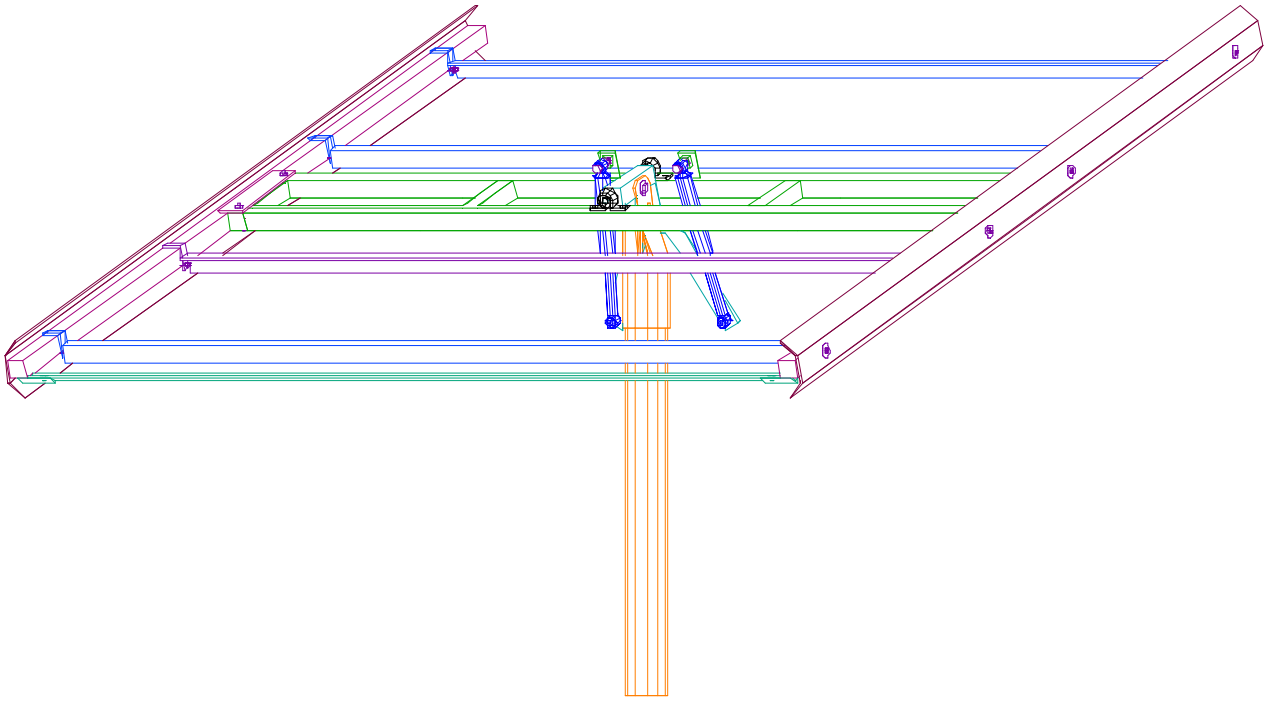
ZOMEWORKS
CORPORATION

UTR040, UTR055, UTR070 & UTR085
UNIVERSAL TRACK RACK™

ASSEMBLY INSTRUCTIONS

SO# _____ MODEL# _____



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UNIVERSAL TRACK RACK™ OPERATION AND MAINTAINENCE

- TRACKER OPERATION

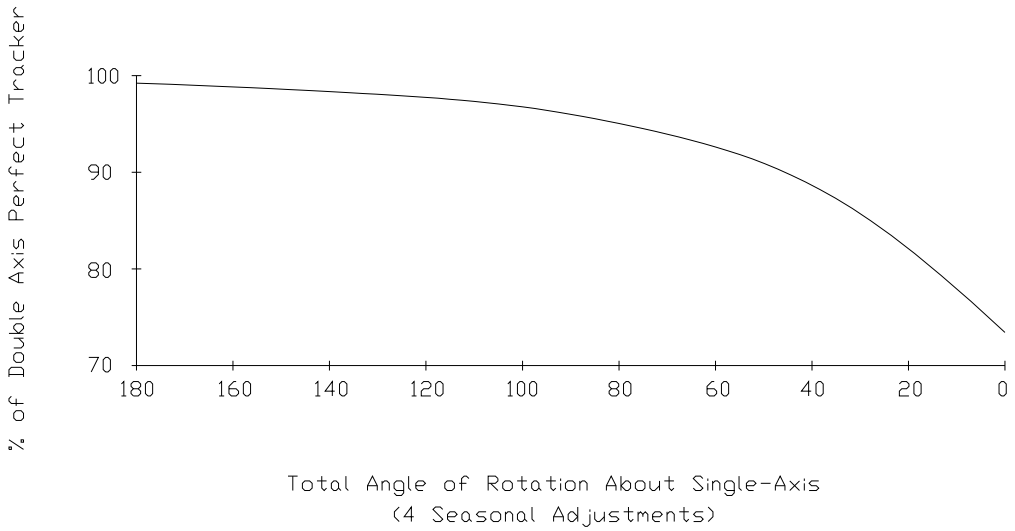
The Universal Track Rack™ is moved by the shifting weight of liquid refrigerant from the east side canister to the west side canister through the crossover tube located at the south end of the assembly. The fluid's movement is dictated by the sun's visibility and movement throughout the course of the a day. This process is enhanced by the aluminum "shadow plates" located on the east and west sides of the Track Rack™.

- CHOOSING A LOCATION

Locate the Track Rack™ where it will receive the earliest sun and will not be shaded during the day. The rack needs the early morning sun to "wake up", or return to the eastern position, so it is important to place your Track Rack™ where it won't be shaded in the morning by structures, poles, bushes, etc.

- TOTAL TRAVEL

To get the full advantage of tracking, the rack should travel through 80^0. The rack is designed to travel through a range of up to 90^0. The decrease in output due to tracking is not substantially affected unless the total travel of the tracker is below 80^0, as shown in the graph below.



- SHOCKS AND THE BUMPER BOLT

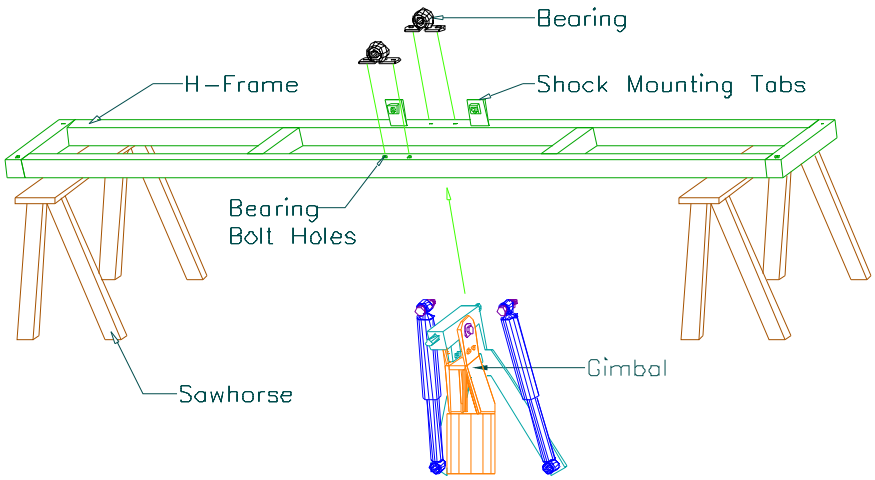
The shock absorbers are the first line of defense for the Track Rack™ against the wind. They are meant to prevent sudden gusts from pushing the rack off course, as well as restricting any violent movement that may harm the rack. The shocks yield to a constant force, by design, thus promoting tracking and, as a result, will be affected in a constant wind-loading situation. The bumper bolt is the second failsafe in the structure. It prevents any catastrophic failure from occurring, limiting the travel of the rack from both ground or pole contact.

The assembly of the bearings is critical to the efficient operation of the Universal Track Rack™. Read the next section carefully!

1. ***Why is the center of balance of my Track Rack™ so important?*** *Finding the right center of balance in relation to gravity is literally the difference between the maximum potential energy available to the rack versus the rack's stability in moderate to gusting winds.*
2. ***What does this compromise do to my overall power output?*** *When the rack is installed for maximum energy gain, it will wake up sooner, but be prone to drifting off course in moderate winds. Conversely, a rack set up to withstand gusty to strong winds will act slower in following the sun's movements.*
3. ***How do I obtain the correct set up I desire?*** *An installation for maximum power gain would require bearing adjustment on or below the recommended bearing height given in the matrix. For a more stable rack in moderate winds place the bearings above the recommended adjustment. However do not exceed this height by more than 3/8"as any more could jeopardize the rack's ability to overcome gravity all together. The end result would be a rack that doesn't track at all and would simply be stalled at either the western or eastern horizon.*
4. ***How can I ascertain which installation better suits my needs?*** *Think about your location and your weather patterns.* ***Do you have a bluff to the east that blocks early morning sun or live in a canyon?*** *Then stability or recommended bearing height is optimal.* ***Is it inherent in your location that stiff winds are always accompanied by a storm system?*** *If so there probably isn't enough sunlight available for power generation.*

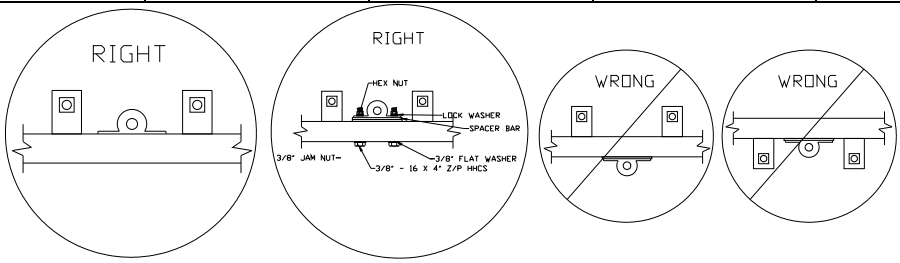
Step 1:

- Set the H-frame on saw horses or other stands.
- Slide the gimbal under the H-frame and raise it up through the center of the H-frame, resting the axle across the H-frame in the center, between the shock mounting brackets. The shock absorbers MUST be on the same side of the H- Frame as the shock mounting tabs. (The UTR040 only has one shock.)



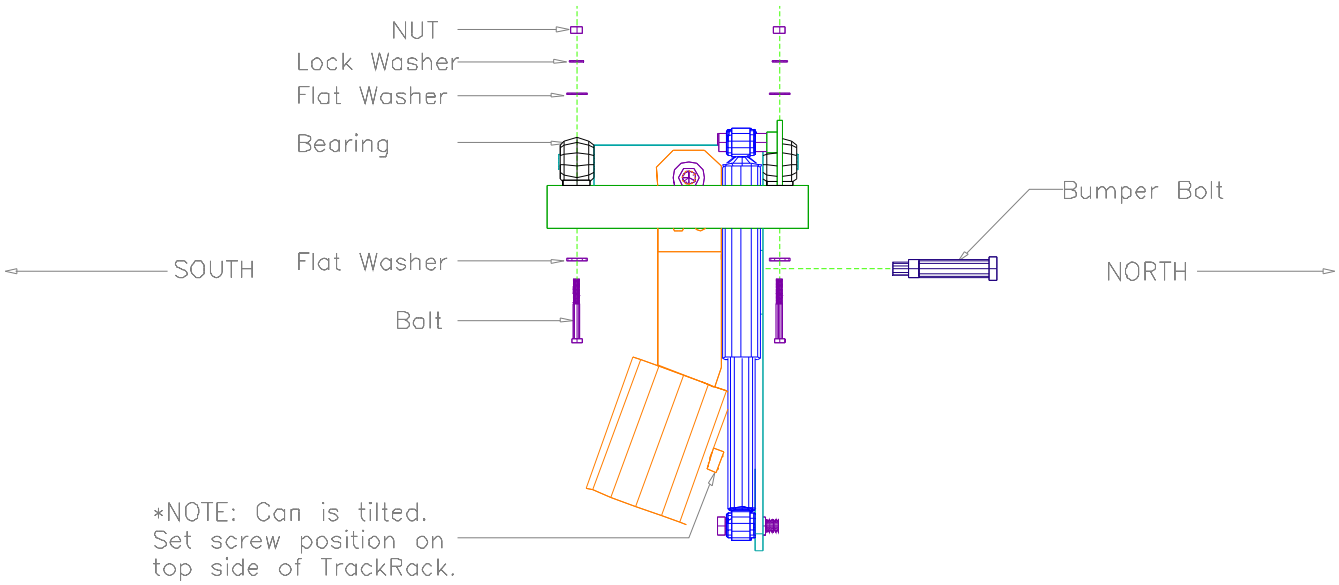
UNIVERSAL TRACK RACK™ BEARING HEIGHT MATRIX

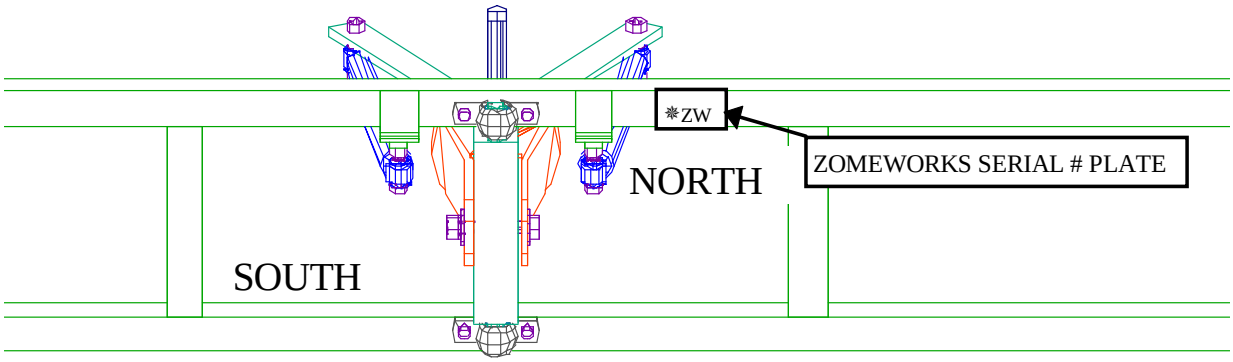
Module Type	UTR040	UTR055	UTR070	UTR085	UTR100
ASE-50	0.25”	0”	0”	0”	0”
AP-1106/1206	0”	0”	0”	0”	0”
AP-6105/7105	0”	0”	0”	0”	0”
BP-140	0.25”	0”	0”	0”	0”
BP-275/590	0”	0”	0”	0”	0”
H-800-X	0”	0”	0”	0”	0”
KC-60	0.375”	0.375”	0.25”	0.187”	0”
KC-80	0.375”	0.375”	0.25”	0.187”	0”
KC-120	0.25”	0.25”	0.25”	0”	0”
KY-51	0”	0”	0”	0”	0”
PWX-500	0.25”	0”	0”	0”	0”
S-50/53/55	0”	0”	0”	0”	0”
S-100/110D	0.375”	0.375”	0.25”	0.25”	0”
S-90D/100D	0.375”	0.375”	0.25”	0.25”	0”
SM-55/65/75	0”	0.375”	0”	0”	0”
SP-75	0”	0”	0”	0”	0”
SR-90/100	0”	0”	0”	0”	0”
SR-50	0.25”	0.25”	0”	0”	0”
SQ-80/90	0.375”	0.375”	0.25”	0.25”	0”
SX-40	0.375”	0.375”	0.25”	0.25”	0”
SX-60/64	0.25”	0.375”	0.25”	0.25”	0”
SX-77/83	0.25”	0.375”	0.25”	0.187”	0”
SX-120	-	0.25”	-	0.187”	0”
US-64	0”	0”	-	0”	0”
US-32	0.25”	0”	-	0.25”	0”
VLX-53	0.25”	0.375”	0.25”	0.25”	0”
VLX-80	0.25”	0.375”	0.25”	0.187”	0”



Step 2: Attaching the Gimbal / Shocks

- Slide, (as clearance allows) the three brass colored washers over the top side of the axle - the side with the shock absorbers.
- Slide a bearing over each end of the axle and center the bearings over the bolt holes in the H-Frame.
- Insert four 3/8" x 4" bolts **<u>from underneath</u>** the H frame up through the bearings and attach nut and washers as shown.
- Bolt the two shock absorbers into the two tabs sticking up from the H- Frame. Tighten the inside nut against the nut welded to the H-Frame.
- Attach the bumper bolt in the upper hole. Tighten the jam nut against the nut that is welded in place.

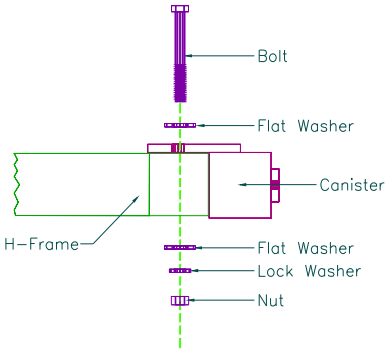


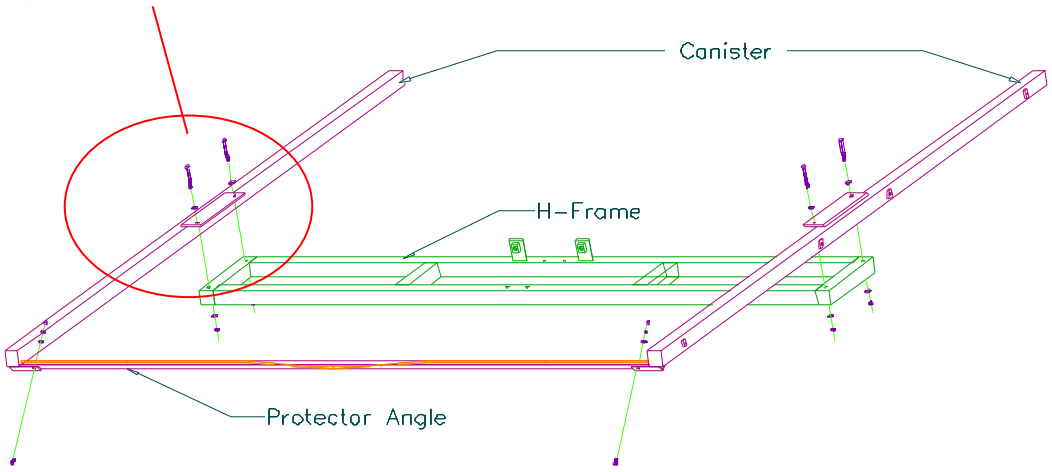


Caution! The canisters contain pressurized gas. Do not puncture the canisters or bend or crimp the ¼" copper tubing.

Step 3: Attaching canisters

- Carefully separate the two canisters and straighten the ¼" tube. Be very careful not to kink, strain or twist the tube. Hold the tube firmly where it is soldered to the canister so that as you straighten the tube the solder joint is not strained.
- **The ¼" copper tubing goes on the bottom side of the tracker**, the opposite side from the shock absorbers.
- Lay the canister on top of the H-Frame and install one side at a time. (Note the UTR085 has double plates on each canister.)
- Bolt the middle of the canisters to the ends of the H-Frame as shown using 3/8"x 3 ½" bolts.
- Attach the 1" angle to protect the cross-over copper tubing. Bolt in place as shown using ¼" x 5/8" bolts, two flat washers, lock washers and nut.
- Use the black plastic wire ties to hold the copper tubing to the angle.

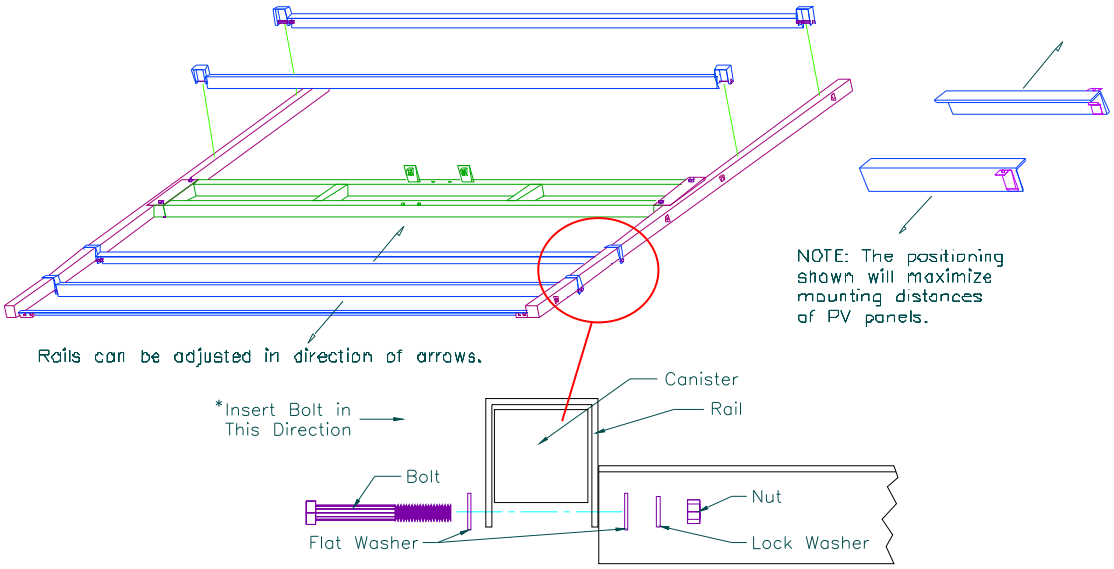




Step 4: Attaching module mounting rails

- Slip the rails over the canisters as shown, insert bolts from the outside edge with the nut underneath the rail. Finger tighten the bolts to hold rails in place. Two rails go on each side of the H frame. Keep rails loose until after modules have been properly aligned.

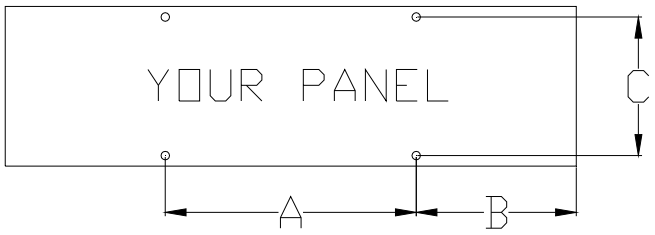
Some PV modules will require a maximum spacing for mounting. Each pair of rails should "face away" from each other as shown, this placing the rail under tension and relieving the J-Clip from direct stress from the wind. It is not advised to mount panels in any configuation other than previously detailed.



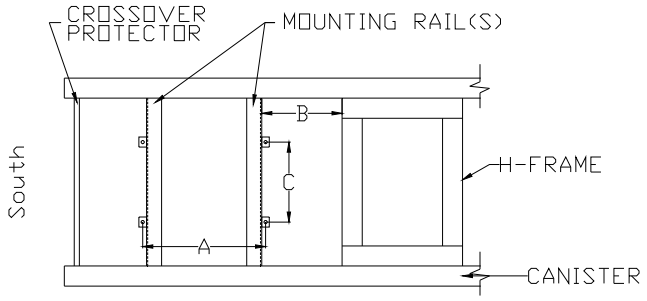
Step 5: Attaching modules

- **IMPORTANT:** ***The modules MUST be centered and balanced east west on the tracker*****.** Modules must be balanced within about ¼" of the center line of the gimbal axle. Find the center of the rails with a tape measure.
- The modules can be attached before or after the tracker has been placed on its mounting pole.

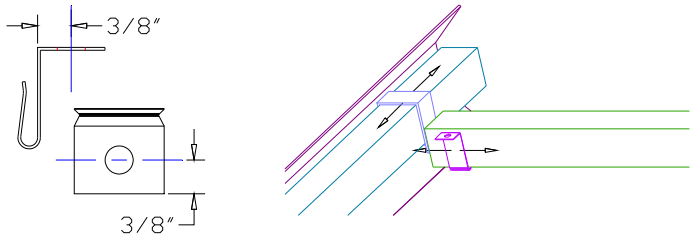
1. **Measure** the back of your panel. Select the set of mounting holes that are less than 32" center-to-center or as detailed **Measurement A**. For our example let Measurement A equal 24".



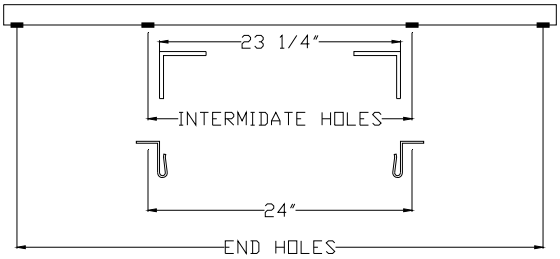
2. Now measure the distance from the edge of the P.V. Module to the edge of the panel. This is **Measurement B.**



3. Take one mounting rail and place it on the H-Frame/Canister assembly at the minimum of **measurement B** with the down flange of the rail facing the H-Frame.
4. The distance from the center of the J-clip to the edge of the mounting rail is 3/8".



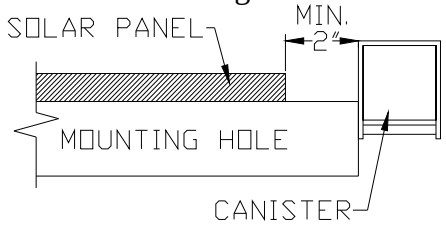
5. Subtract a distance of ¾" 2 x 3/8" to **Measurement A**. For our example this will produce a new measurement of 23 ¼" or 3/8"-24-3/8".



6. Finally space the J-Clips at a distance of **Measurement C**. Follow these steps for each P.V. module. After modules have been aligned, secure rail assemblies to the Track Rack™.

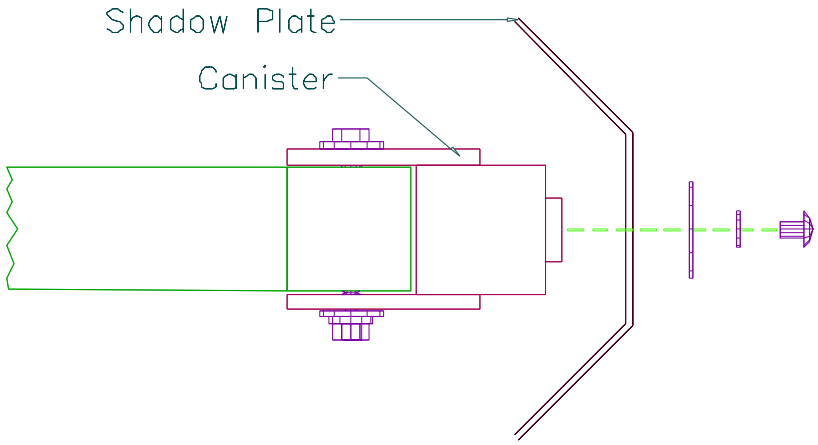
- ***There are two important things to remember:***

1. Make sure to work off of the centerline or axle of the Track Rack™.
2. Space the outside module(s) no closer to the canister than 2"-2 ½". (This spacing is paramount in the overall performance of the Universal Track RACK™. It prevents the outside panels from shading the canister set throughout the course of the day.)



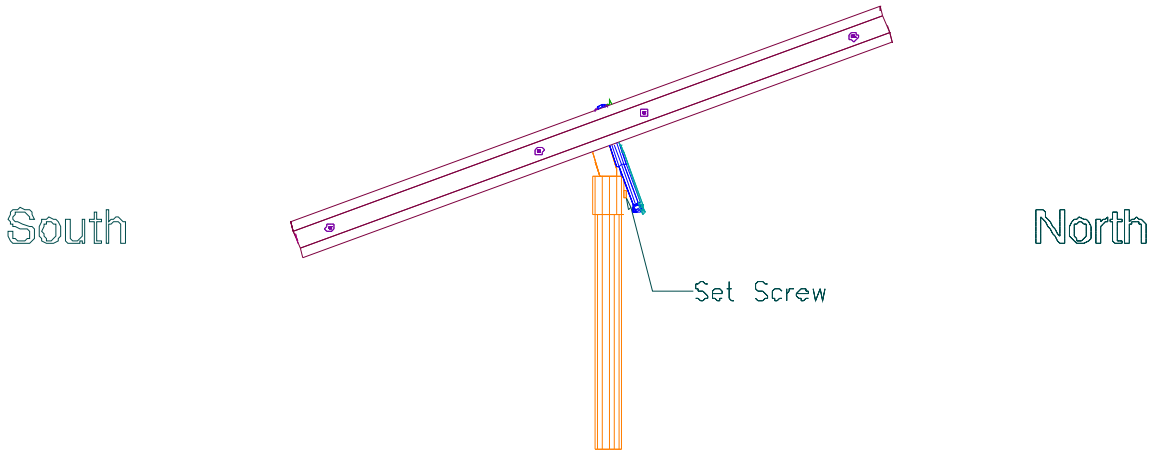
Step 6: Attaching shadow plates

- Screw the shadow plates into the side of the canisters as shown.



Step 7: Set tracker on mounting pole

- **Align the tracker to a true north south position**. The axle should point north south, and the set screws on the gimbal where it goes over the mounting pole should be on the north side of the pole.
- Tighten set screws.



Step 8: Set seasonal adjustment

- There are four holes on the gimble for setting the angle. They represent 2°, 15°, 30°, and 45°. Two holes on each plate. Set tracker to desired setting.