

(R) FLASHER TEST

1. **Scope**—This SAE Standard specifies the test procedure, test circuitry, and instruments required for measuring the performance of flashers used in motor vehicles.
2. **References**—There are no referenced publications specified herein.
3. **Laboratory Facilities**—The laboratory shall be equipped with all of the facilities required to make the tests in this document, in accordance with established laboratory practice, including the following:
 - 3.1 **Ambient Conditions**—Means shall be provided to maintain ambient temperatures over the range from -32°C to 63°C within the tolerances specified for each test condition, in an air atmosphere.
 - 3.2 **Power Supply—Performance Tests**—The power supply for testing performance requirements shall not generate any adverse transients not present in motor vehicles and shall comply with the following specifications:
 - 3.2.1 **OUTPUT VOLTAGE**—Capable of supplying to the input terminals of the standard circuit 11 to 16 V DC for 12 V flashers or 5.5 to 8 V DC for 6 V flashers or 22 to 32 V DC for 24 V flashers.
 - 3.2.2 **OUTPUT CURRENT**—Capable of supplying required design current(s) continuously and inrush currents as required by the design bulb load complement.
 - 3.2.3 **REGULATION**
 - 3.2.3.1 **Dynamic**—The output voltage shall not deviate more than 1.0 V from 0 to maximum load (including inrush current) and shall recover within the area generated by the equation $1.0 V(1 - e^{-t/T})$, $T = 100 \mu\text{s}$. The curve shall end at the maximum voltage deviation allowed for static regulation. (See Figure 1.)
 - 3.2.3.2 **Static**—The output voltage shall not deviate more than 2% with changes in static load from 0 to maximum (not including inrush current) nor for static line voltage variations.
 - 3.2.4 **RIPPLE VOLTAGE**—Maximum 75 mV, peak to peak, from 0 to maximum design bulb load.
 - 3.3 **Power Supply—Durability Tests**—The power supply for the durability test requirements shall not generate any adverse transients not present in motor vehicles and shall comply with the following specifications:
 - 3.3.1 **OUTPUT VOLTAGE**—Capable of supplying, as required, 14 and 13 V (7 and 6.5 V DC or 28 and 26 V), according to the flasher rating, to the input terminals of the standard test circuits shown in Figures 2 and 3.
 - 3.3.2 **OUTPUT CURRENT**—Capable of supplying a continuous output current of the design load for one flasher times the number of flashers and inrush currents as required by the bulb load complement.

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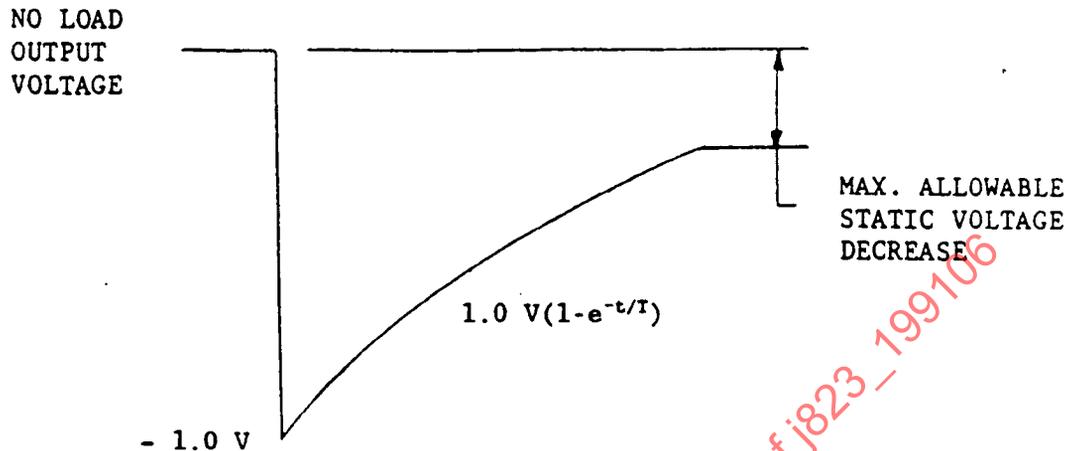


FIGURE 1—POWER SUPPLY—MAXIMUM DYNAMIC REGULATION CURVE

3.3.3 REGULATION

3.3.3.1 *Dynamic*—The output voltage shall not deviate more than 1.0 V from 0 to maximum load (including inrush current) and shall recover within the area generated by the equation $1.0 V(1 - e^{-t/T})$, $T = 5$ ms. The curve shall end at the maximum voltage deviation allowed for static regulation. (See Figure 1.)

3.3.3.2 *Static*—The output voltage shall not deviate more than 2% with changes in static load for 0 to maximum (not including inrush current), and means shall be provided to compensate for static line voltage variations.

3.3.4 RIPPLE VOLTAGE—Maximum 300 mV, peak to peak, from 0 to maximum design bulb load for one flasher times the number of flashers.

4. Test Procedures

- 4.1 The flashers shall be mounted as specified by the manufacturer if special precautions are required.
- 4.2 The flashers shall be connected in a standard test circuit as shown in Figure 2 for turn signal and hazard warning flashers or Figure 3 for warning lamp alternating flashers using the design load(s) within 0.5% at 12.8 V (6.4 V or 25.6 V) specified by the flasher manufacturer.
- 4.3 A suitable high impedance measuring device connected to points X-Y in Figure 2, or to points X-Y₁ and to points X-Y₂ in Figure 3 shall be used for measuring flash rate, percent current "on" time, starting time, and voltage drop across the flasher. The measurement of these quantities shall not affect the circuit.
- 4.4 The resistance at A-B for each load circuit in Figure 2 or Figure 3 shall be measured with flasher and bulb loads each shorted out with removable shunt resistances not to exceed 0.005Ω each. The effective series resistance in the total circuit (Figure 2) or in each of the parallel circuits (Figure 3) between the power supply and bulb sockets (excluding the flasher and bulb loads by using the removable shunt resistances) shall be $0.10 \Omega \pm 0.01$.

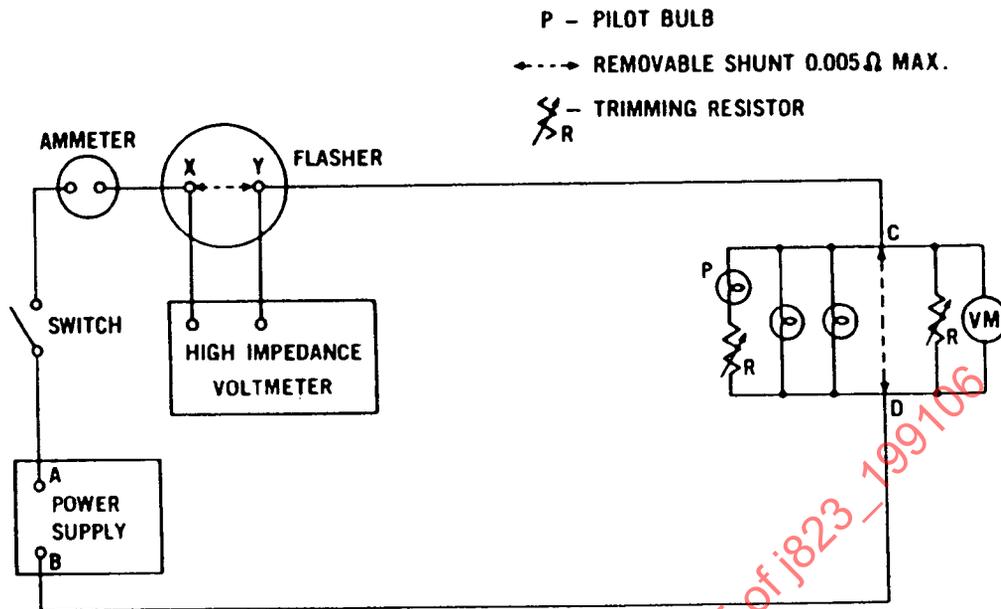


FIGURE 2—STANDARD TEST CIRCUIT—TURN SIGNAL AND HAZARD WARNING FLASHERS

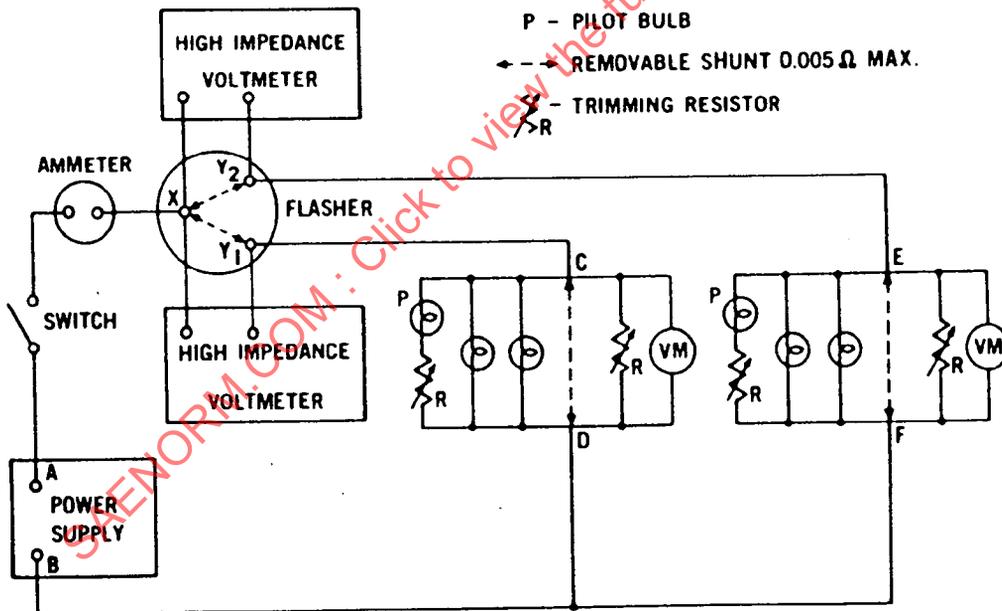


FIGURE 3—STANDARD TEST CIRCUIT—WARNING LAMP ALTERNATING FLASHERS

- 4.5 Adjust the voltage at the bulbs to 12.8 V (6.4 V or 25.6 V) as required for testing at C-D in Figure 2 or C-D and E-F in Figure 3 with the flasher shorted out by an effective shunt resistance not to exceed 0.005 Ω. The load current shall be held to the rated value for the total flasher design load(s) within 0.5% at 12.8 V (6.4 V or 25.6 V) by simultaneously adjusting trimmer resistors, R.
- 4.6 For testing fixed load flashers at other required voltages, adjust the power supply to provide required voltages at required temperatures at C-D in Figure 2 or C-D and E-F in Figure 3 without re-adjustment of trimming resistors, R.

4.7 For testing variable load flashers, the circuit shall be first adjusted at 12.8 V (6.4 V or 25.6 V) at C-D in Figure 2 or C-D and E-F in Figure 3 with a minimum required bulb load and the power supply shall be adjusted to provide other required test voltages at required temperatures at C-D in Figure 2 or C-D and E-F in Figure 3 without readjustment of trimming resistors, R (each required test voltage shall be set with a minimum bulb load in place). The required voltage tests with a maximum bulb load shall be conducted without readjusting each corresponding power supply voltage previous set with minimum bulb load.

5. Notes

5.1 **Marginal Indicia**—The (R) is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

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