



SPECIFICATION
SOLAR MESSAGE CENTER
SMC 1000 ST

1.0 Introduction

This specification shall describe a trailer-mounted, portable sign upon which varying electronically generated messages will be displayed to motorists as advisories or for the purposes of warning and/ or control.

The equipment described shall be a standard model produced by a manufacturer with experience in the production of trailer-mounted traffic control products. All workmanship, materials, and assembly procedures shall be of quality design. Each component of the unit shall be adequate for and compatible with all structural and performance requirements of the complete unit. The equipment shall remain operational under inclement weather conditions.

1.1 Description

The Solar Message Center manufactured by Precision Solar Controls Inc. is a trailer mounted variable message sign consisting of 24 LED characters, a character consisting of 35 pixels in a 7 pixel high by 5 pixel wide configuration. Each pixel shall contain 5 LEDs, and there shall be 2 ½ inch spacing between pixels. The LED display is powered by a bank of batteries in order to convey bright, legible messages to the traveling public. The batteries are recharged automatically by a solar array located at the highest point of the unit. The Solar Message Center is designed with a sufficient battery bank to operate the system continuously for a period of 21 days without any sun. The solar array is sized to recharge the battery bank at a rate of 2.5 hours of good sun to one 24 hour period of usage.

2.0 Construction Requirements

2.1 General

The trailer and all mounted equipment shall be structurally adequate for unlimited, normal operation in wind velocities normally encountered on the roadway. The equipment shall be designed to enable one person to perform all transporting and operating functions effectively without assistance.

2.2 Trailer

The 2 wheel trailer shall be structurally adequate to serve both as a carrier and as an operating platform for all components of the unit. The base structure shall be structural rectangular 2 inch by 4 inch steel tubing with a minimum wall thickness of .120 inches. All tubing shall be joined by welding and all structural welds shall be continuous bead welds.

Axle and suspension systems shall be rated at 3500 pounds, minimum. Wheels shall be 15 inch, tires shall be DOT trailer rated, 4 ply tires capable of towing at speeds up to 65 miles per hour. Plastic step fenders shall be installed over each wheel.

Four crank type, heavy duty, 2000 pound capacity industrial leveling jacks, one at each corner of the trailer deck, shall be installed. A 2 inch ball type trailer hitch with two safety chains in accordance with SAE J684F shall be installed. The zinc plated high strength steel chains shall be mounted to the trailer tongue using a 1/2" grade 8 steel bolt.

A lighting system shall be provided for the trailer to include tail lights, stop lights, turn signals, side marker lights, a license plate light and reflectors. A trailer electrical cable with connector compatible for towing vehicles shall be installed. To eliminate chafing no wiring shall be installed on top of the trailer frame. All wiring shall be jacketed or shielded by wire loom to guard against environmental deterioration and physical wear.

All exterior surfaces of the trailer shall be painted PSC safety orange using powder coat paint.

2.3 Display Cabinet

The sign panel shall be of aluminum construction and so assembled as to prevent dissimilar metal action from occurring. The sign panel frame shall be assembled from sheet aluminum without welding. All riveted seams and joints shall also use high strength adhesive/ sealant to insure structural rigidity. The windows shall install and be retained by a system of guides and interlocks that allow ease of access and protection of the electronic componentry from water. Ventilation shall be natural convection. Moving parts involved in the ventilation of the message sign shall not be allowed.

The length of the sign panel shall not exceed 128 inches. The front face of the sign shall be covered with a clear UV inhibited polycarbonate to prevent fading. The polycarbonate shall be composed of 6 separate windows held in place with upper and lower guides and an integral locking system located in the middle of each row. Complete removal of each window panel shall be easily accomplished by one person. All windows shall be keyed the same.

The display cabinet sign panel shall contain three (3) separate lines. Each line shall consist of 8 characters, equally spaced a minimum of 3 inches apart. Each character shall be 18 inches in height and 12 inches in width. Each character shall be made up of 35 square LED lamp pixels, in a 7 pixel high by 5 pixel wide configuration. Each pixel shall contain a minimum of five (5) LEDs with LED color being approximately 590 nanometers.

The sign shall be capable of displaying at least 10 pages per message with 24 characters per page, with variable timing in 1/10 (.1) second increments under computer control. The sign display shall be able to change all lines of text in not more than 100 milliseconds.

The sign shall be clearly visible and legible from a distance of 1,000 feet under both day and night conditions. Under varying ambient light conditions the sign shall automatically adjust its light source so as to meet the 1,000 foot legibility requirement. The light intensity shall not change suddenly in response to temporary changes in ambient light conditions, such as a car's headlights, and shall have an intentional built-in delay to provide a steady light output.

The sign panel shall be supported on a telescoping upright member in a manner to permit raising the sign for operation and lowering the sign for transport. The sign shall be raised and lowered with an electro-hydraulic pump. The upright (mast) shall include a device to enable 360° sign panel rotation and shall lock into any desired position for display. The bottom of the sign cabinet shall be a minimum of 7 feet above the ground when fully raised. In the transport position, the sign shall orient to the longitudinal axis of the trailer in a manner that reduces aerodynamic drag during towing.

3.0 Power Supply Requirement

The solar powered changeable message sign shall be powered by a 12 volt DC power supply. A battery bank consisting of two 4-D deep cycle batteries shall provide adequate power to operate the system for 21 continuous days. The battery bank shall be housed in a lockable battery compartment. The batteries shall be recharged by a solar panel array producing 110 watts of power, capable of generating 1 day's system power requirement in 2.5 hours of good sun.

An optional battery charger, with a minimum 45 ampere per hour rating, shall allow the system to accept existing 120 volt electrical power to the unit.

4.0 System Control Requirements

The changeable message sign shall be controlled in all functions by an on-board dedicated computer that shall:

- a) Be of solid state design and be removable.
- b) Include a keyboard through which user originated messages may be entered for display or storage.
- c) Include an LCD display screen upon which messages can be reviewed before displaying on the message sign.
- d) Store a minimum of 250 preprogrammed messages for display when called upon by an operator through the keyboard.
- e) Store a minimum of 100 user originated multi-page messages.
- f) Maintain stored message list.
- g) Provide password protection.
- h) Provide control programming to display stored messages under operator control through keyboard entry.
- i) Provide a scheduling program to automatically start and stop the display of messages at predetermined times.
- j) Provide character board and battery diagnostics.

The computer and charge controller shall be modular, to allow for ease of replacement. The computer and charge controller shall be housed in a lockable weather resistant enclosure, be securely attached to the frame of the trailer and shall be able to be removed or replaced with a standard Phillips screwdriver. Battery voltage and amperage generated from the solar array to the battery bank shall be monitored and displayed at the system's computer.

The charge controller shall incorporate a PV regulator with thermal compensation for variances in ambient temperature to regulate the charge rate to the battery bank.

The Solar Message Center shall include a photocell to reduce LED lamp intensity at night to reduce glare. The dimming feature shall incorporate a delay to prevent LED intensity fluctuation caused by temporary changes in ambient light, such as approaching vehicle headlights. The Solar Message Center shall also incorporate an automatic intensity control feature to keep LED intensity constant regardless of varying battery voltage.

Solar Message Center ST General Specifications

Trailer Specifications:

Trailer Height—Travel Position.....103” (2.61M)
Travel Height---Erected Position.....158” (4.01M)
Trailer Width.....96” (2.43M)
Trailer Length With Tongue.....168” (4.26M)
Trailer Length Without Tongue.....130” (3.3M)
Trailer Weight.....1875 lbs. (850.5Kg)
Main Frame..... 2” x 4” x .120” High Grade Rectangular Steel Tubing
Axle Capacity.....3500 lbs. (1587.6Kg)
Leaf Spring Capacity.....3500 lbs. (1587.6Kg)
Jack Capacity.....2000 lbs. each (907.2Kg), total 8000 lbs. (3628.7Kg)

Display Cabinet Specifications:

Cabinet Height.....70” (1.76M)
Cabinet Width.....127” (3.22M)
Characters..... 3 Lines, 8 characters per line, total 24 characters
Character Height.....18” (.46M)
Character Width.....12” (.32M)
Character Spacing.....3” (.08M)
Line Spacing.....5.5” (.14M)
Field of View.....30 degree cone
Pixels.....35 per character, 7 high by 5 wide
LEDs per pixel.....5

Central Processing Unit (CPU)

Processor.....Rabbit Core Microprocessor 22.1 MHz
Power Requirements.....175 mA @ 12VDC
Memory Type and Size.....512 KB Static RAM
512 KB Flash Memory
Memory Back-up.....SRAM/ 3 year life
Temperature.....-40° C to + 75° C
-40° F to + 167° F
Humidity.....95% Non-condensing
Display Screen Type.....Liquid Crystal Display-LCD
Screen Size.....240 x 64 Dot Pixels
Interfaces.....RS232

Solar Generator Specifications

**Solar Panel Array.....110 Watt Minimum
Operating Voltage.....12.6 Volts DC
Battery Bank.....Two 4D Deep Cycle 12 Volt Batteries-400 Amp hour total
Low Voltage Disconnect, 4 point caution display.....11.0 Volts
Low Voltage Disconnect, complete shutdown.....10.7 Volts
Charge Controller.....Series regulator with thermal compensation**