INSTRUCTION MANUAL

SP65 Solar Panel

Revision: 7/08

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SP65 Solar Panel

1. General

Solar panels are a photovoltaic power source used for charging lead acid batteries. The SP65 has two leads terminated with spade lugs that connect to the regulator that is shipped with the SP65. The 15' cable shipped with the SP65 connects the regulator to the battery. Do not use the SP65 with the PS100 or CH100.

2. Specifications

	SP65*
Typical peak power (Pp)	65 W
Voltage @ peak power (Vpp) (voltage from solar panel before regulator)	17.6 V
Current @ peak power (Ipp)	3.69 A
Guaranteed minimum peak power	60 W
Temperature coefficient of power	-(0.5 ± 0.05)%/°C
Length, cm	111.1
Width, cm	50.2
Depth, cm	5
Weight, kg	7.2

NOTE The above solar panel characteristics assume a 1 kilowatt per square meter illumination and a solar panel temperature of 25°C. Individual panels may vary up to 10%. The output panel voltage increases as the panel temperature decreases.

*An SP65 can be connected to another SP65 to provide 130 W of typical peak power.

Regulator

Model:	Morningstar SunSaver SS-10-12V
Temperature Compensation (mV/°C):	-28
Self Consumption:	6 to 10 mA
Operating Temperature:	-40° to +85°C

3. Installation

3.1 Mounting

The panel should be mounted facing south if located in the Northern Hemisphere, or facing north in the Southern Hemisphere. The solar panel mounts to the mast or leg of a tripod, or any 1 5/8" schedule 40 pipe, see Figure 1. The panel should be mounted to the pipe using the U-bolts and 5/16

NC (course) nuts provided with the solar panel. The nuts fastening the bracket to the pipe should be as tight as possible without bending the bracket.

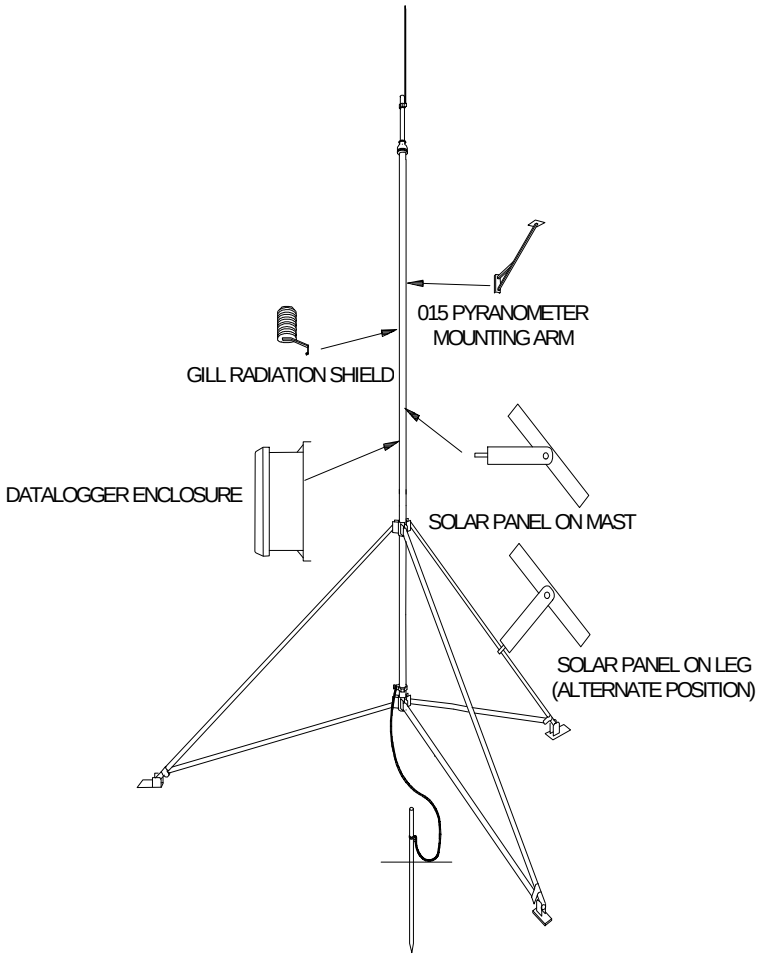

FIGURE 1. Solar Panel Mounting

3.2 Orientation

The solar panel should be oriented to receive maximum insolation (incident solar radiation) over the course of a year. Suggested tilt angles of the solar panel are given in Table 1.

After determining the tilt angle, loosen the 5/16" nuts on each side of the solar panel, adjust the panel, and tighten the two nuts to secure the position. See Figure 2.

TABLE 1. Solar Panel Tilt Angle*

Site Latitude (N or S)	Tilt Angle
0 – 10°	10°
11 – 20°	Latitude +5°
21 – 45	Latitude +10°
46 – 65	Latitude +15°
> 65	80°

***** From "Design Aids for Small PV Power Systems", Solorex Corp.

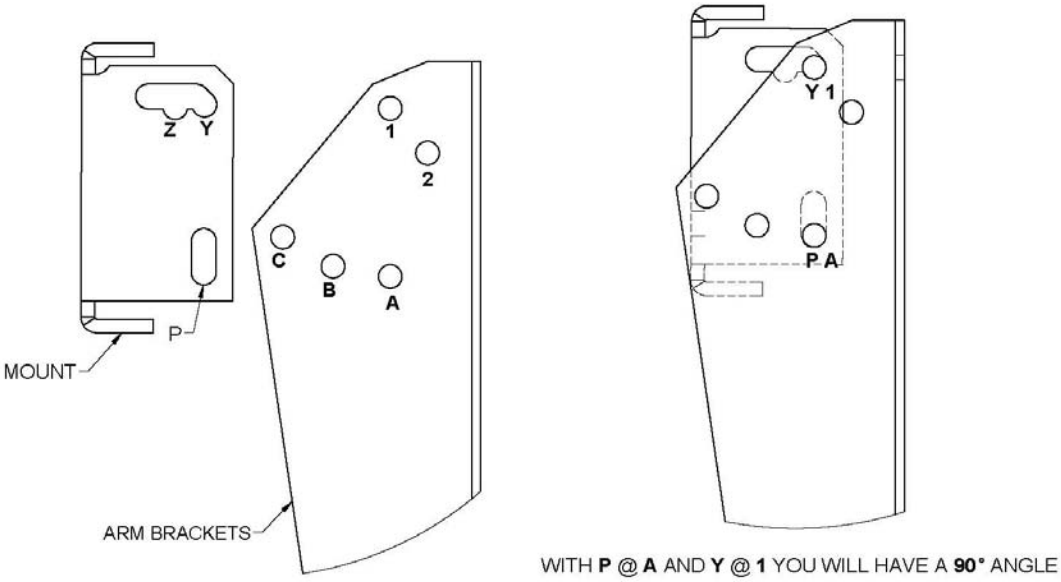

FIGURE 2. Angle Settings on Mounting Bracket

TABLE 2. Configurations for Desired Angles

Hole Locations	Angle
Holes P and A Aligned with Holes 1 and Y	90
Holes P and A Aligned with Holes 1 and Z	80
Holes P and B Aligned with Holes 1 and Y	70
Holes P and B Aligned with Holes 1 and Z	60
Holes P and C Aligned with Holes 1 and Y	50
Holes P and C Aligned with Holes 1 and Z	40
Holes P and C Aligned with Holes 2 and Y	30
Holes P and C Aligned with Holes 2 and Z	20

3.3 Installation of Morningstar SunSaver SS-10-12V Regulator

NOTE For safety reasons, completely cover the solar panel to limit output current and voltage. If nothing is available to cover the panel, be careful not to short solar panel (+) and (-) leads together.

1. Using the supplied mounting hardware, install the Morningstar SunSaver SS-10-12V regulator to the mounting plate of an environmental enclosure (see Figure 3).

2. Using the supplied red and black power cables, secure the black wire to terminal lug#1 marked battery (-) on the regulator. Connect the pigtailed end of the cable to the negative battery terminal. Secure the red wire to terminal lug #2 marked battery (+) on the regulator. Connect the pigtailed end of the cable to the battery's positive terminal. With the battery connected and no solar panel input, the green charging LED **SHOULD NOT** be on.

3. Connect the black (-) wire from the SP65 power cable to terminal lug #3 marked solar (-) on the regulator. Connect the red (+) wire from the SP65 power cable to terminal lug #4 marked solar (+) on the SunSaver regulator. If using a sealed rechargeable battery such as our BP24, then verify that the metal jumper is installed to configure the regulator to recharge sealed rechargeable batteries (see Figure 3). If using a flooded battery (e.g., car or marine deep cycle), then remove the jumper. Also note that no connections are made on the load terminals of the regulator for this application (see Figure 3).

4. If charge current is available from the solar panel, the green charge LED **WILL LIGHT UP**. This will verify proper operation and wiring of the regulator.

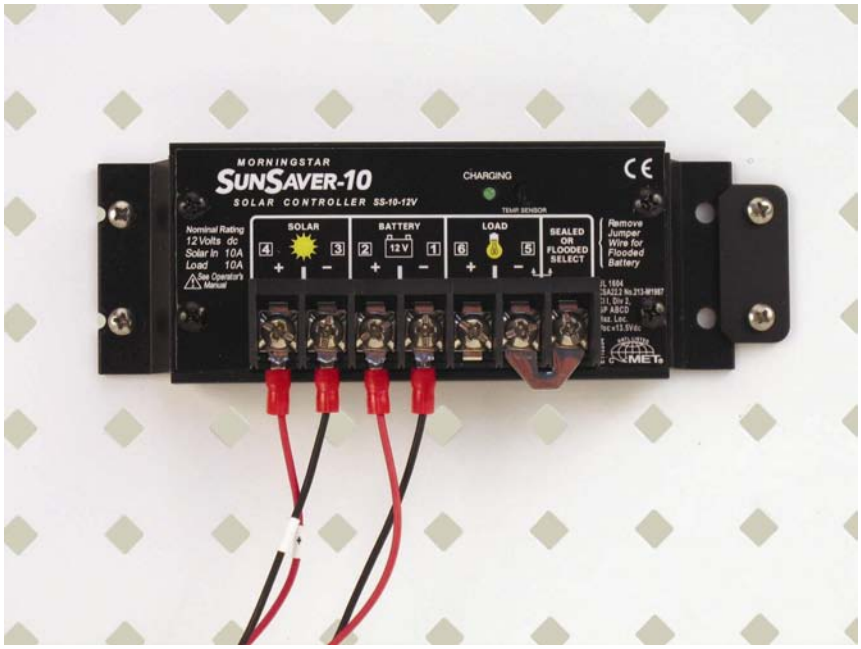

FIGURE 3. Morningstar's SunSaver SS-10-12V regulator mounted on an enclosure backplate.

4. Maintenance

An occasional cleaning of the glass improves the solar panel's efficiency.

If a problem with the solar panel is suspected, the panel may be checked by measuring the voltage output. Check the voltage with a voltmeter connected between the two leads of the solar panel. There must be solar radiation incident on the panel and there must be a load connected to the solar panel. The load can be the datalogger, other equipment, or a 75 ohm resistor capable of dissipating solar panel power between the two leads. No voltage output implies a bad solar panel, regulator, or cable. The magnitude of the voltage output depends on the incident solar radiation.

5. Power Considerations

5.1 Solar Power and Lead Acid Batteries

The solar panel converts light energy to electricity, or specifically direct current. The direct current produced is used as a charging source for lead acid batteries.

The solar panel operates in both direct and diffuse light (cloudy days), but not at night.

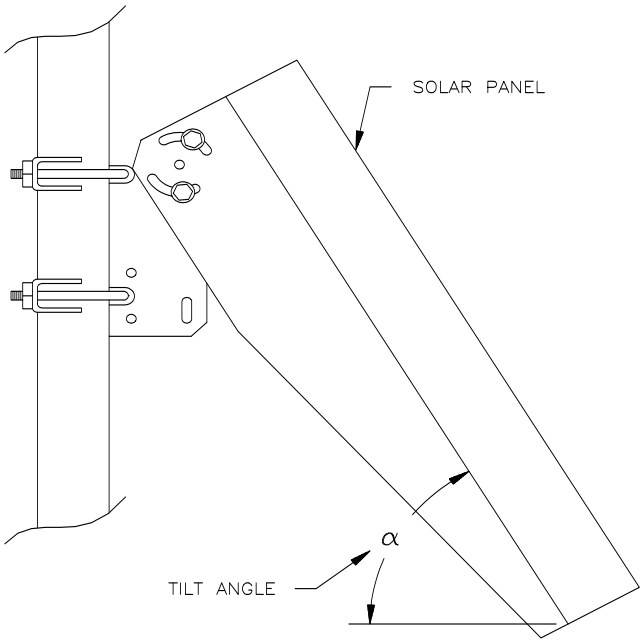

FIGURE 4. Solar Panel Orientation

The minimum battery size and solar panel output required depends on 1) the average current drain of the system, 2) the maximum time the battery must supply power to the system without being charged, and 3) the location of the site. When some batteries are discharged below a specified voltage, the battery becomes damaged and cannot be recharged.

The battery supplies power directly to the operating system, the solar panel supplies power to recharge the battery. Therefore, on the average, the solar panel must provide at least as much power to the battery as is being used by the system.

The battery must have enough capacity to power the system during times of no charging (night) or low charging (stormy winter days).

5.2 Voltage Regulator

The regulator has two basic functions: 1) blocks any current flow from the battery to the solar panel, and 2) limits the source current to the battery.

The SP65 is shipped with Morningstar's SunSaver SS-10-12V regulator. The regulator connects to the battery via the 15' cable shipped with the SP65. The regulator and battery should be housed in an environmental enclosure. Mounting brackets are included with the regulator for attachment to an enclosure backplate.

Appendix A. Assembly Instructions for 65 Watt Solar Panel with Mounting Bracket

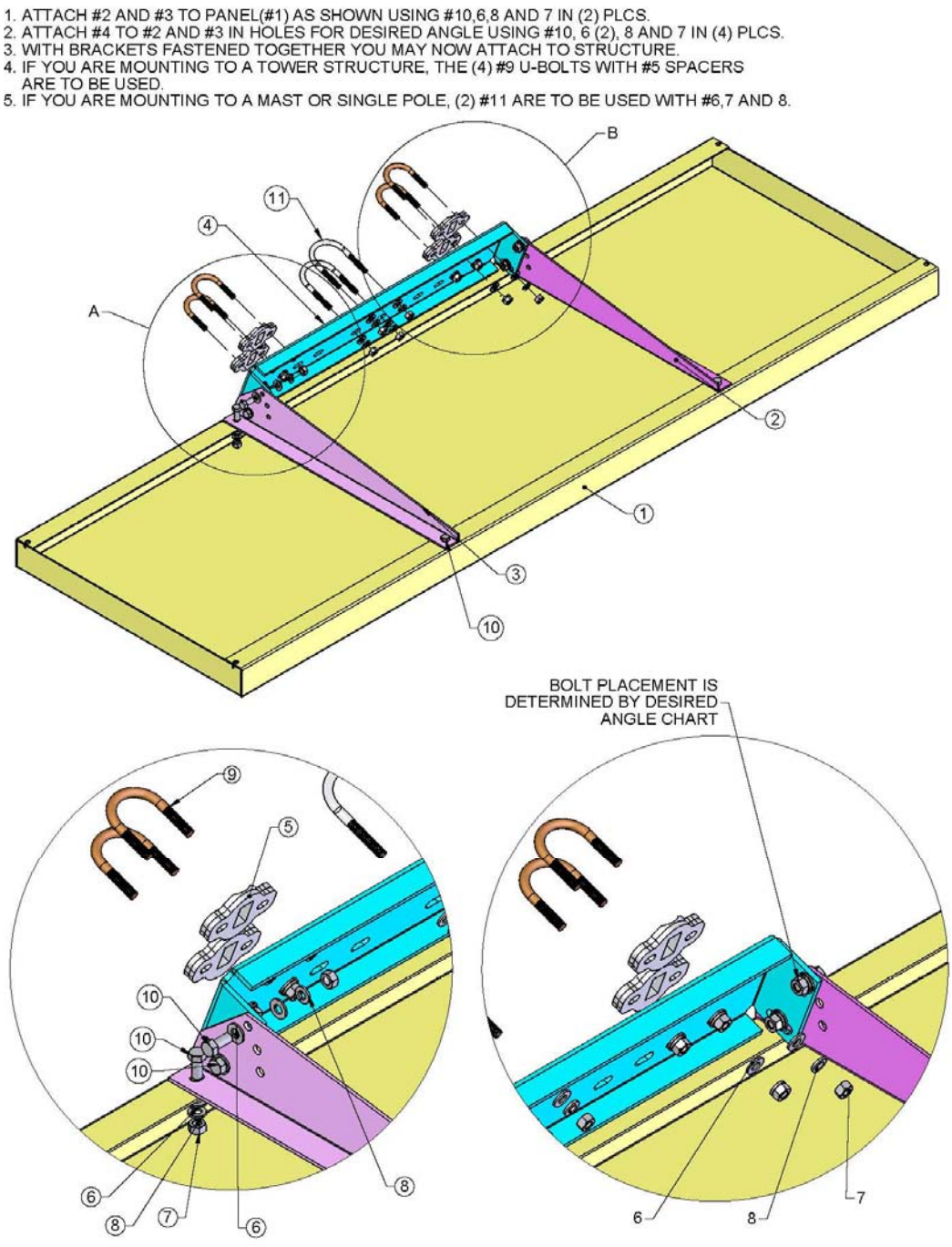

FIGURE A-1. 65 Watt Solar Panel Assembly Instructions

TABLE A-1. Mounting Bracket Parts List

Item #	Description	Qty
1	65 W Solar Panel	1
2	Right Arm Bracket	1
3	Left Arm Bracket	1
4	Mount	1
5	Spacer	4
6	Flat Washer	24
7	5/16-18 Nut	8
8	Lock Washer	20
9	5/16-18 x 1.50 U-Bolt w/nuts	4
10	5/16-18 x .750 Hex Bolt	8
11	5/16-18 x 2.0 U-Bolt w/nuts	2

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