for closing.

4. All nuts and screws shall be securely locked.

5. Contact elements and other moving parts shall be so secured or designed that they cannot be damaged or lose adjustment during shipment.

6. Means shall be provided for adjustment of the flashing rate in service without breaking the seal.

7. For electronically controlled flasher relays, module shall meet NEMA 2 requirements for dirt and moisture protection and the electronic components shall be protected against mechanical damage. It shall be capable of operating from 8 volts to 16.5 volts dc.

C. Mounting

Mounting shall conform to Manual Part 6.5.1 Identical Items "Boilerplate" for All Relay Manual Parts in Section 6, Section B.
D.  **Armature Supports**

1. For both electronically controlled flasher relays and electro-mechanically controlled flasher relays, the armature supports shall conform to Manual Part 6.5.1 Identical Items "Boilerplate" for All Relay Manual Parts in Section 6, Sections C.13, C.14 and C.17.


E.  **Air Gap**

   Air gap shall conform to Manual Part 6.5.1, Sections D.7 and D.8.

F.  **Coil Insulation**

   Coils shall conform to Manual Part 15.2.4 Recommended Selection and Application Criteria of Insulating Materials Used in Coils for Magnetic Assemblies and in Other Electrical Devices.

G.  **Contacts**

1. Contact elements shall be so secured that they will not shift or become loose in shipment or service.

2. Material used in affixing contact elements shall not cause corrosion.

3. Internal operating contacts where used for the control of the energizing current of the relay shall be so designed that they cannot, in normal operation throughout the useful life of the relay, stop in a position to prevent the relay from properly performing its function.

4. Contacts should be designed to open and close a non-inductive tungsten lamp load of 5 amperes (ac or dc) at 30 volts or less per contact, $r_t$—for 10 million operations with the average resistance per contact not to exceed 0.05 ohm. The contact resistance should be determined by taking at least 20 readings, at every 500,000 operations, during the test. The initial cleaned contact resistance measured with 1 ampere through contacts should not exceed 0.03 ohm. All resistance measurements should be taken with armature energized against stop.
Part 6.1.45

5. Each contact shall be designed to carry 5 amperes continuously.

6. The minimum contact opening, with the armature fully energized in either position, shall be 0.030 in (0.762 mm) and with the normal contacts just closed the minimum reverse contact opening shall be 0.018 in (0.457 mm).

7. The relay shall be so designed that upon de-energization, one set of contacts shall remain closed and the other set shall remain open.

H. Flexible Connections

Flexible connections shall conform to Manual Part 6.5.1 Identical Items "Boilerplate" for All Relay Manual Parts in Section 6, Section E.1.

I. Binding Posts

Binding posts shall conform to Manual Part 6.5.1, Sections G.1 and G.2.

J. Environmental Requirements

Requirements shall conform to Manual Part 11.5.1 Recommended Environmental Requirements for Electrical and Electronic Railroad Signal System Equipment Class C, and Manual Part 15.2.5 Recommended Dielectric Requirements for the Design and Installation of Electrical Equipment and Other Electrical Devices.

K. Operating Characteristics

1. Flasher relay shall cause the contacts to operate not less than 45 times nor more than 75 times per minute with energy applied to the coils at rated voltage, at +68 °F (+20 °C), when new. Relay shall not change to below 45 operations per minute at +68 °F (+20 °C) before 10 million operations with rated current broken by each contact.

2. Flashing rate at rated voltage, ±20%, shall not go below 45 operations per minute nor above 75 operations per minute over a temperature range conforming to Manual Part 11.5.1, Class C, when new.

3. The time of closed normal contacts shall be essentially the same as the time of closed reverse contacts at rated voltage and at +68 °F (+20 °C). Break-before-make-time of contacts shall be mandatory for each contact reversal, but shall not exceed 0.002 seconds total time per cycle.

4. For electro-mechanically controlled flasher relays, operating characteristics shall be as shown in Table 6145-1 at +68 °F (+20 °C):
Table 6145-1

<table>
<thead>
<tr>
<th>RATED RELAY VOLTS</th>
<th>MAXIMUM VOLTS REQUIRED FOR STARTING</th>
<th>MINIMUM RESISTANCE IN OHMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>0.8</td>
<td>4.5</td>
</tr>
<tr>
<td>6.0</td>
<td>4.5</td>
<td>185.0</td>
</tr>
<tr>
<td>8.0</td>
<td>4.5</td>
<td>200.0</td>
</tr>
<tr>
<td>10.0</td>
<td>6.8</td>
<td>400.0</td>
</tr>
<tr>
<td>12.0</td>
<td>6.8</td>
<td>500.0</td>
</tr>
</tbody>
</table>

5. For electronically controlled flasher relay, operating characteristics shall be shown in Table 6145-2 at +68 °F (+20 °C):

Table 6145-2

<table>
<thead>
<tr>
<th>RATED RELAY VOLTS</th>
<th>MAXIMUM VOLTS REQUIRED FOR STARTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4.5</td>
</tr>
<tr>
<td>10</td>
<td>6.0</td>
</tr>
<tr>
<td>12</td>
<td>7.5</td>
</tr>
</tbody>
</table>

6. Relay shall start and operate at rated voltage at +68 °F (+20 °C) when tilted 20 degrees from the vertical axis in any direction.

L. Finish

Finish shall conform to Manual Part 6.5.1 Identical Items "Boilerplate" for All Relay Manual Parts in Section 6, Section I.
M. Identification