

FLASHING ARROW PANEL

The flashing arrow panel shall consist of the following components:

- A. flasher panel
- B. lamps
- C. controls
- D. power supply
- E. mounting

A. Flasher panel

The flasher panel shall be of exterior type plywood or corrosion resistant metal construction of adequate design and strength. The panel finish shall be flat black.

A flasher panel shall be one of three sizes. The type A panel shall be a nominal 24" (610 mm) high by 48" (1219 mm) wide. Type B shall be a nominal 30" (762 mm) high by 60" (1524 mm) wide. Type C shall be a nominal 48" (1219 mm) high by 96" (2438 mm) wide.

Flashing arrow panels shall normally utilize high output (4412A and 4415A) lamps powered by an engine driven generator when permitted by the plans. The contractor may also furnish units powered by a solar array and batteries or only batteries. However, these units shall not be used where the approaching traffic would be on a horizontal curve in excess of 3 degrees. These units shall not be used if the approaching traffic, closer than 1 mile (1.6 km) [1/2 mile (.8 km) where speed limits are less than 40 MPH], is more than 5 1/2 degrees horizontally or 2 degrees vertically from the central axis of the lens units.

B. Lamps

For engine powered generator units, lamps shall be ANSI Number 4412a (PAR 46) for type B and C and 4415a (PAR 36) for type A. The lamp shall be fitted with an upper hood of not less than 180° at least 5" (127 mm) long. Arrow panels may use a lower power (wattage) lamp than the standard arrow panels. The lamps shall be approximately 5" (127 mm) diameter with a parabolic reflector. The lamp shall provide improved light distribution control by means of high quality reflectors and refractors. The light output from each lamp of the arrow shall not be less than shown in figure 1 when operating at full daytime brightness.

The lamps shall be securely mounted and positioned in the panel perpendicular to the panel face and oriented so that the lamp location lug (on back of the lamp) is on the horizontal center line through the lens. The lug will be on the right side of the lamp as viewed from the front.

The lamps shall be wired in circuits that can be switched to display any one of the following messages: left arrow, right arrow, left and right, and caution bar. A minimum of three indicator lights shall be placed on the back of the panel to indicate which message mode is in operation.

Each panel shall contain the following number of lamps as a minimum: type A-12 lamps, type B-13 lamps, type C-15 lamps.

CANDLE POWER CHART

				100					4°	HORIZONTAL
		100	150	200	150	100			2°	
100	150	200	250	350	250	200	150	100	0°	
		100	150	200	150	100			- 2°	
				100					- 4°	
10°	7.5°	5°	2.5°	0°	2.5°	5°	7.5°	10°		
LEFT			CENTER			RIGHT				

- (1) Measurements expressed in candela.
- (2) Color of output light shall be yellow to light yellow.

Figure 1

C. Controls

Each flashing arrow panel shall contain a flasher control and a dimmer control unit housed in a cabinet which can be locked.

1. Flasher control

The flash rate for the sign panel shall be 25 to 40 flashes per minute. The flasher shall not cause electromagnetic interference. The lamps shall have a minimum "on time" of 50% and a maximum of 66%.

2. Dimmer control

Lamp intensity shall be variable by means of a photoelectrically controlled circuit which shall reduce lamp output during low ambient light conditions. Lamp intensity shall be at the nighttime level whenever the ambient illumination is in or below the range 2 foot-candle (21 lux) to 5 foot-candle (54 lux) and shall be at daytime level when ambient illumination is in or above the range 5 foot-candle (54 lux) to 10 foot-candle (108 lux). If controls provide for continuous adjustment of lamp intensity with respect to ambient illumination, then lamp intensity shall increase linearly from nighttime intensity at 5 foot-candle (54 lux) to daytime intensity at 3250 foot-candle (35,000 lux). A time delay shall be built into the control to prevent false operation due to light flashes. The photoelectric control shall contain a switch which shall override the photoelectric control.

D. Power supply

The flashing arrow panel shall operate from power sources capable of continuously furnishing the proper voltage to the lamps a minimum of 24 hours without attendance.

D. Cont.

Motor generators, if used shall be of modern design to provide low emission of pollutants and shall be properly muffled. The motor generator shall be enclosed in a mesh enclosure which can be locked. The fuel tank shall have a cap which can be locked. Motor generators supplying power to a flashing arrow sign shall not be used to supply power to other equipment. Gasoline fueled engines shall not be used.

Battery and solar/battery units shall have a no-charge-life of not less than 15 days. No-charge-life is the number of consecutive days that the system can continue to function (double arrow mode, normal dimming during 12 hour night, full output during 12 hour day) starting with a full battery charge and with no additional charge being provided by the solar cells. The no-charge-life may be based upon calculations providing that manufacturer's ratings and efficiency calculations are furnished for each major component.

E. Mounting

The flashing arrow panel may be trailer or vehicle mounted or mounted on a rigid supporting device suitable for maintaining it in the designated position. Each of the mounting methods shall be suitably stable such as to prevent movement due to high winds or passage of large vehicles.

When a trailer is used, construction shall be such as to transport the flashing arrow panel and appurtenances adequately and legally as well as support them properly during operation. The trailer shall be equipped with devices which shall provide leveling and stability during operation.

Minimum arrow panel mounting height shall be 7 feet (2.1m) above the pavement surface (measured to the bottom of the panel).

Use and operation

The flashing arrow panel shall be located as shown in the maintenance of traffic drawings or as directed by the Engineer and operated continuously during traffic maintained periods. The Contractor shall supply all fuel, lubricants and parts necessary to obtain continuous operation and shall provide all service. The Contractor shall inspect the operation of the unit daily, including weekends and holidays. The Contractor shall arrange with the Engineer, an acceptable method of obtaining service for a malfunctioning panel within 30 minutes of a reported malfunction. Lamp intensity shall be adjusted to provide minimum legibility distances of 1/2 mile (.8 km) type A, 3/4 mile (1.21 km) type B and 1 mile (1.6 km) type C.

Type C panels shall be used for stationary operations on high speed 55 MPH or greater, high volume roadways. Type B shall be used for stationary operations on intermediate speed 40-50 MPH facilities, and type A on low speed 20-35 MPH facilities.

In addition, type B panels shall be used for moving operations on freeways and expressways and type A for moving operations on other facilities.

Battery and solar/battery units shall be fully charged when first set up. They shall have gauges to indicate approximate battery charge remaining. The Contractor shall verify daily that the unit is operating satisfactorily and the remaining battery charge is sufficient for at least 2 more days.

Flashing arrow panels are not to be used on two lane-two way roadways.

When left unattended the control cabinet, motor generator enclosure and fuel tank shall be locked.

Type A and type B panels used in moving operations may be powered by the vehicle's electrical system but shall not be left unattended when so powered.

When not in use, the flashing arrow panel shall be stored at a location which will not be hazardous to traffic or pedestrians.

The panels shall be designed for operation in 100% humidity and temperatures from -20 to + 130 degrees Fahrenheit (-29 to + 54 degrees Celsius).