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Maintenance Bureau Specification 2001-05
for
Class 1 Strobe Beacon (Gaseous Discharge)
(9 February 2010)

This document describes the features and specifications for a "360-Degree, Class 1, Strobe Beacon".

1.0 Features:

1.01 Unit shall be a 360 degree strobe (gaseous discharge).

1.02 Shall produce at a minimum a 70 quad/quint flash pattern per minute(280/350 total flashes).

1.03 The flash tube shall not be obstructed in any way; it shall be "Helix" shaped and easily replaceable without using any mechanical hardware, nor require the un-installation/removal of the unit from the vehicle.

1.04 Unit shall meet or exceed SAE J845 and J1318 requirements for a Class 1 strobe warning beacon.

1.05 Dimensions of light should be between 4" & 8" in height and between 6" & 8" in diameter.

1.06 All components shall be fully enclosed and sealed to protect against moisture and vibration, in either a cast aluminum or polycarbonate base.

1.07 The base of the unit shall be capable of one of the following mounting options: **Permanent Mount** - Have at least 2 mounting holes to enable mounting on a flat surface or shall also be available with a 1" NPT pipe mount; **Temporary Mount** - a magnetic mount w/sufficient length cord and cigar plug with on/off switch.

1.08 Dome (lens) shall be constructed of a polycarbonate material and amber in color.

1.09 A method to prohibit the dispersal of light through the top of the dome shall be provided.

1.10 Amp draw shall not exceed 2.5 amps @ 12 VDC.

1.11 Unit shall be capable of attaching optional branch guard.

1.12 Unit shall have Hi/Lo intensity capability, either manually or automatic.

1.13 Unit shall be capable of operating at either an operating voltage of 12 or 24 VDC.

1.14 Unit shall include all mounting hardware for desired installation at the time of order.

1.15 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2001-10
for
LED Surface Mount
(21 January 2010)

This document describes the features and specifications for a "LED Surface Mount ".

1.0 Features:

1.01 Unit shall meet or exceed current SAE applicable standards.

1.02 Unit shall operate at 12 VDC.

1.03 Unit shall be encapsulated for heavy-duty vibration and moisture resistance with a minimum wire length of 6" for power, communication, and control.

1.04 Unit shall contain sufficient LEDs and wide angle optics lens to provide visibility when viewed at a deflection angle of $^{+}$/- 30-degrees from head on.

1.05 Unit shall contain a minimum of eight (8) built-in standard, flash patterns, that are easily changeable when unit is installed.

1.06 Unit shall display either yellow(amber) or white.

1.07 Unit may have the option of having a split display with both yellow(amber) and white.

1.08 Unit shall contain a polycarbonate lens in either clear or amber, depending on the use and design.

1.09 Unit shall include all related material required for the installation of the unit based on the mounting option selected: **Bezel/Flange** option mounts directly to surface, requiring a small hole for wiring and attaching; **Grommet** option mounts into the surface, requiring a hole just larger than the unit; **Clip/Bracket** option allows the unit to mount to non-vertically flat surfaces such as in grills, under bumpers, etc.

1.10 Unit shall be capable of coordination with other like units.

1.11 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2001-11
for
LED Directional Light Assembly
(19 February 2010)

This document describes the features and specifications for a "LED Directional Light Assembly" (Traffic Advisor).

1.0 Features:

1.01 Each unit shall include all necessary mounting and installation hardware and appropriate length cable from power connection to control unit.

1.02 Mounting hardware shall be available to allow the 'LED Directional Light Assembly' to be attached to an existing lightbar or as a stand-alone device.

1.03 Each unit shall consist of a minimum of six (6) yellow (amber) LED modules mounted horizontally, not to exceed 10 LED modules. The end LED modules can be special arrow modules or the same as the interior modules. Each module shall be replaceable from the front of the assembly.

1.04 Each LED module shall have its own independent, impact-resistant, polycarbonate, amber, lens.

1.05 Each LED module shall be housed in a heavy-duty, extruded aluminum housing that is front-side serviceable.

1.06 Each unit or LED module may have an optional horizontal visor that covers and extends beyond the edge of the reflector dome to improve effectiveness during daylight hours. Exception to this is when the unit is installed in the front grill of a vehicle.

1.07 The maximum amperage draw per LED module shall not exceed 0.5 amps @ 12 VDC.

1.08 The controller for the unit shall be capable of producing, at a minimum, the following four patterns: Left to Right sequential, Right to Left sequential, Split-Out from center, and Cautionary Flash.

1.09 The controller shall be separate from the display unit and capable of being mounted inside the vehicle.

1.10 The controller shall contain a switch for selecting the above patterns, as well as a LED status display to visually imitate the pattern being shown on the unit.

Maintenance Bureau Specification 2001-11
for
LED Directional Light Assembly

1.11 The controller shall produce, at a minimum, twenty pattern cycles per minute for any of the above listed patterns.

1.12 The unit shall be capable of operating from a 12 VDC power source.

1.13 Unit shall come complete with all applicable mounting hardware for either grill mount, surface mount, or track/rack mount options. Also, with sufficient cable lengths to power and operate the unit.

1.14 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2001-15
for
180° Heavy Equipment Strobe
(5 February 2010)

This document describes the features and specifications for a "180° Heavy Equipment Strobe".

1.0 Features:

1.01 Unit shall have separate power supply with flash capability.

1.02 Unit shall feature a high-profile, slimline design.

1.03 Unit size shall not exceed 5" in height, 4" in width, and 12" in length.

1.04 Unit shall provide 180-degree warning coverage (horizontally) when mounted on a vertical plane. Unit shall be designed for sub-roof line mounting on heavy, roadworking equipment.

1.05 Unit shall include all mounting hardware and shielded cable harness.

1.06 Unit base shall be cast aluminum with rubber gasket to provide weatherproof seal between the base and vehicle.

1.07 Unit shall come with an optically corrected amber lens to ensure 180-degree coverage.

1.08 Unit shall be capable of operating at a voltage of 12 or 24 VDC.

1.09 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2001-18
for
COMPACT DUAL LED LIGHTHEAD
(5 February 2010)

This document describes the features and specifications for a "Compact, Dual LED Lighthead".

1.0 Features:

1.01 Unit shall be comprised of two (2) compact LED heads in the following possible configurations: one head with amber LEDs and the other head with clear LEDs; or two (2) amber LED heads. [NOTE: Should the device ever be installed to face the rear of the vehicle, then the two (2) amber LED head model shall be used]

1.02 The lens for each strobe head shall be constructed of a polycarbonate material.

1.03 The LED panels shall be housed in a black, polycarbonate housing that can be mounted to the windshield via suction cups. The ability to mount this to the dash or deck is optional at the users request.

1.04 Unit shall be capable of providing nearly uniform lighting intensity up to 45-degrees on either side of the unit, 90-degrees total.

1.05 The unit size shall not exceed 5" in height, 3" in depth (not counting hood), and 12" in width.

1.06 Unit shall be supplied standard with a snap-on hood, constructed of black polycarbonate material to reduce flashback to the driver.

1.07 Unit shall provide a minimum of eight (8) user selectable flash patterns. A default flash pattern shall be provided and will be the last pattern selected by the operator prior to power down; last selected shall be the default pattern upon turn on of the unit.

1.08 Average amp draw shall not exceed 2.2 amps @ 12 VDC.

1.09 Unit shall be equipped with a minimum 8' power chord with cigar plug. The cigar plug shall be equipped with an on/off switch and also house a LED "On" indicator.

1.10 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2004-01
for
Class 1 LED Beacon
(9 February 2010)

This document describes the features and specifications for a "360-Degree, Class 1, LED Beacon".

1.0 General

1.01 Unit shall be a 360 degree LED beacon.

1.02 Shall produce at a minimum a 60 quad/quint flash pattern per minute(240/300 total flashes) along with other user selectable flash patterns.

1.03 Unit shall meet or exceed SAE J845 requirements for a Class 1 warning beacon.

1.04 Dimensions of light should be between 4" & 8" in height and between 6" & 8" in diameter.

1.05 The LED beacon shall feature solid-state circuitry, polarity protection and no moving parts for highest degree of reliability.

1.06 The LED module shall not be obstructed in any way; it shall be easily replaceable with using any mechanical hardware, nor require the un-installation/removal of the unit from the vehicle.

1.07 The base of the unit shall be capable of one of the following mounting options: **Permanent Mount** - Have at least 2 mounting holes to enable mounting on a flat surface or shall also be available with a 1" NPT pipe mount; **Temporary Mount** - a magnetic mount w/sufficient length cord and cigar plug with on/off switch.

1.08 Domes (lenses) shall be constructed of polycarbonate material and shall be amber in color.

1.09 A method to prohibit the dispersal of light through the top of the dome shall be provided.

1.10 Average amp draw shall not exceed 1.2 amp at 12 VDC during operation.

1.11 Unit shall be capable of attaching an optional branch guard.

1.12 Unit shall be capable of operating at an operating voltage of 12 or 24 VDC.

1.13 The LED beacon electronics shall be conformal coated with an electrically inert material, or similar environmental protection, to make them resistant to corrosion, moisture, dust, and vibration related to failure. The electronics shall be housed within either a cast

aluminum or polycarbonate base, with no parts such as screws, fasteners, or wires being exposed to moisture other environmental hazards.

1.14 Unit shall include all mounting hardware for desired installation at the time of order.

1.15 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2010-01
for
LED Mini-Lightbar
(9 February 2010)

This document describes the features and specifications for a general "LED Mini-Lightbar". This specification will cover a wide range of sizes and mounting options.

1.0 Features:

1.01 Unit shall have enough LED modules to provide 360-degree combined coverage around the light-bar.

1.02 Unit shall meet or exceed SAE J845 requirements for a Class 1 warning beacon.

1.03 The unit shall be configured so that the unit can flashed simultaneously as a whole or alternately from one-half to the other.

1.04 All internal components, such as LED modules and power supplies, shall be modular in design for ease of replacement.

1.05 LED modules shall be available in one of two LED display types, regardless of the lens and reflector technology used to achieve the display (general appearance of the modules when not illuminated); Dot or Linear.

a. **Dot Display:** LEDs in this display type will show individual LED dots for each LED used in the module, giving the appearance of illuminated dots.

b. **Linear Display:** LEDs in this display type will appear to represent a vertical line of light from each LED used in the module. This shall apply to both vertical and horizontal displays.

1.06 Unit shall produce at a minimum a 70 quad/quit flash pattern per minute(280/350 total flashes) with other user selectable flash patterns as required.

1.07 Each unit shall be classified as either a "low profile" or "high profile" unit and shall not exceed 12" in width and 30" in length.

a. **Low Profile:** Refers to lightbars that do not exceed 3½ inches in height, not including the mounting option.

b. **High Profile:** Refers to lightbars that are greater-than 3½ inches in height yet less-than 6 inches in height, not including the mounting option.

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For
LED Mini-Lightbar

1.08 Unit shall have a heavy gauge, extruded aluminum or polycarbonate chassis/base which resists stress. The base of the unit shall also be capable of one of the following mounting options: **Permanent Mount** - Have a means of attaching the device directly to the vehicle or through the use on a rail/rack type system; **Temporary Mount** - a *magnetic* or *magnetic/suction* mount w/sufficient length cord and cigar plug with on/off switch.

1.10 Each unit shall,be provided with an amber polycarbonate outer dome.

1.11 Unit shall be capable of operating on a voltage of 12 VDC through the use of a cord with an attached cigar plug configured with an on/off switch. The length of the cord shall be of sufficient length to operate the unit centered on the roof of the vehicle.

1.12 Average amp draw per unit shall not exceed 3.0 amps @ 12 VDC.

1.13 Unit may be equipped with an optional manual or automatic "Hi/Lo" intensity mode selector.

1.14 All units shall come complete with all applicable mounting hardware for the magnetic/suction mount option.

1.15 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2010-02
for
Multi-Head LED Lightbar
(9 February 2010)

This document describes the features and specifications for a "Multi-Head, LED, Lightbar". This specification will cover a wide of sizes.

1.0 Features:

1.01 Unit shall have enough LED modules to provide 360-degree combined coverage from the ends of the lightbar.

1.02 The minimum configuration of the units shall consist of amber LED modules on each end providing 180-degree coverage each and a minimum of six (6) centroid LED module slots facing the front and rear of the unit. Four (4) of the six (6) slots facing the front shall be either amber or clear LED modules, as required by the user. Shall be capable of incorporating additional LED or light modules in both the front and back centroid of the unit.

1.03 LED modules shall be available in one of two LED display types, regardless of the lens and reflector technology used to achieve the display general appearance of the modules when not illuminated); Dot or Linear.

a. **Dot Display:** LEDs in this display type will show individual LED dots for each LED used in the module, giving the appearance of illuminated dots.

b. **Linear Display:** LEDs in this display type will appear to represent a vertical line of light from each LED used in the module. This shall apply to both vertical and horizontal displays.

1.04 The back six (6) centroid LED module slots, if required, shall be capable of being utilized as a traffic advisor.

1.05 When including the optional traffic advisor, the controller for the traffic advisor shall be capable of producing, at a minimum, the following four patterns: Left to Right sequential, Right to Left sequential, Split-Out from the center, and Cautionary Flash.

1.06 The controller shall produce, at a minimum, twenty pattern cycles per minute for any of the above listed patterns.

1.07 All internal components, such as LED modules and power supplies, shall be modular in design for ease of replacement without removing the lightbar from the roof of the vehicle.

Maintenance Bureau Specification 2010-02
for
Multi-Head LED Lightbar

1.08 Unit shall meet or exceed SAE J845 requirements for a Class 1 warning beacon.

1.09 Each LED module used shall produce at a minimum a 70 quad/quit flash pattern per minute(280/350 total flashes) with other user selectable flash patterns as required.

1.10 Unit shall be capable of operating on a voltage range of 12 VDC.

1.11 Each unit shall be classified as either a "low profile" or "high profile" unit and shall not exceed 12 inches in width and have a minimum length greater than 40 inches.

a. **Low Profile:** Refers to lightbars that do not exceed 3½ inches in height, not including the mounting option.

b. **High Profile:** Refers to lightbars that are greater-than 3½ inches in height yet less-than 6 inches in height, not including the mounting option.

1.12 Unit shall have a heavy gauge, extruded aluminum base or I-beam chassis which resists stress.

1.13 Each unit shall be provided with polycarbonate lens, color appropriate to the layout, either amber or clear as required.

1.14 Average amp draw per LED module shall not exceed 0.5 amps @ 12 VDC.

1.15 Unit shall have a manual or automatic "Hi/Lo" intensity mode.

1.16 All units shall come complete with all applicable mounting hardware.

1.17 Unit shall include one (1) set of installation and operation instructions, in English.

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Maintenance Bureau Specification 2010-03
for
4 Corner-Remote LED Warning System
(10 February 2010)

This document describes the features and specifications for a "4 Corner, Remote LED Warning System".

1.0 Features:

1.01 Each system shall consist of 4 light heads, a power and control system, and applicable wire/cabling and hardware for a complete install.

1.02 The system electronics, power supply and control, shall be solid state and utilize the most recent technology to provide reliable operation in heavy duty applications.

1.03 The system shall be able to operate at a voltage of 12 or 24 VDC, depending on the user application.

1.04 Unit shall include all mounting hardware required for installation based on the mounting option selected: **Bezel/Flange** option mounts the light directly to surface, requiring a small hole for wiring and attaching to the side of a vehicles body; **Insert** option requires the drilling of a hole into the existing vehicle light assembly to allow the insertion of the light head into the vehicle's light assemble to utilize the existing housing and reflectors. The light head shall utilize some sort of gasket to seal the light head to the vehicle's light assembly.

1.05 The system supply shall produce, at a minimum, a 70 flash per minute pattern, per head, along with other user selectable flash patterns.

1.06 The power source for this system shall be either a central power supply or an inline power supply system as follows.

a. **Central Power Supply:** A system that utilizes a central device that contains all components required to operate the light system, power and flash control. All the lights in the system are routed/connected solely to this component for power and control.

b. **Inline Power Supply:** A system that does not utilize a central device to power and control the light system. One or more lights can be connected to this device. Coordination shall be accomplished through the connection of the inline devices by a communication line for synchronization. The inline power supply components shall be fully encapsulated for moisture and vibration resistance.

1.07 The system shall provide for a controller device in the cab of the vehicle installed to allow control of the lights, programming and activation. The system shall be capable of operating only the front or rear lights independently in case only half the system is required for a given application.

1.08 Interconnect cables shall be a minimum of 20 feet in length with waterproof connectors.

1.09 Wires or connectors leaving the LED head shall be sealed to prevent moisture or dust from entering the LED head.

1.10 The system shall include 4, remote LED heads mounted on a metallic base to help dissipate heat and enclosed in a sealed lens of the required color specified by the user as follows: Either 4 yellow (amber) LED heads or 2 clear LED heads (vehicle front), and 2 yellow (amber) LED heads (vehicle rear).