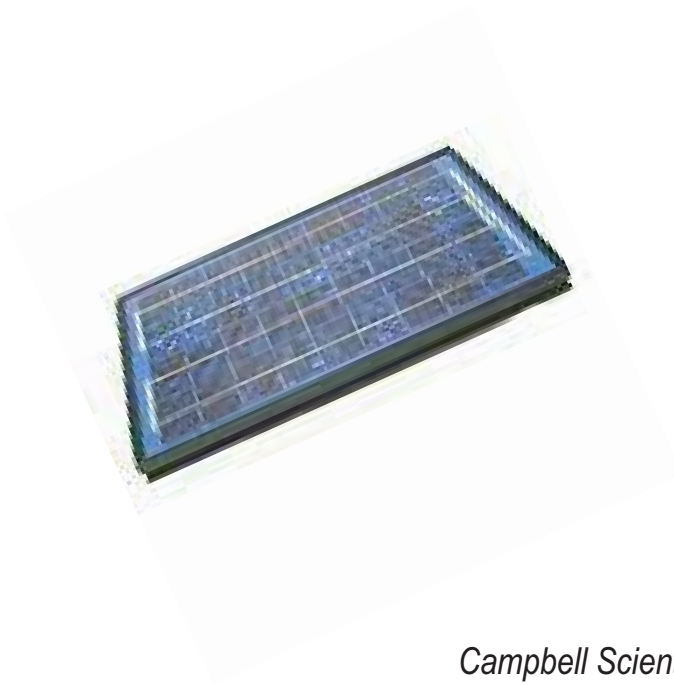


INSTRUCTION MANUAL



MSX10, MSX20, MSX20R, MSX30R, and MSX50R Solar Panels

July 2009



Copyright © 2007
Campbell Scientific (Canada) Corp.

WARRANTY AND ASSISTANCE

This equipment is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. ("CSC") to be free from defects in materials and workmanship under normal use and service for **twelve (12) months** from date of shipment unless specified otherwise. ***** **Batteries are not warranted.** ***** CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.



CAMPBELL SCIENTIFIC
C A N A D A C O R P .

11564 - 149 street - edmonton - alberta - T5M 1W7
tel 780.454.2505 fax 780.454.2655

www.campbellsci.ca

MSX Solar Panels Table of Contents

PDF viewers note: These page numbers refer to the printed version of this document. Use the Adobe Acrobat® bookmarks tab for links to specific sections.

- 1. General 1
- 2. Specifications 1
- 3. Installation..... 1
 - 3.1 Mounting1
 - 3.2 Orientation3
- 4. Maintenance4
- 5. Power Considerations5
 - 5.1 Solar Power and Lead Acid Batteries5
 - 5.2 Voltage Regulator.....5
- 6. Appendix A.....6
 - Mounting the MSX50R Solar Panel with the C1286.....7

Figures

- 1. Solar Panel Mounting2
- 2. Regulated Solar Panel and External Battery3
- 3. Angle Settings on Mounting Bracket4

Tables

- 1. Solar Panel Tilt Angle3

MSX10, MSX20, MSX20R, MSX30R, and MSX50R Solar Panels

1. General

The solar panel is a photovoltaic power source used for charging lead acid batteries. The MSX10, MSX20, MSX20R, MSX30R, and MSX50R are 10, 20, 20, 30, and 50-watt solar panels, respectively.

The MSX10 Solar Panels has two leads stripped and tinned to insert into the terminals labeled 'CHG' on the PS100 or PS12LA Charging Regulator. With a CR7, the two wires from the solar panel are inserted into the terminals marked SOLAR PANEL located underneath the 700X Control Module. An external lead acid battery can be connected to the CR7 at the terminals marked EXTERNAL BATTERY next to the SOLAR PANEL terminals.

The MSX20R, MSX30R, and MSX50R are regulated solar panels with two stripped and tinned leads for direct connection to an external 12-volt lead acid battery.

2. Specifications

	MSX10	MSX20/ MSX20R	MSX30R	MSX50R
Typical peak power (Pp)	10 W	20 W	30W	50W
Voltage @ peak power (Vpp) (voltage from solar panel before regulator)	17.1 V	17.1 V	17.1	17.5
Current @ peak power (Ipp)	0.60 A	1.17 A	1.75 A	2.9 A
Guaranteed minimum peak power	10 W	20 W	30	50
Approximate effect of temperature on power	-0.37%/°C	-0.38%/°C	-.38/°C	-.38/°C
Length, cm	42.0	50.1	59.2	83.9
Width, cm	26.9	42.0	50.1	53.7
Depth, cm	2.3	5.0	5	5
Weight, kg	1.50	2.95	5.29	6.0

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.

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 the CM10/CM6 Tripod, or any 1 5/8" schedule 40

pipe, see Figure 1. See Appendix A for information about mounting the MSX50R. 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.

If the MSX10 solar panel is being used, route the solar panel cable to the datalogger power supply and charging circuitry. If the MSX20R, MSX30R, or MSX50R is being used, attach the leads of the solar panel directly to the external battery with a user supplied connector. Figure 2 shows an example of a regulated solar panel connected to an external battery to run a radiotelemetry system.

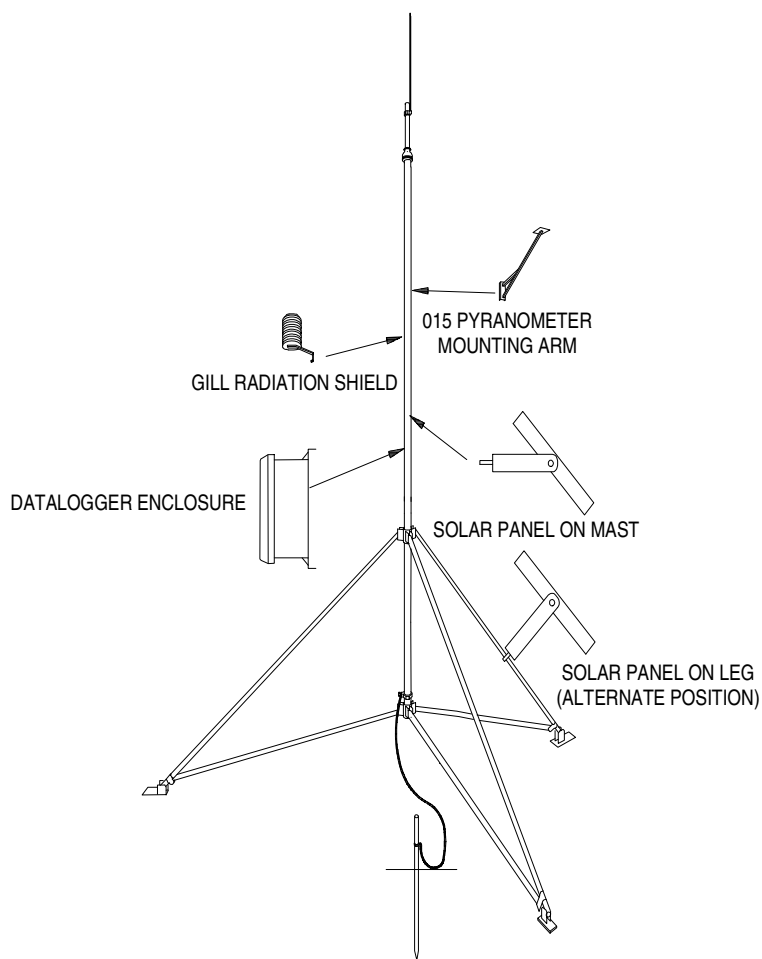


FIGURE 1. Solar Panel Mounting

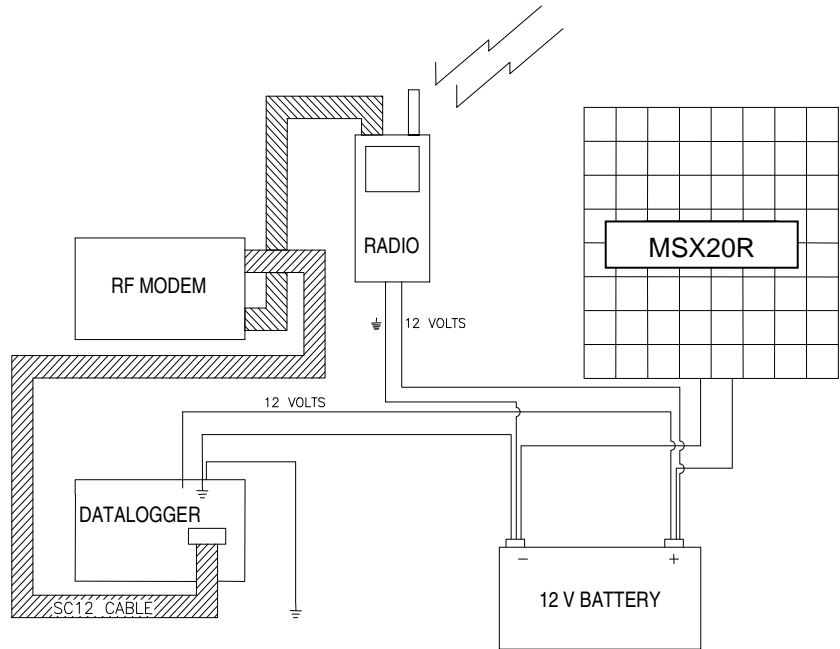


FIGURE 2. Regulated Solar Panel and External Battery

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 mounting bracket, adjust the panel, and tighten the nuts to secure the position. See Figure 3.

TABLE 1. Solar Panel Tilt Angle*

<u>Site Latitude (N or S)</u>	<u>Tilt Angle</u>
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.

NOTE

In locations of high snowfall it may be necessary to mount the solar panel vertically. This will help avoid the accumulation of snow and ice on the solar panel.

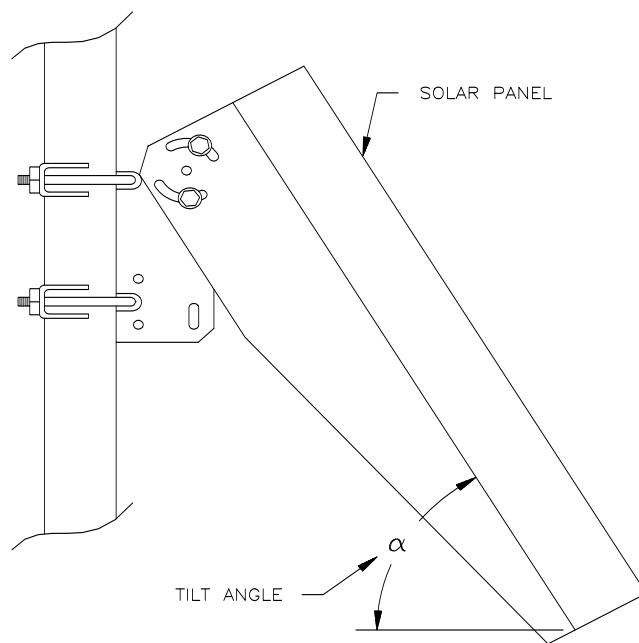


FIGURE 3. Angle Settings on Mounting Bracket

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.

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

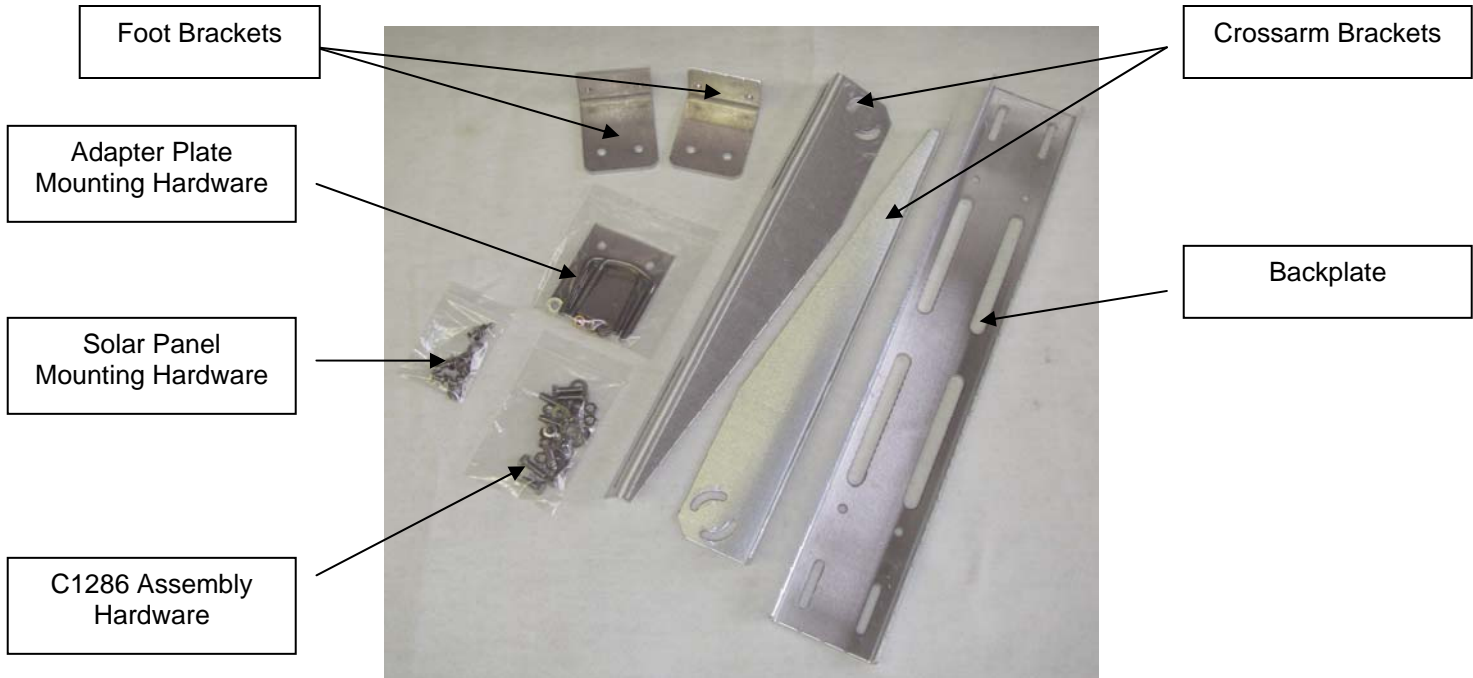
The solar panel must be regulated either with a Campbell Scientific regulator or an attached regulator. The regulator has two basic functions: 1) blocks any current flow from the battery to the solar panel, and 2) limits the source current to the battery.

The MSX10 is unregulated and must be connected to a Campbell Scientific voltage regulator. These regulators include the PS100, PS12LA, PS512M, CH12R, CH512R, CH100, CR23X rechargeable base, 21XL base, CR200 series dataloggers, and the CR7 solar panel input.

The MSX20R, MSX30R, and MSX50R have a voltage regulator attached. These panels are connected directly to a battery.

Appendix A: Mounting the MSX50R Solar Panel with the C1286

The following are steps to assemble and attach the C1286 mounting kit to the MSX50R(-L) 50W solar panel. Figure A.1 is an overview of the components that make up the C1286 mounting bracket.



A.1 – C1286 Overview



A.2 – C1286 Assembly Hardware



A.3 – Solar Panel Mounting Hardware

Figure A.2 shows the bolt and nut with washers (2 flat & 1 lock washer) used to assemble the C1286. Figure A.3 shows the bolt and nut with washers (1 flat & 1 lock washer) used to attach the solar panel to the C1286 mounting bracket.

Step 1:

Loosely attach both of the foot brackets to the slot located at each end of the back plate (Figure A.4).

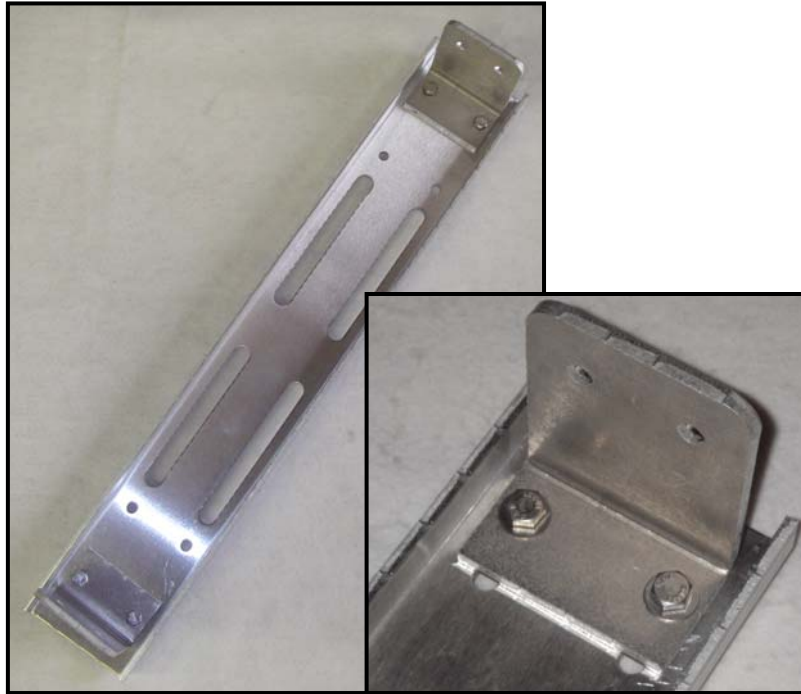


Figure A.4 – Mounting Foot Brackets

Step 2:

Loosely assemble crossarm brackets with foot brackets (Figure A.5).

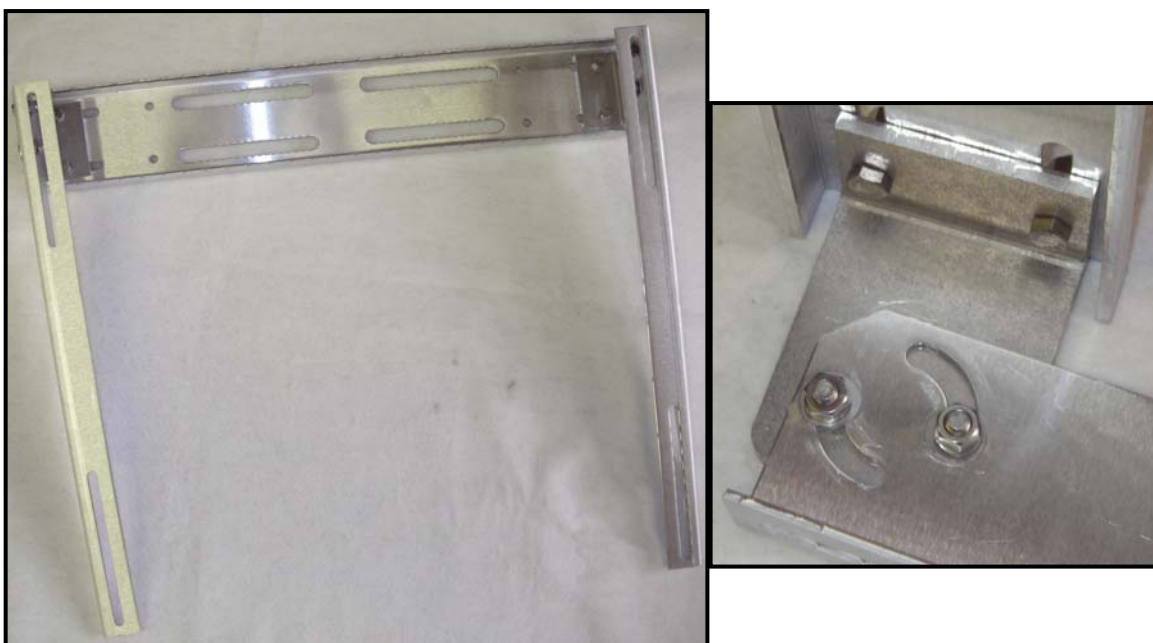


Figure A.5 – Mounting Crossarm Brackets

Step 3:

Place solar panel box on flat surface from which you can work. Remove lid of solar panel box, so that the panel is facedown. Place the C1286 bracket on top of the panel and line up the appropriate hole in the panel with the slots of the crossarm. Be sure to keep the panel and C1286 square to one another, and have mounting hardware evenly spaced in slots.

Note: The occupied cable entry seals must be oriented so that they will be facing down once installed.

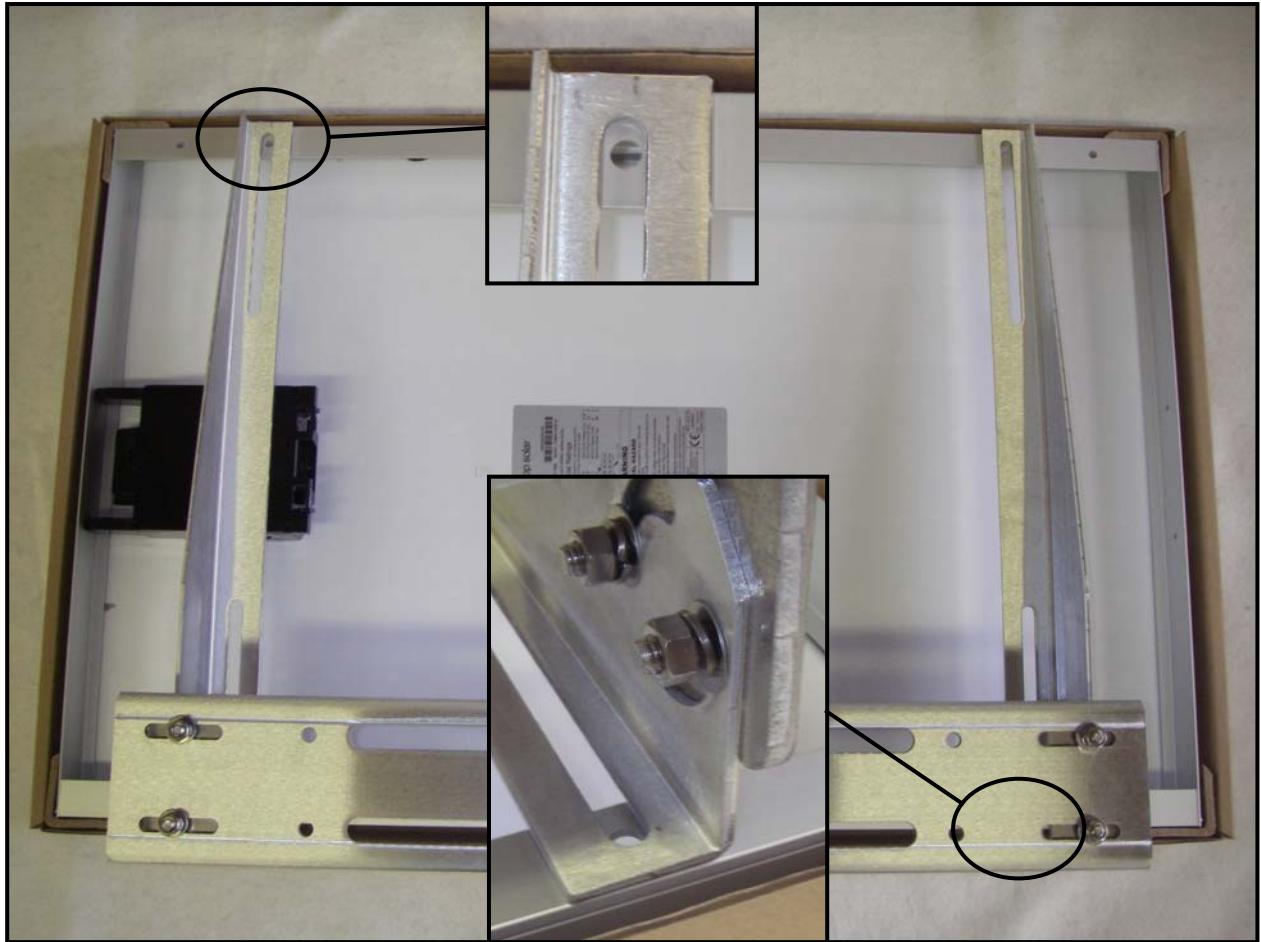


Figure A.6 – Align C1286 and Solar Panel

Step 4:

Attach and secure the solar panel to the C1286 mounting bracket (Figure A.7).

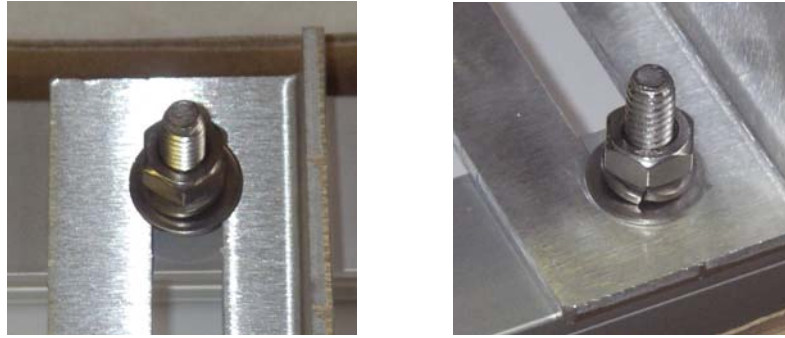


Figure A.7 – Hardware Securing Solar Panel

Step 5:

Tighten the hardware attaching the foot bracket to the back plate.

In order to optimize solar insolation refer to Section 3.2 of the manual. Determine the correct tilt angle required for your location, and secure the crossarm brackets to the foot bracket at the required angle. Depending on the mounting location, it may be easier to do this while the solar panel is on the ground.

Step 6:

The solar panel can now be installed. Again, depending on the installation this step may require two people. Place the supplied adapter plate into the channel of the back plate. Holding the panel in place, feed the V-bolts around the mast and through the back plate and adapter plate. Secure the V-bolts in place with the hardware supplied with the adapter plate mounting hardware. Figure A.8 shows a mock-up of the installation.



Figure A.8 – Solar Panel Installed