

Louisiana
Department of Transportation
And
Development

Traffic Control Standard
Number 195

Solar Powered Flashing Beacons

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SOLAR POWERED FLASHING BEACONS ASSEMBLY (SAP # 50660)

1.0 GENERAL

1.1 The purpose of this specification is to describe the minimum acceptable requirements for a solar/battery-powered 24 hour Advance Warning flasher assembly. The assembly shall be complete and include all components necessary (Section 2.0 thru 6.0) for installation (Signs, Pole, Base, and Anchor Bolts are not included in this specification). The beacons shall be 12" Yellow LED's. The assembly shall include all hardware to mount onto a 4½" O.D. pole.

2.0 SOLAR GENERATOR

2.1 The solar modules shall be industrial grade, polycrystalline type. Modules deemed to be of consumer grade will not be acceptable. Solar modules must have a power output rating of +/- 5% or better. Electrical termination will take place in a single, conduit capable, junction box. Solar modules shall be an 80 to 100 watt module. Each solar module, regardless of wattage size, shall share common mounting holes for mounting such that a single mounting structure will accommodate the entire module line. Each solar module will incorporate 6" square polycrystalline cells and have at least two (2) bypass diodes installed at the factory. Module construction will utilize low iron tempered glass surface with an industrial grade anodized aluminum frame that completely surrounds and seals the module laminate. Construction should be consistent with the demands of installation near humid salt air environments. The mounting bracket shall have no less than four (4) stainless steel bolts, lock washers, and hex head nuts to secure the solar module to the frame. An ultra violet (UV) resistant, weatherproof junction box providing wire termination for up to #8 AWG wiring shall be provided with the solar module.

2.2 The solar module mounting assembly shall be constructed of galvanized steel (ASTM A-153 Class A) or aluminum, of adequate design and strength to provide a means of securely attaching the solar module frame to a pole at a permanent angle of 45 degrees. The pole mounting hardware shall accommodate a 4½" O.D. pole. The bracket shall be capable of 360 degree horizontal orientation with a means of locking the bracket at an inscribed angular position about the pole.

2.3 The solar module harness shall not exceed one percent (1%) total voltage drop between the solar module and the charge control circuit.

3.0 CONTROL CABINET

3.1 The control cabinet shall be manufactured of sheet aluminum with a minimum thickness of 0.125 inches, or cast aluminum alloy. The cabinet shall be sized to provide adequate space for the control electronics and battery/batteries. The cabinets shall have louvers for ventilation and to prevent the accumulation of gasses.

3.2 The door and its opening shall encompass and constitute the entire area of the face of the cabinet. It shall

be hinged via a continuous hinge which shall be riveted to the door and to the cabinet. The door shall be tightly secured via a latching device which pulls the door snugly against a neoprene gasket affixed to the cabinet body forming a weather-tight seal. The latching device shall be equipped with a standard police door or #2 traffic locking device.

3.3 The cabinet shall be equipped with the necessary hardware and pole clamps to provide rigid top and bottom mountings to a 4½" O.D. pole.

4.0 CONTROL COMPONENTS

4.1 The back panel shall be mounted to the inside of the cabinet. All electronic components within the cabinet shall be mounted to the back panel. The electronic components shall be easily installed or removed with simple hand tools. Located on the back panel shall be an eight (8) position 8-32 x 5/16" binder head screw design terminal strip, with shorting bars. The terminal strip should be clearly labeled for all wiring terminations such as, power +, power -, led +, led -, flasher output terminations, etc.

4.2 The controller shall have an on-board, solid state, charge control circuit to insure proper charging on the system battery bank. The charging circuit shall incorporate a blocking diode for reverse current protection. The charge control circuit shall incorporate thermal compensation to adjust the battery charge rate to variances in temperature with an adjustable voltage swing above and below the ambient set point as defined by the battery manufacturer. The battery float voltage calibration shall be at a voltage defined by the battery manufacturer at 25° C ambient temperatures. An LED/LCD shall be provided to indicate solar panel charging.

The solar charge controller will have the capability of displaying load amps, and battery volts.

4.3 The controller shall have night dimming capabilities. The night dim level shall be calibrated to reduce the power of the LED module by a maximum of seventy-five percent (75%) where ambient light levels are 5-foot candles or less. The controller shall not allow dimming from dawn to dusk (daylight hours).

4.4 The unit shall be supplied with a color coded harness and a complete wiring diagram. Wires shall be a minimum 16 gauge stranded. Termination of the harness wiring to components mounted to pedestal poles, solar modules, and signal beacons shall be accomplished via connectors. Female connectors shall be terminated for ease of installation and male connectors are to be supplied with each harness. Battery terminals shall be 3/8" diameter round crimp terminals. Flasher termination shall be spade terminals. Regulator/charger terminations shall be spade terminals. The harness shall be installed in the controller cabinet using chassis tie downs and riveted to the harness bracket. The harness shall have spiral tubing to protect wires from the control cabinet to the door. The total voltage drop of any branch of the harness shall be no greater than one percent (1%).

4.5 The flashing operation of the unit shall be initiated and terminated by toggle switch or fuse(s).

4.6 The flasher shall be:

1. 12 volts DC.

2. Solid-state with no relays or electro-mechanical devices.
3. 2-circuit with fifty percent (50%) duty cycle (per circuit) and shall provide fifty-five (55) flashes per minute (+/- 5 flashes per minute) to each circuit in accordance with M.U.T.C.D. standards.
4. Constructed so that each component may be readily replaced if needed.

5.0 SIGNAL BEACONS

- 5.1 The 24 hour Advance Warning flasher assembly shall operate with two (2) Yellow 12" LED signal beacons. The signal beacons (signal housings and Yellow LED modules) and mounting hardware shall be supplied. The housings of the signal beacons may be aluminum or polycarbonate. Aluminum signal housings, with the exception of gaskets, terminal blocks, and wiring, shall be finished both inside and out with a thick black powder coating or with two (2) coats of high grade black enamel. Each coat shall be independently baked to resist peeling and chipping. Polycarbonate signal heads shall be constructed from one (1) piece of injection molded polycarbonate resin in black.
- 5.2 The solid state Yellow 12" LED signal modules shall have an incandescent look, be universal and easily retrofitted into standard signal housing using the existing lens gasket. The supplied LED module shall incorporate the use of AllnGap technology LED's. The power rating of any module shall be 6 to 11 watts. The LED control circuit must not be in the LED Module. The module shall be either a clear or tinted UV stabilized acrylic which shall be easily removed and replaced. The module shall have a TOP mount position which is clearly identified. The module shall be self-regulating with input voltages of 10.5 to 35 VDC. The modules shall have a 24" minimum DC color coded wiring harness with + and - clearly labeled. The wiring harness shall have strain relief at the module housing.

6.0 BATTERY

- 6.1 The battery/batteries shall be AGM-electrolyte 100 Amp Hour batteries as specified in the system sizing report. The valve regulated, AGM-electrolyte battery/batteries must be rated for a minimum of 2000 cycles with ten percent (10%) capacity withdraw. The battery/batteries shall be 12-volt D.C. nominal. The plate alloy shall consist of lead calcium. The element post shall be designed for 1/4" bolt termination. The container/cover shall be polypropylene. The AGM-electrolyte shall contain sulfuric acid, fumed silica, pure demineralized and deionized water, and a phosphoric acid additive. The AGM-electrolyte battery/batteries shall be spill proof and should have the ability to be installed in any position. Battery shall have maximum dimensions of, 13.5" length, 6.9" width, and 9.0" depth / height.