



Module		
Type	Width	Length
D	31-33"	60-67"
E	38-40"	51-53"
F	38-42"	58-61"
G	37-42"	61-67"

Top-of-Pole Mount for 4 Modules (TPM4) For Module Types D, E, F, & G

ASSEMBLY INSTRUCTIONS

**step-by-step
assembly and installation**

Top-of-Pole Mount for 4 Modules (TPM4) For Module Types D, E, F, & G

A few words about the product

The TPM4 for module types D, E, F, & G is designed to mount on 4 inch SCH40/80 galvanized steel pipe (installer supplied).

Pipe size and foundation requirements are based on several factors including the array surface area, maximum design wind speed, exposure category, soil type, steepest expected tilt angle, and above-ground clearance.

For general foundation and pipe size recommendations, please see our publication titled “TPM Pipe and Foundation Recommendations”.

For foundation and pipe size recommendations on a specific installation, please contact us at:

Phone: 800-260-3792

Email: info@power-fab.com

About these Assembly Instructions

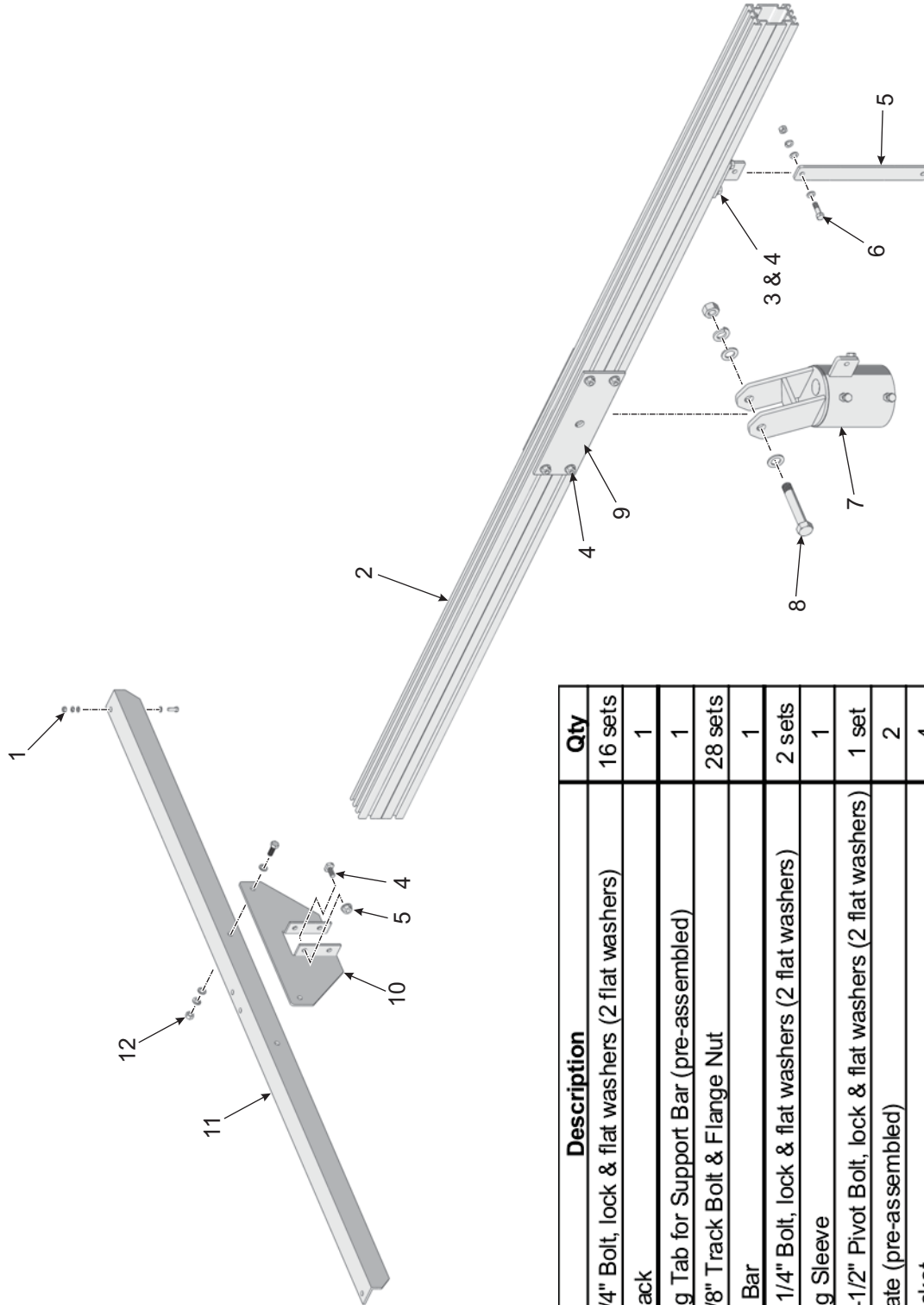
These instructions...

WARNING:
Follow the procedures and precautions in these instructions carefully.

- Are intended to be used by individuals with sufficient technical skills for the task. Knowledge and use of hand tools, measuring devices and torque values is also required.
- Include various precautions in the forms of Notes, Cautions, and Warnings. These are to assist in the assembly process and/or to draw attention to the fact that certain assembly steps may be dangerous and could cause serious personal injury and/or damage to components. Following the step-by-step procedures and these precautions should minimize the risk of any personal injury or damage to components while making the installation not only safe but an efficient process.

Required Tools & Publications

- 7/16 inch wrench or socket for 1/4 inch module hardware
- 9/16 inch wrench or socket for 3/8 inch hardware
- 1-1/8 inch wrench or socket for 3/4 inch Pivot Bolt hardware
- Torque wrench
- Ratchet wrench
- Ratchet extension bar
- 3 to 6 foot level
- Tape Measure
- Square
- Publication: TPM4 Types D, E, F, G, & H Rail Bracket Spacing Chart



Item	Description	Qty
1	1/4" x 3/4" Bolt, lock & flat washers (2 flat washers)	16 sets
2	Strongback	1
3	Mounting Tab for Support Bar (pre-assembled)	1
4	3/8" x 7/8" Track Bolt & Flange Nut	28 sets
5	Support Bar	1
6	3/8" x 1 1/4" Bolt, lock & flat washers (2 flat washers)	2 sets
7	Mounting Sleeve	1
8	3/4" x 4-1/2" Pivot Bolt, lock & flat washers (2 flat washers)	1 set
9	Pivot Plate (pre-assembled)	2
10	Rail Bracket	4
11	Module Rail	4
12	3/8" x 1" Bolt, lock & flat washers (2 flat washers)	8 sets

Top-of-Pole Mount for 4 Modules for Module Types D, E, F, & G Parts Identification

CAUTION:

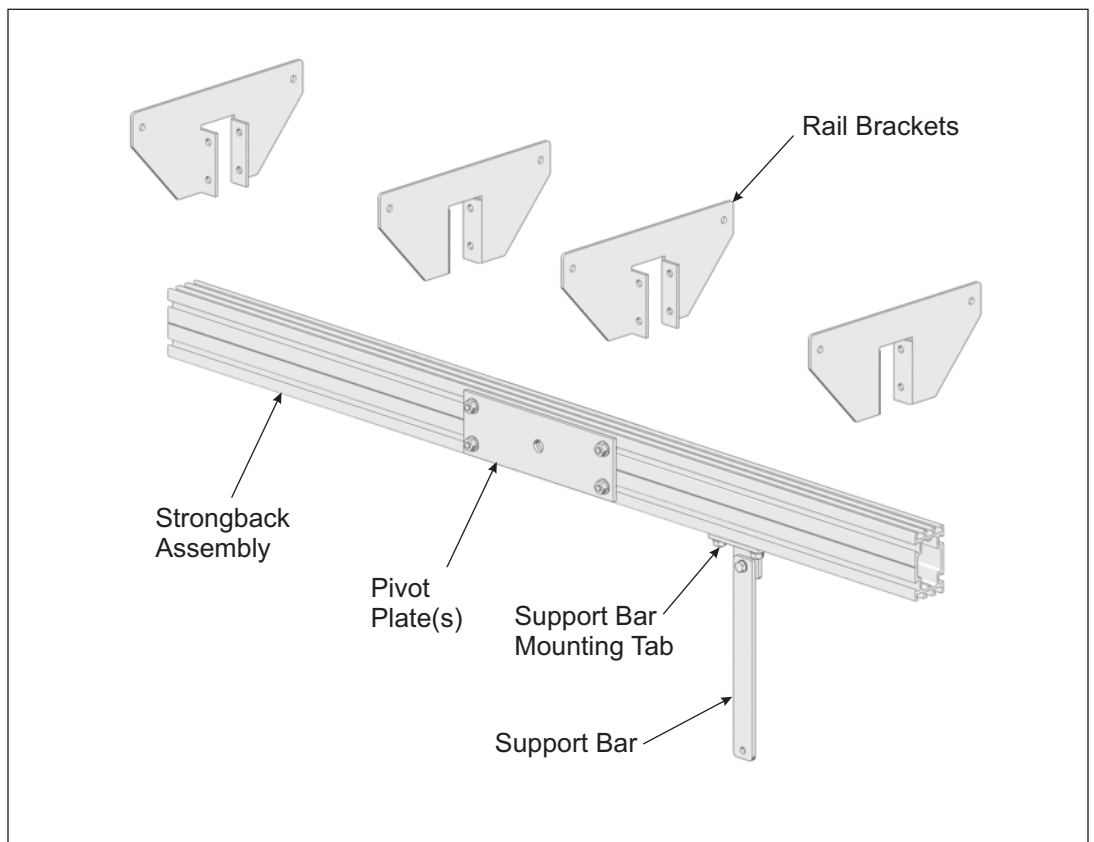
Use care while working around the structure during assembly. There could be components that create hazards or obstruct free movement causing serious bodily injury. Many are at head/eye level. Move slowly and with care around the work area.

Assembly of the Strongback

The new Strongback extrusion has been designed to accommodate a wide range of PV Module sizes and configurations. As such, its flexible design requires special positioning of the Rail Brackets to the Strongback to match the particular hole placement of any given module. These instructions walk you through the proper positioning and installation of the Rail Brackets.

The Strongback is shipped partially assembled with the Pivot Plates, Support Bar, and the Mounting Tab for the Support Bar attached to the Strongback.

The Rail Brackets are bolted to the Strongback using 3/8" x 7/8" Track Bolts and Flange Nuts. The Rail Brackets must be carefully positioned along the Strongback to ensure proper alignment to the mounting holes of the PV Modules used in your particular installation. To assist in this positioning, see publication "TPM6 Types A, B, C, & D Rail Bracket Spacing Chart" which lists various PV Modules and their respective measurements to properly position the Rail Brackets along the Strongback. Locate the PV Module to be used in your installation and use the corresponding measurements "A" and "B" to install the Rail Brackets.



Strongback Assembly and Rail Brackets

NOTE:

If your Module is not listed on the “TPM6 Types A, B, C, & D Rail Bracket Spacing Chart”, please call 800-260-3792

NOTE:

Be precise in measuring, marking and installing the Rail Brackets. Improper installation will lead to misalignment issues when installing PV Modules.

Step 1: Measure and Mark Rail Bracket Positions

Using a tape measure, square, and marker, carefully measure and mark the Rail Bracket positions on the face of the Strongback.

- A. Refer to the Rail Bracket Spacing Chart. Locate the Module Type to be used in your installation and find the corresponding “A” and “B” measurements.
- B. First mark the “A” dimension on either side of the Strongback Pivot Hole. From the center of the Pivot Hole, measure outward on both sides of the Pivot Hole and draw a line establishing dimension “A”. (See Figure 1-1)
- C. Next, measure and mark the “B” dimensions on either side of the Pivot Hole by measuring from the “A” reference lines established in the previous step.

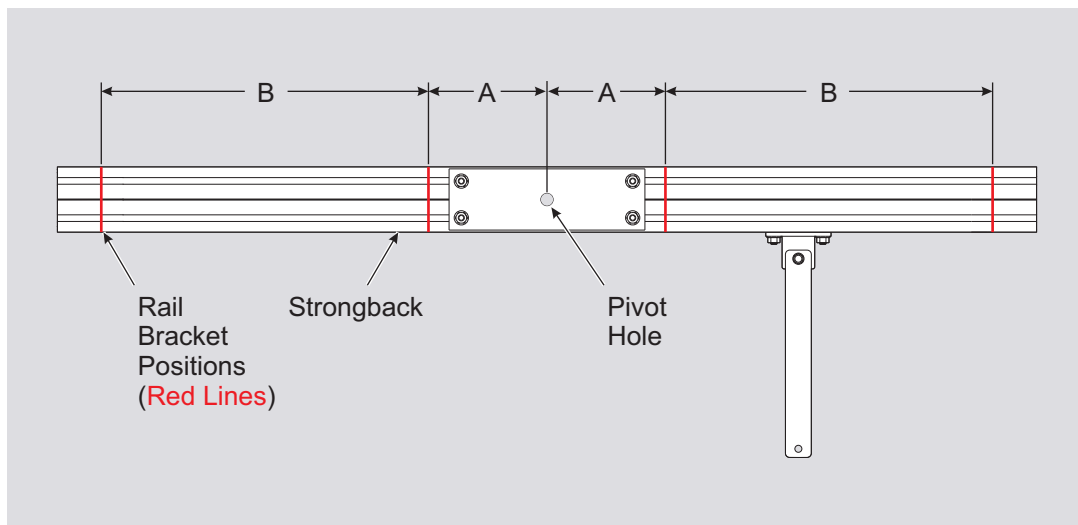


Figure 1-1: Measuring Rail Bracket Positions on Strongback

Step 2: Attach Rail Brackets to the Strongback

Rail Brackets are secured to the Strongback using 3/8” x 7/8” inch Track Bolts and Flange Nuts. Care must be taken to properly orient each Rail Bracket to marks “A & B” made in the previous steps. See Figure 2-1 for proper orientation.

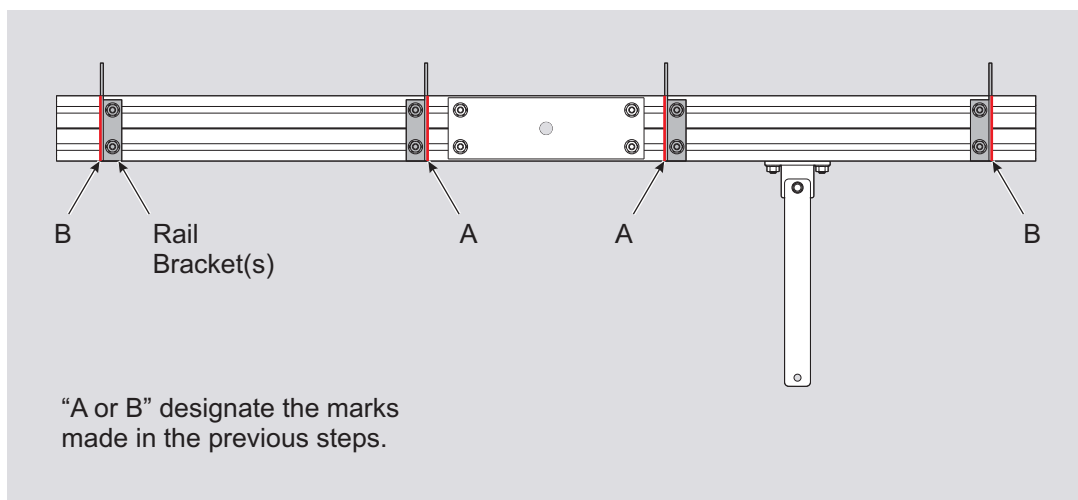


Figure 2-1: Rail Bracket orientation to marks A & B

Start with installing the interior Rail Brackets and work outward. (See Figure 2-2)

- A. Insert four 3/8" x 7/8" Track Bolts into the four holes of the Rail Bracket and loosely thread a 3/8" Flange Nut on each of the Track Bolts.
- B. Carefully align the Track Bolts into the slots of the Strongback and slide the Rail Bracket along the Strongback, aligning it to the interior "A" mark.
- C. Use a square and square-up the Rail Bracket to the Strongback and for now, finger tighten the Flange Nuts.

Continue in this manner to install the remaining Rail Brackets at each of the A & B locations while referring to Figure 2-1 for proper Rail Bracket orientation.

NOTE:
Finger-tighten the Rail Brackets to the Strongback while installing. After PV Modules are installed re-tighten to specified torque values.

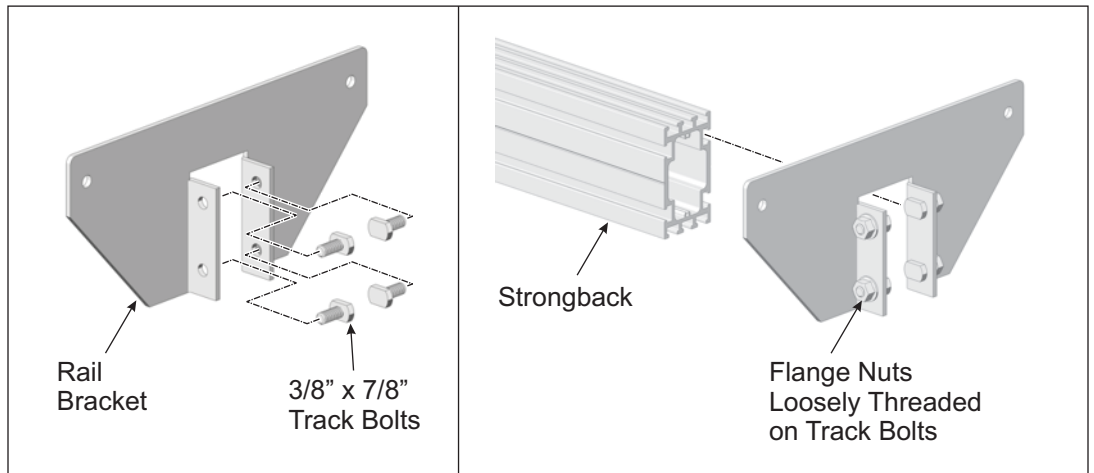


Figure 2-2: Installing Rail Brackets on the Strongback

Step 3: Install the Mounting Sleeve on Vertical Pipe

Before installing the Mounting Sleeve, verify that the Mounting Pole is plumb to the ground and hasn't shifted or leaned while the concrete footing has cured.

The Mounting Sleeve slips on top of the Mounting Pole and has three 3/8" Set Bolts which are used to secure it to the Mounting Pole.

- A. Slip the Mounting Sleeve on top of Mounting Pole and slide it down until it rests/bottoms out on top of Mounting Pole. (See Figure 3-1)

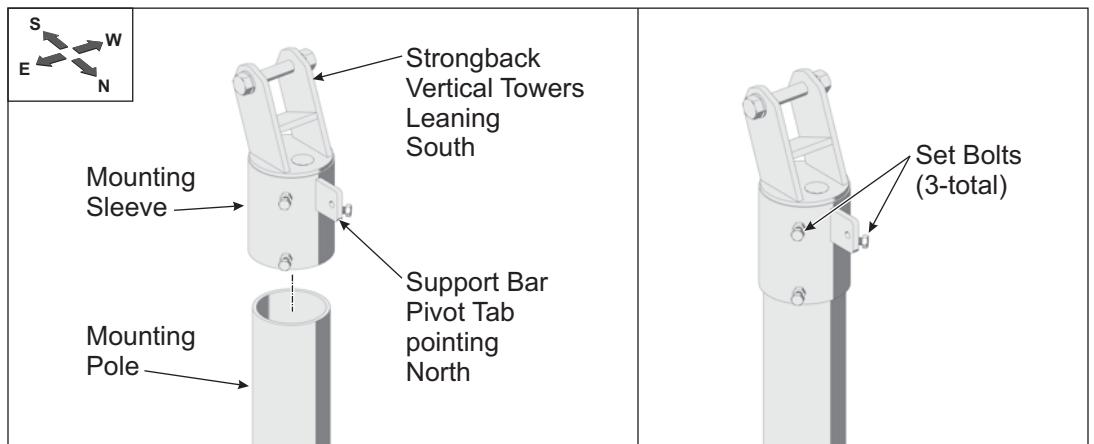


Figure 3-1: Installing the Mounting Sleeve

- B. Rotate the Mounting Sleeve so that the Support Bar Pivot Tab is pointing north and the Strongback Vertical Towers are leaning south.
- C. Secure the Mounting Sleeve by tightening the three 3/8" Set Bolts. **Torque each Set Bolt to 32-34 ft.-lbs.**

CAUTION:

This is a two person activity. The Strongback must be held in place by one person while the second person aligns it and secures it to the Mounting Sleeve using the Pivot Bolt and Support Bar. Failure to do so could lead to serious personal injury.

Step 4: Installing the Strongback on the Mounting Sleeve

The Strongback is attached to the Mounting Sleeve using the Pivot Bolt that passes through its two Vertical Towers and the Support Bar. The Support Bar is attached to the Mounting Tab on one end and the Support Bar Pivot Tab of the Mounting Sleeve on the other end using 3/8" hardware.

- A. Remove the Pivot Bolt from the Mounting Sleeve and also collect the 3/8" x 1-1/4" bolt, flat washers and lock washer needed to secure the Support Bar to its Pivot Tab on the Mounting Sleeve.
- B. Orient the Strongback to the Mounting Sleeve with its Support Bar positioned on the same side of the Mounting Sleeve as the Support Bar Pivot Tab.
- C. Place the Strongback between the two vertical mounting tabs, aligning the thru-hole of the Strongback with the holes of the two Vertical Towers.
- D. Insert the Pivot Bolt along with one flat washer through the one Vertical Tower and the Strongback exiting the second Vertical Tower on the opposite side. Secure with the remaining flat washer, lock washer and hex nut. For now, finger tighten only to allow movement for the next step.

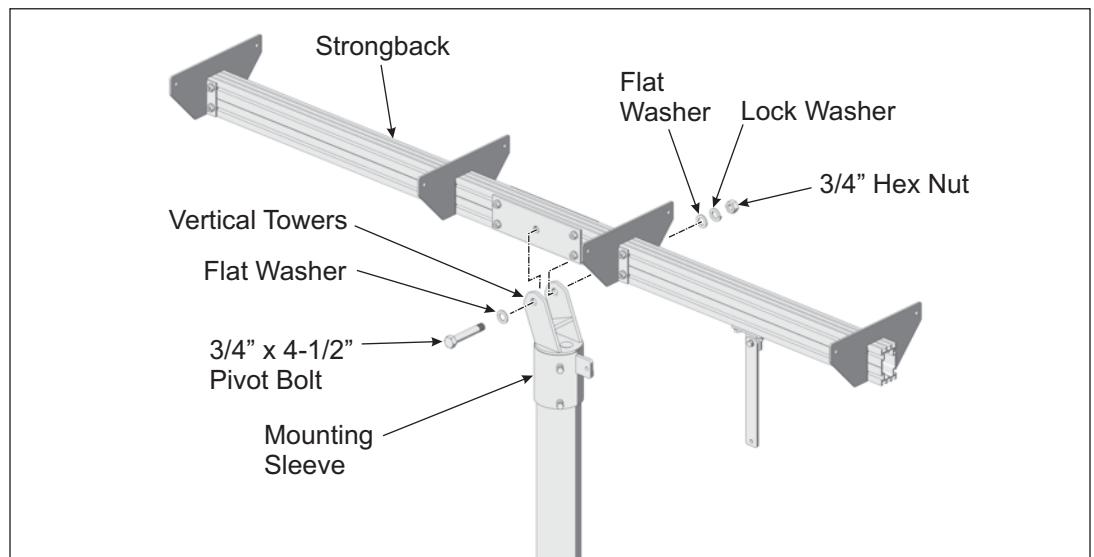


Figure 4-1: Installing the Strongback

For safety and ease of assembly, position the Strongback at 0-degrees or level to the ground. Follow these steps to level and secure the Strongback. This is a two person activity, with one person supporting the Strongback while the second adjusts and secures the Strongback with the Support Bar.

- E. First, loosen the four 3/8" Flange Nuts securing the Support Bar Mounting Tab to the Strongback. (See Figure 4-2)

NOTE:

Although this system offers variable elevation set points, for ease of assembly, set the angle to 0-degrees. Optimum tilt setting of the rack will take place later in these instructions.

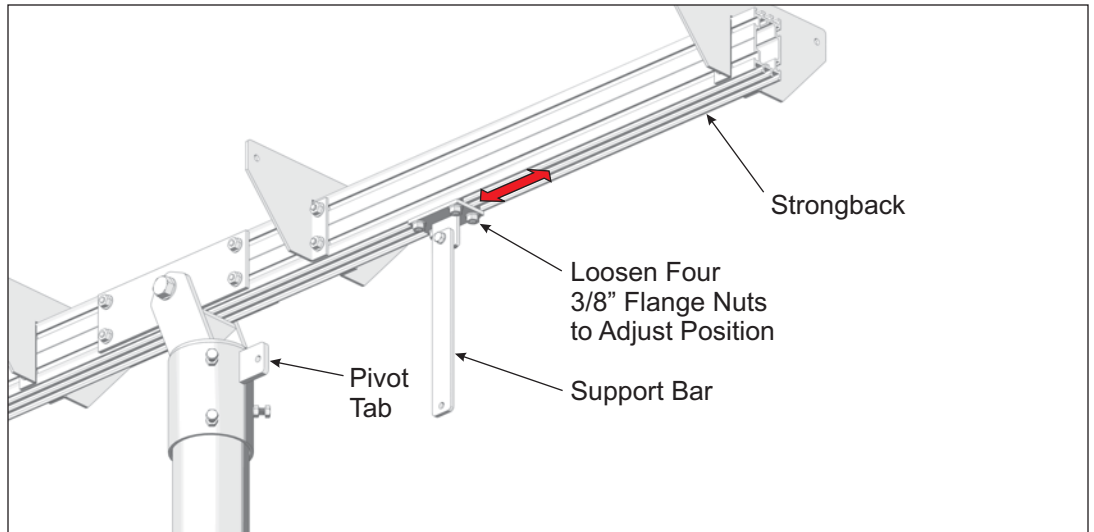


Figure 4-2: Loosening the Support Bar Mounting Tab

- F. Pivot the Strongback to 0-degrees (level to the ground) and hold in position.
- G. Slide the Support Bar Mounting Tab to align the mounting holes of the Support Bar with its Pivot Tab on the Mounting Sleeve. Slide the Support Bar over the Pivot Tab. Insert the 3/8" x 1-1/4" bolt and one flat washer thru the Support Bar and Mounting Tab and secure it with the remaining flat washer, lock washer and hex nut. **Torque hardware on both ends of Support Bar at 32-34 ft.-lbs. Torque the 3/8" Flange Nuts at 32-34 ft.-lbs.** (See Figure 4-3)
- H. Return and tighten the Pivot Bolt, **Torque to 125-150 ft.-lbs.**

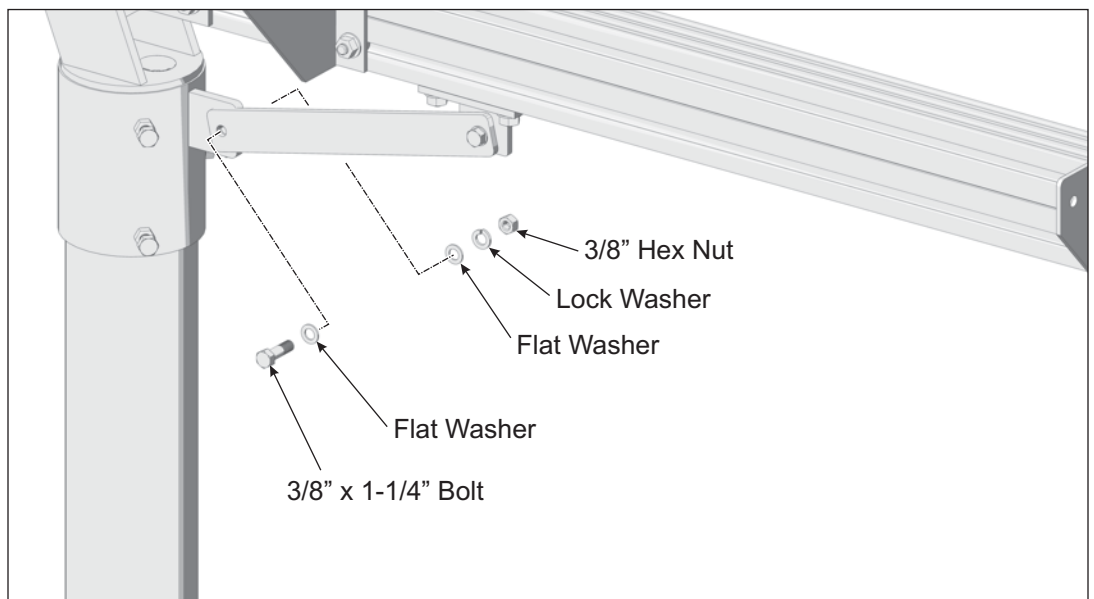


Figure 4-3: Securing Support Bar to Mounting Sleeve

WARNING:

This is a two person activity. Module Rails are unstable before they are fully secured to the Rail Brackets. Module Rails must be held in place by one person while the second person aligns and secures them to the Rail Brackets. Failure to do so could lead to personal injury.

Step 5: Install the Module Rails on the Rail Brackets

Module Rails run in an E-W direction and are secured to the Rail Brackets using 3/8" x 1" bolts and hardware. There are four Module Rails to install.

Module Rail orientation is dependent on location. Follow these instructions carefully for the correct orientation. (See Figure 5-1)

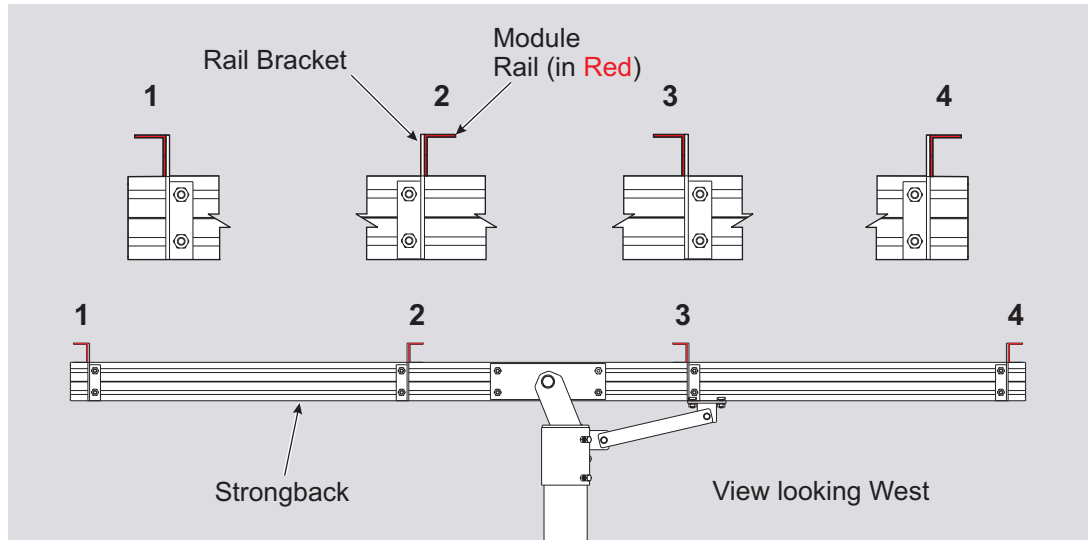


Figure 5-1: Orientation of Module Rails to Rail Brackets

NOTE:

Be certain that the orientation of the Module Rails to the Rail Brackets match these instructions.

Start by installing the inboard Module Rail first and work outward.

- A. Referring to Figure 5-1 for orientation of the Module Rails, position the first section of Module Rail on the Rail Bracket. Align the Module Rail mounting holes with the holes of the Rail Bracket and secure with 3/8" x 1" bolts and hardware. Finger-tighten for now. (See Figure 5-2)
- B. Continue in this manner and install all remaining Module Rails (three more) while following Figure 5-1 for proper orientation of the Rails to the Rail Brackets.

NOTE:

Finger-tighten the Module Rails to the Rail Brackets while installing. After PV Modules are installed re-tighten to specified torque values.

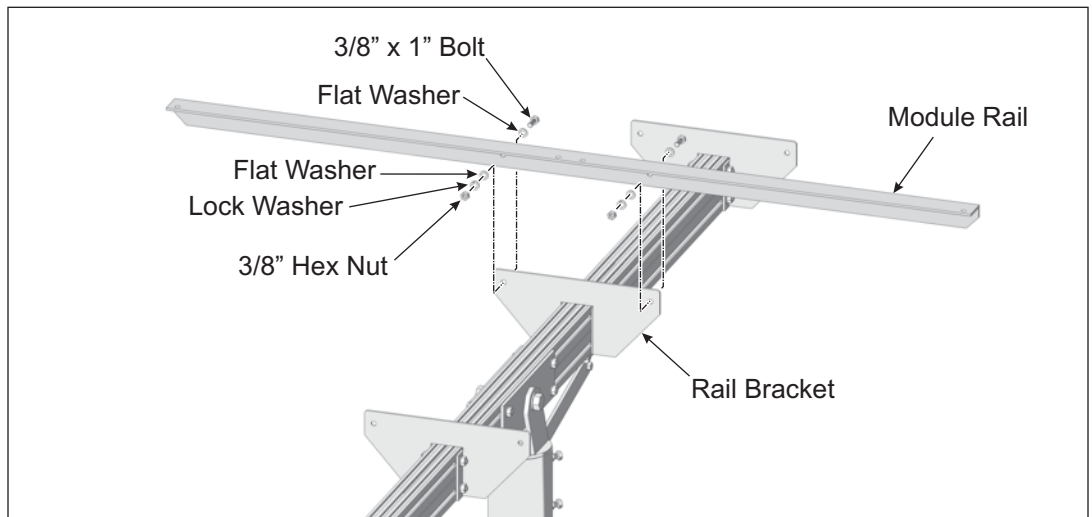


Figure 5-2: Installing Module Rails to Rail Brackets

CAUTION:

This is a two person activity. PV Modules are heavy and unstable before they are fully secured to the Module Rails. PV Modules must be held in place by one person while the second person aligns and secures them to the Module Rails. Failure to do so could lead to serious personal injury and damaged components.

CAUTION:

Be certain to re-tighten all Rail Bracket, Module Rail and PV Module mounting hardware and torque to the specified values. Failure to do so could lead to structural failure, damaged components and/or serious personal injury.

WARNING:

Do not attempt to remove the Pivot Bolt during tilt adjustments! Removal could lead to serious personal injury or death. Adjustments are made with the Pivot Bolt hardware loosened but in place.

Step 6: Installing PV Modules to Module Rails

PV Modules are secured to the Module Rails using 1/4" x 3/4" bolts and hardware. Start with the southern most PV Modules and work in a northern direction.

- A. Place a southern most PV Module on the Module Rails. Align the mounting holes and secure with 1/4" x 3/4" bolts and hardware. Each Module has four attachment points. Finger-tighten for now. (See Figure 6-1)
- B. Continue in this manner to install remaining PV Modules.

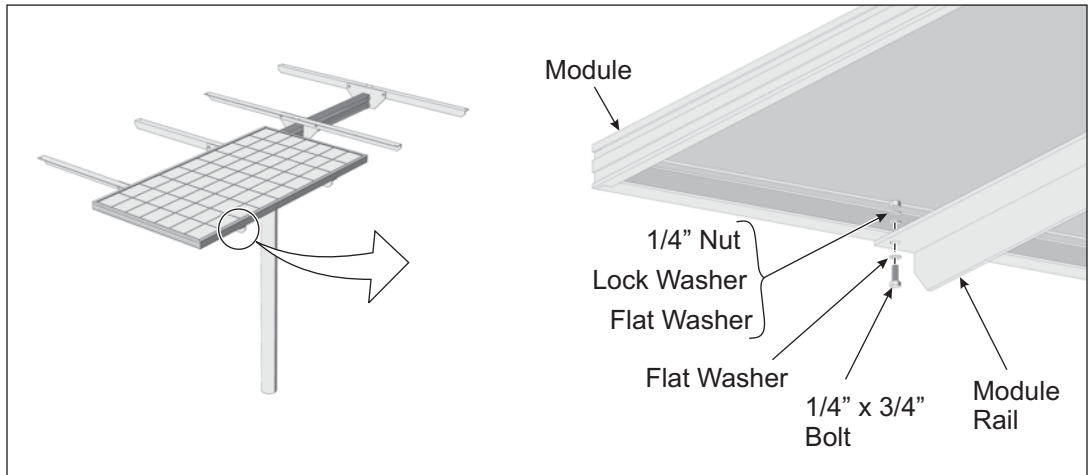


Figure 6-1: Installing PV Modules to Module Rails

Step 7: Now return and tighten mounting hardware.

- A. Return and tighten each set of the 3/8" mounting hardware, securing the Module Rails to the Cross-Bars. **Torque all at 32-34 ft.-lbs.**
- B. Return and tighten each set of 1/4" mounting hardware, securing the PV Modules to the Module rails. **Torque all at 6-8 ft.-lbs.**
- C. Return and tighten each of the 3/8" Flange Nuts, securing the Rail Brackets to the Strongback. **Torque each Flange Nut to 32-34 ft.-lbs.**

Step 8: Adjust the Tilt Angle of the Rack

To adjust the tilt angle, loosen the Pivot Bolt, Support Bar Mounting Tab, and the two sets of hardware at the ends of the Support Bar. Use great care in this procedure as it can be dangerous if the procedure is not completed as described with a minimum of two people.

- A. While one person holds the south edge of rack, the other loosens the Pivot Bolt, the 3/8" Flange Nuts securing the Mounting Tab to the Strongback, and the 3/8" hardware at both ends of the Support Bar at the Support Bar Mounting Tab of the Strongback and the Pivot Tab of the Mounting Sleeve.

CAUTION:

This is a two person activity. As the hardware is loosened the rack is heavy and unstable. The rack must be held in place by one person while the second person loosens the hardware and then re-installs and tightens the hardware back in place. Failure to do so could lead to serious personal injury and damaged components.

- B. Tilt the rack to the desired elevation angle and re-tighten the 3/8" Flange Nuts securing the Mounting Tab to the Strongback and the 3/8" hardware at both ends of the Support Bar at the Support Bar Mounting Tab of the Strongback and the Pivot Tab of the Mounting Sleeve **Torque the 3/8" Flange Nuts to 32-34 ft.-lbs. and the 3/8" hardware to 32-34 ft.-lbs.** (See Figure 8-1)
- C. Re-Tighten the Pivot Bolt. **Torque to 125-150 ft.-lbs.**

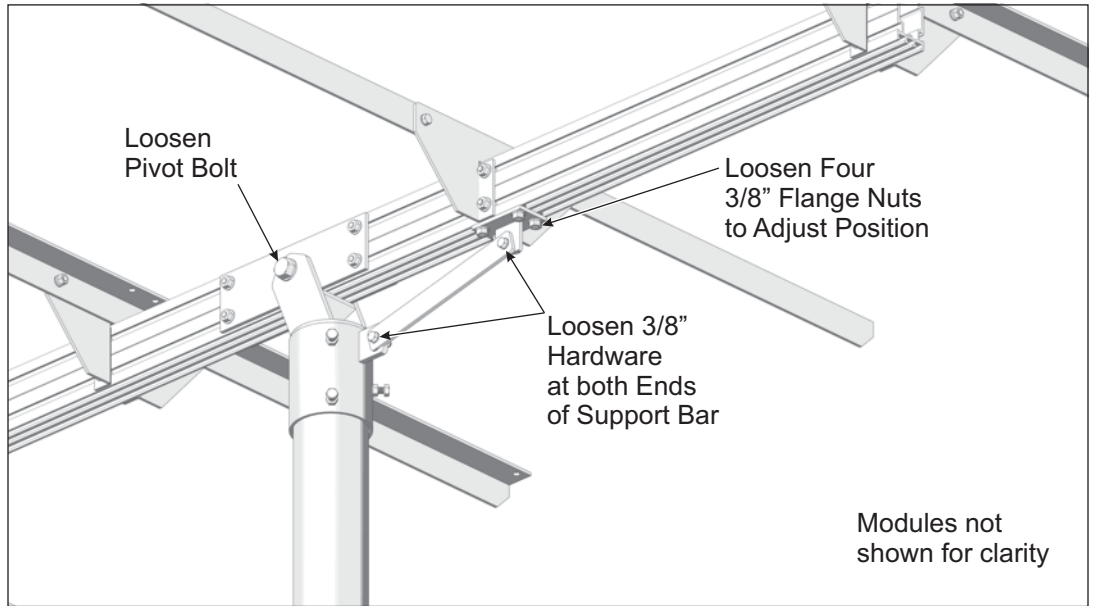


Figure 8-1: Adjusting Tilt Angle



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