



SPECIFICATION
SOLAR MESSAGE CENTER
MODEL SMC – 2000

1.0 INTRODUCTION

This specification shall describe a trailer-mounted, portable changeable sign upon which varying electronically generated lamp 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 optically enhanced 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 30 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 complete unit. The base structure shall be structural rectangular steel tubing of 2 inches by 6 inches with a minimum wall thickness of .120 inches, providing an adequate foundation for the unit. All tubing shall be joined by welding and all structural welds shall be continuous bead welds. All tubing ends shall be closed.

Axle and suspension systems shall be rated at 3,500 pounds minimum. Wheels and tires shall be a minimum of 15 inches, 4 ply, and shall be rated for towing at on-highway speeds of 65 miles per hour. A steel fender shall be installed over each wheel.

Four crank type, heavy duty 2,000 lb. capacity, industrial leveling jacks, one at each corner of the trailer deck, shall be installed. Trailer shall have two ¼" thick high strength steel with bright zinc plating towing safety chains.

A lighting system shall be provided for the trailer, to include tail lights, stop lights, turn signals, license plate light and reflectors. A trailer electrical cable and connector compatible with towing vehicles shall be installed. To eliminate tubing installation chafing no wiring shall be installed on top of the trailer frame. All wiring shall be jacketed or use loom to guard against environmental deterioration and physical wear. A 2-inch ball type trailer hitch with double safety chains in accordance with SAE J684F shall be installed.

All exterior surfaces shall be painted PSC Safety Orange using Sherwin Williams Polane polyurethane paint.

2.3 MESSAGE SIGN

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 a welded assembly made of aluminum alloy. 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 length of the Solar Message Center sign panel shall not exceed 140 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 lamp 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.

Double stroke fonts shall be projected in 20 inch letter heights. The full matrix panel shall consist of 25 LED lamp matrix pixels in height and 48 LED lamp pixels in length.

Each pixel shall incorporate 4 LED's with a lens to produce 48 images and provide complete target size definition within the pixel area. Message color shall be approximately 590 nanometers.

2.4 MESSAGE SIGN-CONTINUED

In addition, standard preprogrammed graphics symbols can be shown due to the full matrix capability. The user shall also have the capability of generating special graphics or letters through the use of remote base station operation.

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 20 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 Solar Message Center shall be designed to accept two (2) power sources.

The first power supply type shall be a battery bank consisting of four size 4-D, deep cycle, lead acid 12 volt DC batteries wired in parallel. The battery bank shall be housed in lockable heavy duty steel weatherproof battery box. The batteries shall be recharged by a solar panel array producing 150 watts of power. There shall be a built-in battery charger with a minimum 25 ampere per hour rating.

The second power supply type shall be the capability of the unit to accept existing 120V commercial electrical service.

The two power sources shall be enclosed in an appropriate protective housing. The complete unit shall be painted with the manufacturer'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 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 messages.
- f) Store a minimum of 80 preprogrammed graphics messages.
- g) Store a minimum of 100 multi-page messages.
- h) Maintain stored message list.
- i) Provide password coding or key entry.
- j) Provide control programming to display stored messages under operator control through keyboard entry.
- k) Provide control for moving arrow display.
- l) Provide automatic letter sizing and centering without separate programming.
- m) Provide for programming while another message is being shown.
- n) Include a calendar program to automatically start and stop the display of sequences at predetermined times.
- o) Provide character board and battery diagnostics.

The computer shall be housed in a weather resistant type NEMA 3R shock resistant lockable control box which shall include a light for night operation. The power control unit shall be housed in the lockable steel weatherproof battery box and contain two current meters, one to show the amperage generated with the battery charger and one to show the amperage from the solar panels to the battery bank. The power control unit shall also incorporate a PV regulator

with thermal compensation for variances in ambient temperature to regulate the charge rate to the battery bank.

4.1 SYSTEM CONTROL REQUIREMENTS-CONTINUED

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.

5.0 OPTIONS

The following options allow remote control of the Solar Message Center and automatic fault monitoring (i.e. the sign will notify the operator in the event of a low voltage disconnect by originating a call to a predetermined telephone number).

5.0.1 TELEPHONE LAND LINE OPTION

This option allows the operator to have remote control of the on board computer as described in paragraph 5.1 – Computer Base Operation. This option requires that a telephone line be run to the trailer site.

5.0.2 CELLULAR TELEPHONE OPTION

This option eliminates the need to run a telephone line to the trailer site. In addition, the trailer can be moved anywhere desired as long as there is cellular telephone coverage. This option allows the operator to have remote control of the on-board computer as described in paragraph 5.1 – Remote Operation.

5.1 REMOTE OPERATION

The communication protocol used for remote operation shall be NTCIP. The Solar Message Center is capable of communicating and being controlled with all NTCIP compliant central control systems.

5.2 5.2 RADAR OPTION

This option provides the system with the ability to determine the speed of approaching traffic and interrupt the programmed sequence with a special default sequence of messages.

**SOLAR MESSAGE CENTER
-GENERAL SPECIFICATION-**

TRAILER SPECIFICATIONS:

TRAILER HEIGHT - TRAVEL POSITION.....102.5"
TRAILER HEIGHT – ERECTED POSITION.....163.5"
TRAVEL WIDTH.....93"
TRAILER LENGTH WITH TONGUE.....194.5"
TRAILER LENGTH WITHOUT TONGUE.....150"
TRAILER WEIGHT.....2,700 LBS.

MAIN FRAME: 2" X 6" X .120" HIGH GRADE STEEL RECTANGULAR TUBING

TONGUE : 2" X 6" X .180" STEEL RECTANGULAR TUBING

TONGUE SLEEVE: .375" STEEL PLATE

OUTER MAST: .250" STEEL TUBING

INNER MAST: .250" STEEL TUBING

MAST MOUNTING PLATE: .500" STEEL PLATE WITH .250" GUSSETS

SOLAR PANEL ARRAY FRAME: .125" ALUMINUM ANGLE

MESSAGE CABINET: WIDTH.....139"
HEIGHT.....76"
DEPTH – INCLUDING SOLAR PANEL ARRAY.....21.0"
DEPTH – TOP-WITHOUT SOLAR PANEL ARRAY.....14.5"
DEPTH – BOTTOM.....9"
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: 11 GAUGE

BATTERY ENCLOSURE – ONE: 12 GAUGE STEEL

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 & RJ11 PHONE JACK

LED LAMP MATRIX SPECIFICATION

PIXEL SIZE.....’’2’’ X 2’’

CHARACTER SIZE.....19.2’’ H X 13.6’’ W

CHARACTER SPACING.....3.2’’

LINES.....3

CHARACTER PER LINE.....8

LINE SPACING.....6’’

FIELD OF VIEW.....MINIMUM 21° HORIZONTAL 7° VERTICAL

CONTRAST ENHANCEMENT FEATURES:

*** OPTICALLY ENHANCED LED – 4 LED PIXEL**

*** TRUNCATED DESIGN * INTEGRATED LIGHT BAFFLES**

*** BLACK BACKGROUND * HOUSING/VISOR**

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..... 150 WATT MINIMUM
OPERATING VOLTAGE.....12.6 VDC
BATTERY BANK: FOUR 4D DEEP CYCLE 12 VOLT BATTERIES 940
AMP HOURS TOTAL
CHARGE CONTROLLER: SERIES REGULATOR WITH THERMAL
COMPENSATION
LOW VOLTAGE DISCONNECT.....11.2 VDC
AC/DC BATTERY CHARGER.....25 AMP

SOLAR MESSAGE CENTER CELLULAR TRANSCEIVER

SPECIFICATIONS

FREQUENCY RANGE.....DUAL BAND 800 MHz AND 1.9 GHz

OPERATING VOLTAGE.....10.0 – 28.0 VDC

**BATTERY DRAIN.....STANDBY.....0.06 AMP
TRANSMIT.....0.30 AMP**

DIMENSIONS6.8 X 3.3 X 2.0 INCHES

WEIGHT2.0 LBS

OPERATING TEMPERATURE.....-30° TO + 70° C (-22° TO +158° F)

RF POWER OUTPUT.....224 mW NOMINAL

INPUT/OUTPUT IMPEDANCE.....50 OHMS TNC

SOLAR MESSAGE CENTER RADAR OPTION SPECIFICATION

***INTERFACES WITH SMC CENTRAL PROCESSING UNIT/SOFTWARE:**

The Solar Message Center shall be equipped with a radar system that monitors the speed of oncoming traffic. With the radar option, the SMC has two modes of operation, which allow the system to display a special sequence of preprogrammed messages. Warnings, statements, or vehicle speed may be displayed on the signboard once the SMC system radar has been triggered.

***RADAR ONLY MODE:**

When the system radar trigger speed has been exceeded, the SMC shall continuously display a special sequence of messages which have been preprogrammed into the computer. The actual vehicle speed may be displayed along with warnings, etc.

***RADAR TRIP MODE:**

This mode is used to display a normal sequence of preprogrammed messages until the radar trigger speed has been exceeded. Once triggered, the SMC will display a sequence of preprogrammed messages which can warn the motorists and display their actual speed.

***SI-XLRM SPEED INTERFACE W/RS232 X-BAND LONG RANGE TRANSCEIVER:**

FREQUENCY:	34.7 GHz (Ka band)
OUTPUT POWER:	.010 WATTS (MIN)/.025 WATTS (MAX)
POWER DENSITY:	<.001 WATTS/CENTIMETER ²
BEAM WIDTH:	12°
POLARIZATION:	CIRCULAR
OPERATING VOLTAGE:	9 – 16 VOLTS DC
OPERATING CURRENT:	370 mA DC
OPERATING TEMPERATURE:	-30°C to 70°C
SPEED RANGE:	5 MPH TO 200 MPH

***APPROXIMATE DETECTION DISTANCE OF AVERAGE SIZE VEHICLE:
2000-2500 FEET (DISTANCE WILL BE REDUCED WITH PRECIPITATION.)**

***SERIAL COMMUNICATIONS: RS232C,+TTL,-TTL**

***DATA FORMAT: 1 START BIT, 8 DATA BITS, 1 STOP BIT, NO PARITY.**

***DATA RATE: 9600 BAUD**

***PHYSICAL SIZE AND WEIGHT:**

**Weight: 1.15 lb
Diameter: 2.6"
Length: 4.7"**

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE