



SPECIFICATION
SOLAR MESSAGE CENTER
MODEL SMC – 2000 FM ST

1.0 INTRODUCTION

This specification shall describe a trailer-mounted, portable changeable sign upon which varying electronically generated messages and graphics will be displayed to highway traffic 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 board consisting of 24 LED lamp matrix panels powered by a bank of batteries in order to convey bright, distinctive messages to the traveling public. The batteries are in turn recharged automatically by a group of solar panels located at the highest point on the unit. The Solar Message Center is designed with sufficient energy backup to operate for a period of 21 days without any sun. The solar panel generator array shall recharge the battery bank at a rate of 2.5 hours 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 operation functions easily and 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 ½" 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 display shall be sealed with trim lock bulb type trim. Ventilation shall be natural convection. Moving parts involved in the ventilation of the sign cabinet shall not be allowed.

The width of the Solar Message Center sign panel shall not exceed 135 inches. The front face of the sign shall be covered with a clear UV inhibited polycarbonate to prevent fading. The polycarbonate window shall be held in place with a 2.0 inch cross-section aluminum frame which is mounted to the display cabinet with three stainless steel slip hinges and held open with two steel wheel style door holders with automatic release.

The Solar Message Center sign panel shall consist of one continuous LED matrix which provides text messages as well as graphic symbols. The sign panel shall be capable of projecting multiple font size characters created in the standard software. The full matrix panel shall consist of 28 LED lamp matrix pixels in height and 48 LED lamp pixels in length. Each pixel shall incorporate 5 LED's to provide complete target size definition within the pixel area. Message color shall be approximately 590 nanometers.

In addition, standard preprogrammed graphics symbols can be shown due to the full matrix capability.

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

The sign, when projecting 18 inch characters, shall be clearly visible and legible from a distance of 1,000 feet under both day and night conditions. Legibility shall increase proportionately to the size of the symbols. Under variable light level conditions, the sign shall automatically adjust its light source so as to meet the 1000 feet legibility requirements without being too dim or too intense. The intensity of the light source shall not change suddenly in response to temporary changes in ambient light conditions, such as a car's headlights, but shall have an intentional built in delay to provide a steady output.

The Solar Message Center 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 upright shall include a device to enable 360° rotation and shall lock into the position to which it is manually rotated. Raise and lower travel shall nominally be 5 feet and shall be accomplished by a hydraulic power pack. The bottom of the sign shall be at least 7 feet above the ground when in the raised position. In a transport position, the sign shall orient to the longitudinal axis of the trailer in a manner that effectively reduces aerodynamic drag during towing.

3.0 POWER AND MISCELLANEOUS REQUIRED EQUIPMENT

The power supply type shall be a battery bank consisting of three size 4-D, deep cycle, lead acid 12 volt DC batteries wired in parallel. The battery bank shall be housed in lockable ABS plastic weatherproof battery box. The batteries shall be recharged by a solar panel array producing 110 watts of power. The complete unit shall be painted with the manufacture's standard colors and materials.

4.0 SYSTEM CONTROL REQUIREMENTS

The Solar Message Center 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/during display on the message sign.

- d) Store 250 preprogrammed messages for display when called upon by an operator through the keyboard.
- e) Store 80 preprogrammed graphics messages.
- f) Store 100 user created multi-page messages.
- g) Maintain stored message list.
- h) Provide password coding or key entry.
- i) Provide control programming to display stored messages under operator control through keyboard entry.
- j) Provide control for moving arrow display.
- k) Provide automatic letter sizing and centering without separate programming.
- l) Provide for programming while another message is being shown.
- m) Include a schedule program to automatically start and stop the display of sequences at predetermined times.
- n) 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 incorporate an automatic intensity control feature in order to keep the LED lamp matrix intensity constant with a reduction in voltage and changes in ambient temperature. This allows the message to remain legible at a distance of 1000 feet any time the unit is operational. The Solar Message Center also has a photocell in order to reduce the lamp intensity at night, eliminating glare.

**SOLAR MESSAGE CENTER
-GENERAL SPECIFICATION-**

TRAILER SPECIFICATIONS:

TRAILER HEIGHT - TRAVEL POSITION.....104.0”
TRAILER HEIGHT – ERECTED POSITION.....163”
TRAVEL WIDTH.....96”
TRAILER LENGTH WITH TONGUE.....170.6”
TRAILER LENGTH WITHOUT TONGUE.....134”
TRAILER WEIGHT.....1875 LBS.

**MAIN FRAME: 2” X 4” X .120” HIGH GRADE STEEL RECTANGULAR
TUBING**

TONGUE : 3” X 3” X .250” STEEL RECTANGULAR TUBING

TONGUE SLEEVE: .375” STEEL PLATE

OUTER MAST: .250” STEEL TUBING

INNER MAST: .250” STEEL TUBING

MAST MOUNTING PLATE: .375” STEEL PLATE WITH .250” GUSSETS

SOLAR PANEL ARRAY FRAME: .125” ALUMINUM

MESSAGE CABINET: WIDTH.....133”
HEIGHT.....79.5”
**DEPTH – INCLUDING SOLAR PANEL
ARRAY.....34”**
**DEPTH – WITHOUT SOLAR PANEL
ARRAY.....4.25”**
POLYCARBONATE WINDOW THICKNESS - .125”
CABINET DELTA - TYP.....20° F

**HYDRAULIC POWER PACK: 12VDC MOTOR/PUMP/VALVE/
RESERVOIR**

AXLE CAPACITY.....3,500 LBS.

LEAF SPRING CAPACITY.....3,500 LBS.

FENDERS: INJECTED MOLDED PLASTIC

BATTERY ENCLOSURE – .250” UV PROTECTED ABS

SWING JACK CAPACITY.....2,000 LBS. EACH/ 8,000 LBS. TOTAL

SWING JACK TRAVEL.....15”

SMC CENTRAL PROCESSING UNIT – CPU SPECIFICATIONS:

PROCESSOR.....Rabbit Core Microprocessor 22.1 MHz

POWER REQUIREMENTS.....175 mA @ 12V

**MEMORY TYPE & 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 TYPE: LIQUID CRYSTAL DISPLAY-LCD

SCREEN SIZE.....240 X 64 DOT PIXELS

INTERFACES: RS232

LED LAMP MATRIX SPECIFICATION

PIXEL SIZE..... 2” X 2”

CHARACTER SIZE.....18” H X 12” W

CHARACTER SPACING.....4.0”

LINES.....3

CHARACTER PER LINE.....8

LINE SPACING.....6”

FIELD OF VIEW..... 30° CONICAL

CONTRAST ENHANCEMENT FEATURES:

- * 5 LED PIXEL**
- * BLACK BACKGROUND**

ELECTRICAL CONTROL:

- * COMPUTER CONTROLLED/AUTOMATIC INTENSITY CONTROL-
ADJUSTS LED OUTPUT WITH VARIANCES OF AMBIENT LIGHT AND
TEMPERATURE / PHOTOCCELL CONTROLLED**
- * OVERCURRENT PROTECTION: PREVENTS WAVELENGTH SHIFT
OVER TEMPERATURE AND CURRENT VARIATIONS**

SOLAR GENERATOR SPECIFICATIONS:

SOLAR PANEL ARRAY..... 110 WATT MINIMUM

OPERATING VOLTAGE.....12 VDC

**BATTERY BANK: THREE 4D DEEP CYCLE 12 VOLT BATTERIES 570
AMP HOURS TOTAL**

**CHARGE CONTROLLER: SERIES REGULATOR WITH THERMAL
COMPENSATION**

LOW VOLTAGE DISCONNECT, 4 point caution display.....11.0 VDC

LOW VOLTAGE DISCONNECT, complete shutdown.....10.7 Volts

