



SolarBeam Mechanical Installation Manual

QUESTIONS?

If you have a question regarding the product,
or if parts are missing, please contact us at:

1-800-615-5898 (North America)

+ 1-902-661-2007 (International)

CAUTION

Read and follow all instructions in this manual.

If information is unclear please call us at the
number provided above.

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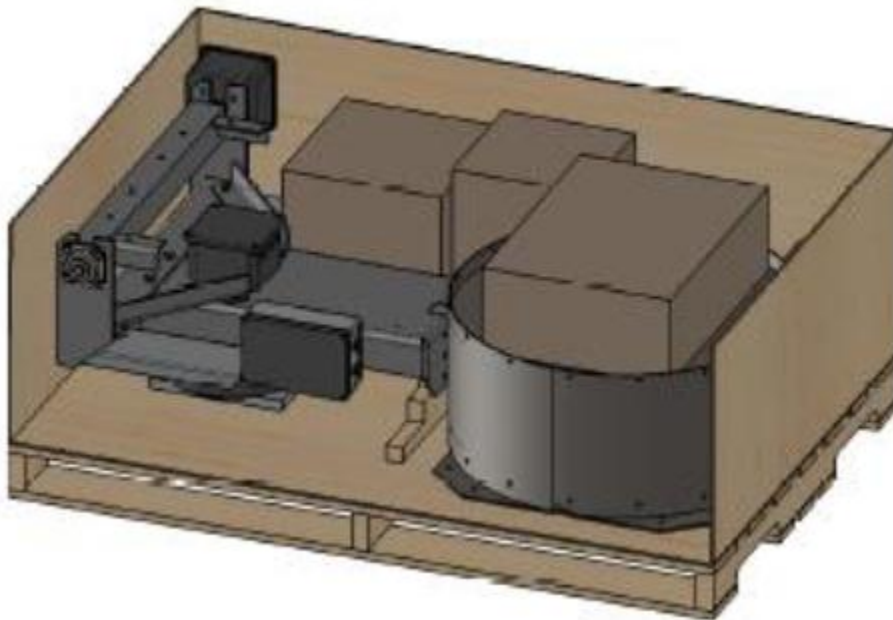
Crate Unloading

Transportation & Unloading

The complete system is provided in 3 crates and needs to be unloaded with a forklift and assembled onsite as per instructions. Do Not Drop the crate otherwise damage to the material may occur.

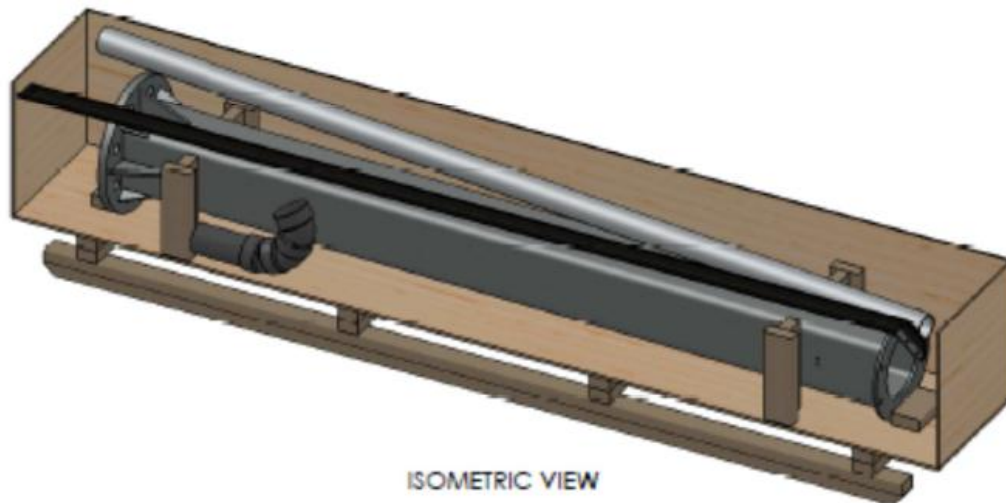
Crate 1: Powertrain, Slew Drive, Control System, Boxes with Bolts & Nuts

Dimension: 64" x 44" x 26" (L x W x H)

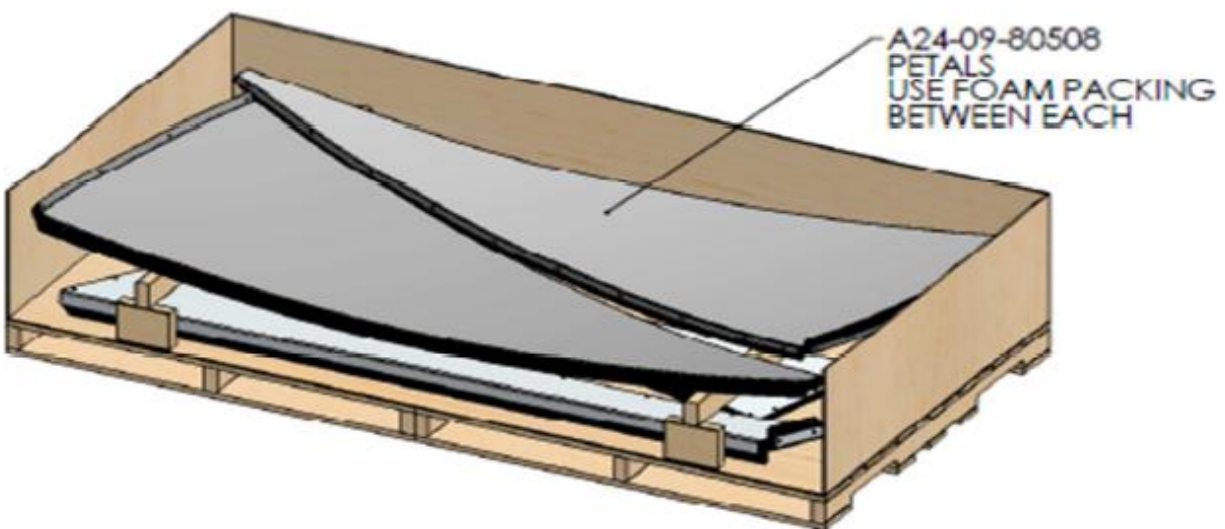


Crate 2: Post, Absorber Arms, PVC pipe, Hose Assembly

Dimension: 114.5" X 17.5" X 17 ¾ " (L x W x H)



Crate 3: Petals, Truss, Skirting
Dimension: 92" x 48" x 23.5"



Recommended tooling

- 5/16" Socket and / or wrench (8mm)
- 1/2" Socket and / or wrench (13mm)
- 7/16" Socket and / or wrench (11mm)
- 9/16" Socket and / or wrench (14mm)
- 5/8" Socket and / or wrench (16mm)
- 11/16" Socket and / or wrench (18mm)
- 3/4" Socket and / or wrench (19mm)
- 1 1/2" Socket and / or wrench (Bolts for mounting post)
- Rehau PEX Tool Kit
- Cordless Drill
- Drill Bits (1/2" and under)
- #2 Robertson Screwdriver
- #3 Robertson Screwdriver
- Small Flat Head Screwdriver
- Flat Head Screwdriver
- #2 Phillips Screwdriver
- Wire Pulling Device (Kellems® Grip – 5") *see picture*
- 4FT Level

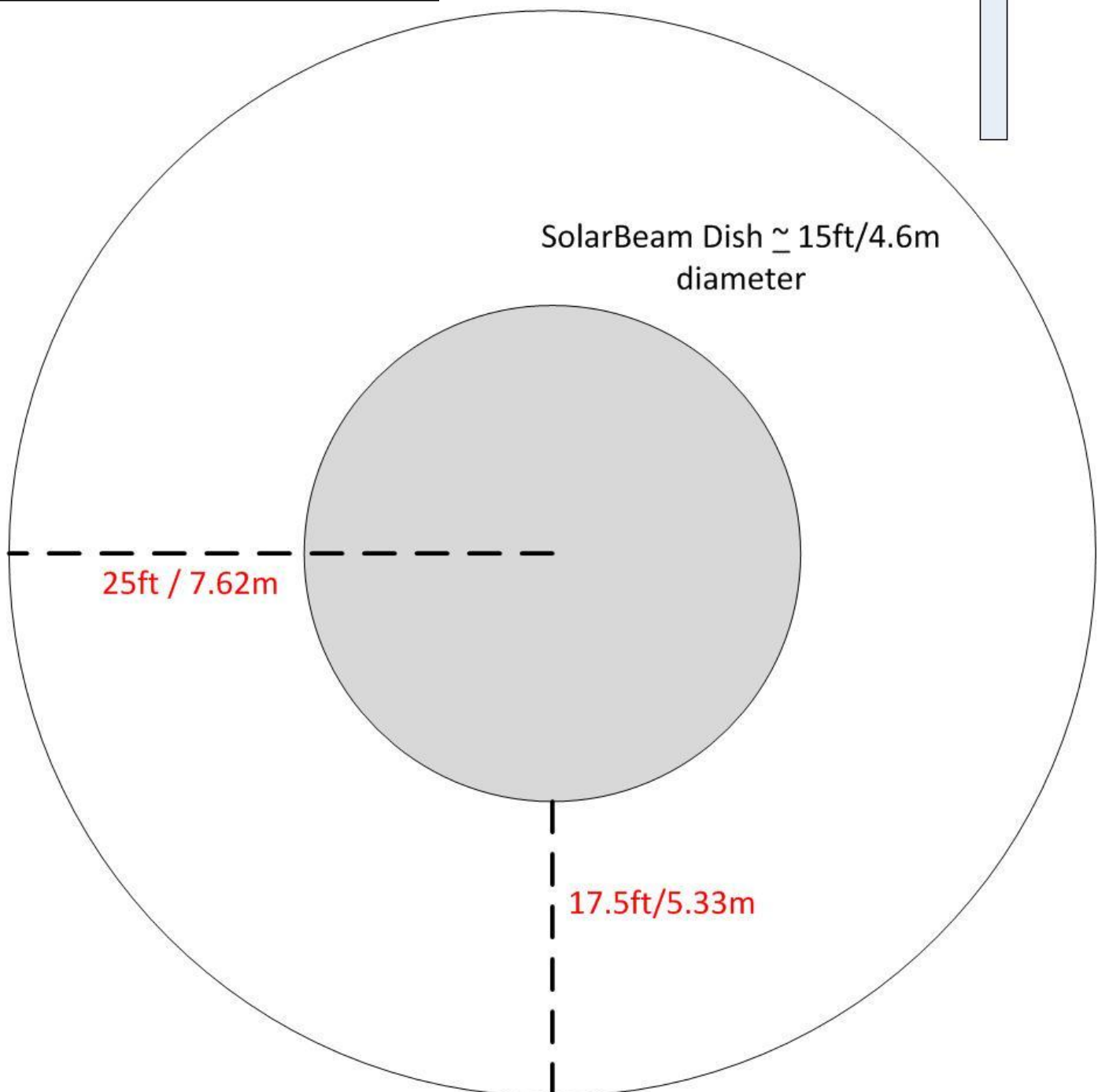
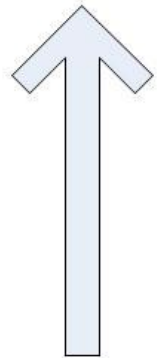


Kellems Grip

Site Layout Diagram

The SolarBeam Concentrator requires a certain amount of unobstructed space. It should rest at the center of a circle with 25ft/7.62m clear around it in all directions. This ensures proper operation of the system and minimizes the risk of damage.

South (Northern Hemisphere)
North (Southern Hemisphere)



SolarBeam Pole & Drive Unit Setup

Technical Specifications

GROSS AREA OF COLLECTOR	15.9 m ²
DIMENSION OF COLLECTOR	4.5 m
GROSS AREA OF ABSORBER	0.0645 m ²
VOLUME OF FLUID IN ABSORBER	550 ml
MAX OPERATING PRESSURE	25 PSI (172.2 kPa)
PRESSURE DROP	1.9 kPa
STAGNATION TEMP 1000 W/m ² at 30° C	93°C
FLOW RATE	15 – 18.9 (Liters/Min)
COLLECTOR WEIGHT	240 kg
TOTAL WEIGHT	463 kg
MAX TILT ANGLE	90 Degrees
MINIMUM TILT ANGLE	0 Degrees
PERMISSIBLE WIND	12.5 m/s
PERMISSIBLE SNOW LOAD	240 Kg
CLEARANCE AROUND SOLARBEAM STRUCTURE	9.1 Meter

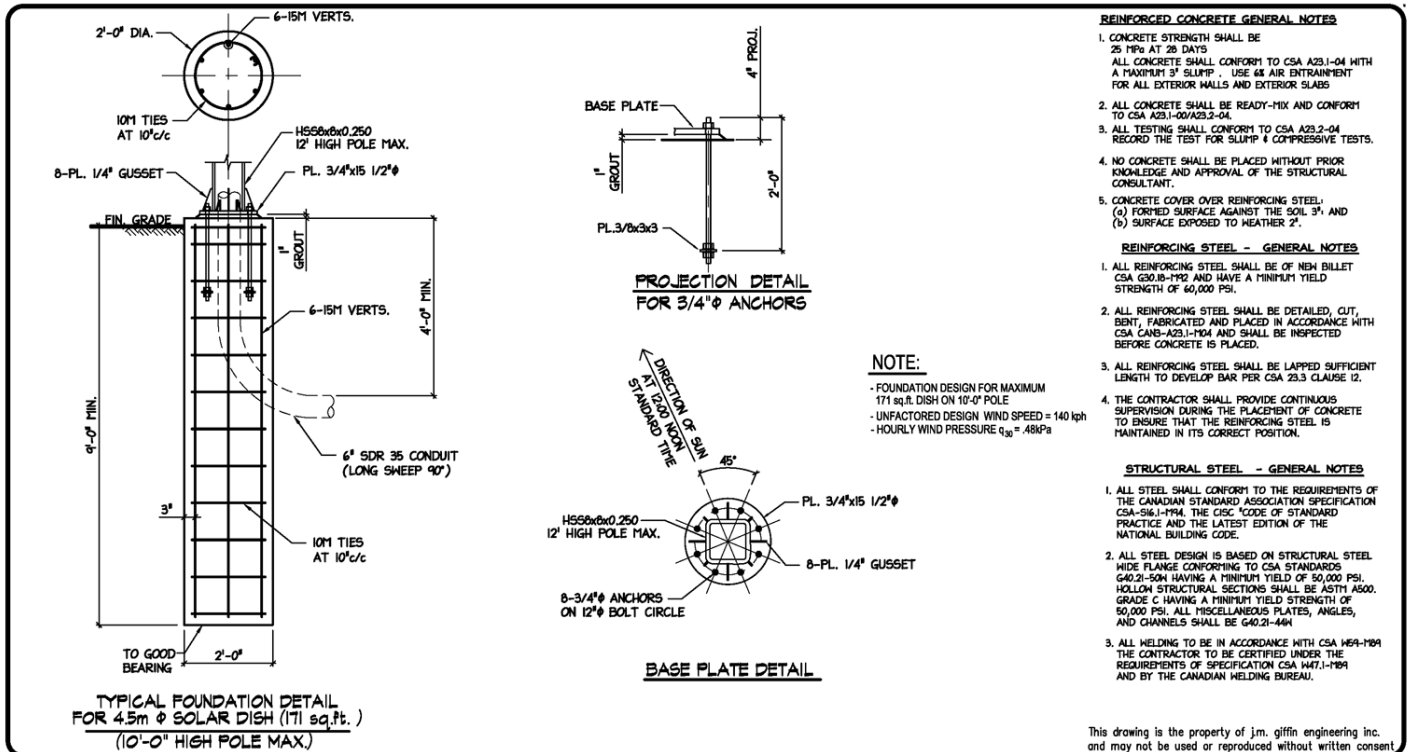
Cyclone Zone

The product is not suitable for installation in Cyclonic areas.

Assembly of Pole & Powertrain

Foundation:

All foundations need to be approved by local engineer to ensure it meets local code. The following diagram is only used as a guideline but all drawings need to meet local building code. There exists a roof-mounted option, but this setup is subject to local laws and approval by structural engineer.

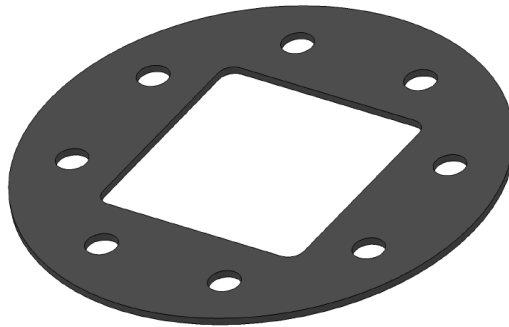


Lightning Protection:

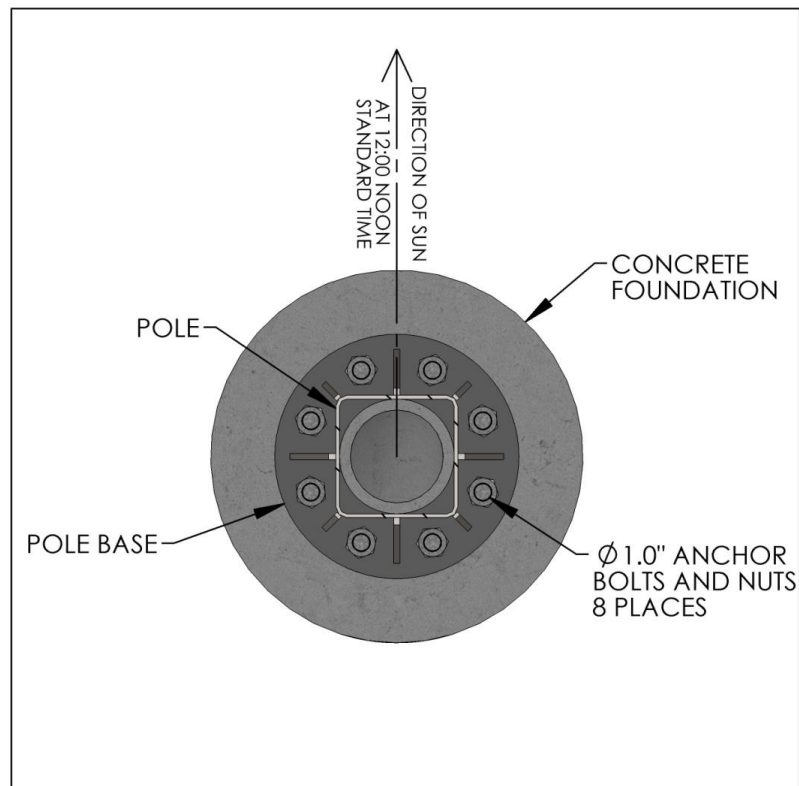
WARNING: The system must either be grounded through the pole with a grounding plate underground or linked from a main bolt through a grounding spike to dissipate any potential lightning.

Pole Assembly

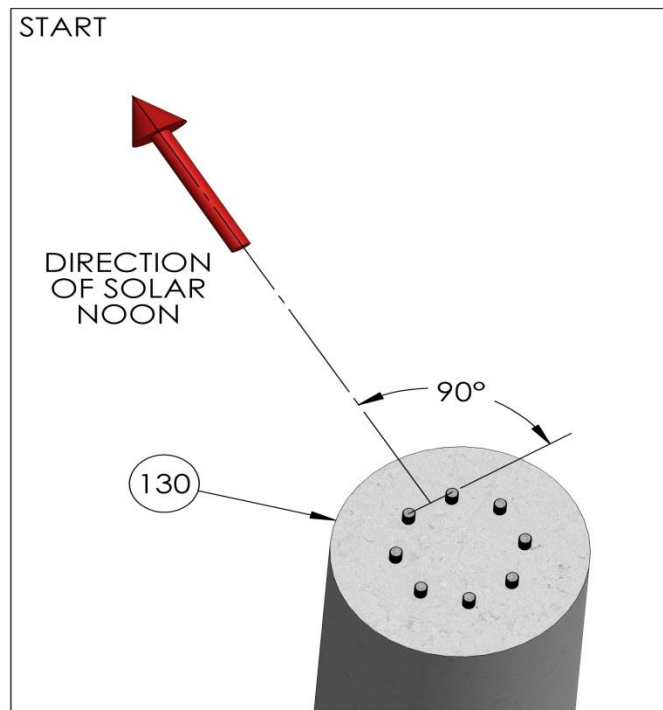
1. Use the provided foundation template to ensure that all the anchor bolts are placed in the correct position. The foundation template needs to be used during foundation installation and removed once the bolt spacing has been confirmed.



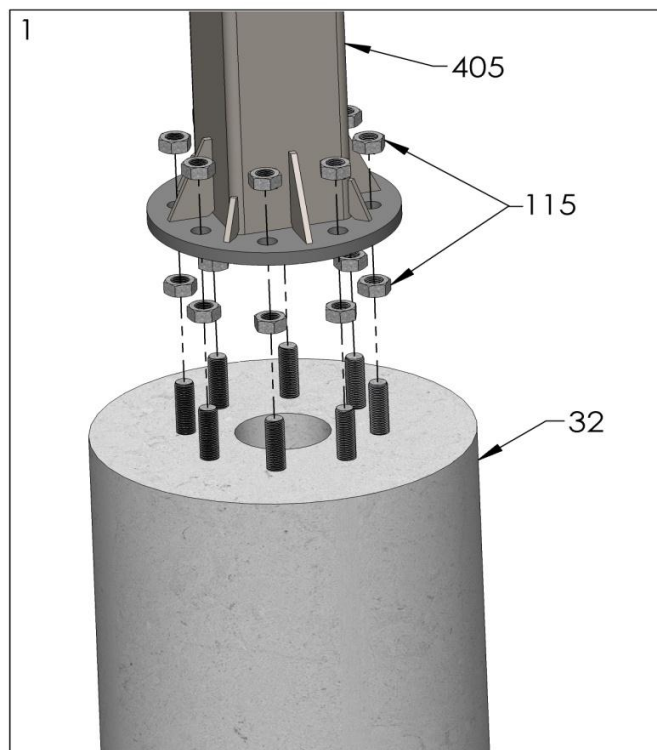
2. The anchor bolts should be positioned to the specific of the plate provided. Alignment of the bolts must be directly across center between bolt position north/south.



3. Once your concrete column (130) has been set into place and leveled you can now start the assembly.

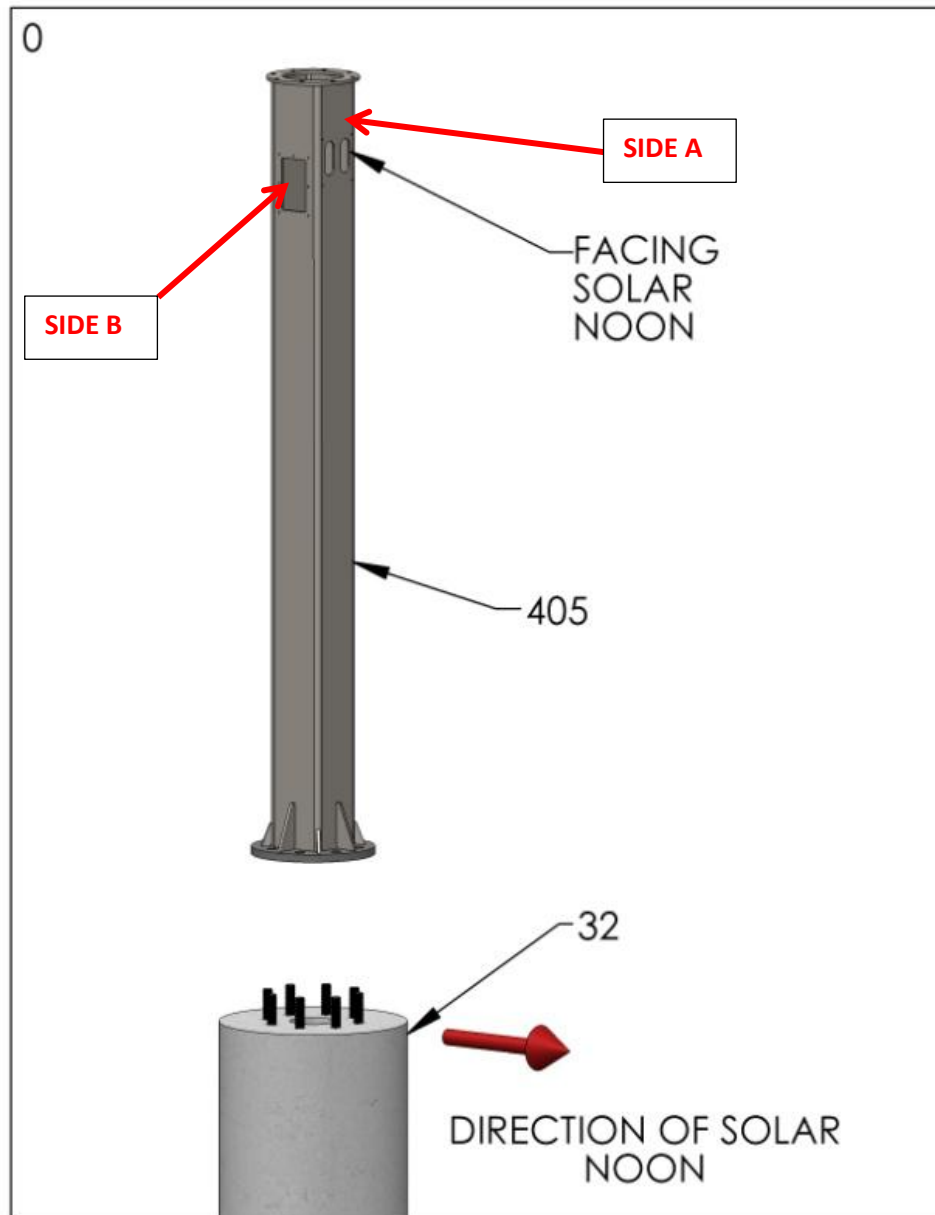


4. 1" nuts can now be placed on the bolts (**Purchase separately**). By adjusting the nuts level this will make it easier to level the pole once set into position. Place a level on bolt #1 (the one pointing in the Direction of Solar noon) and #4 (Clockwise) level, then #4 and #6 level. Bolt #1 and #6 should also be level. Make sure the other nuts are lower than the ones you leveled.

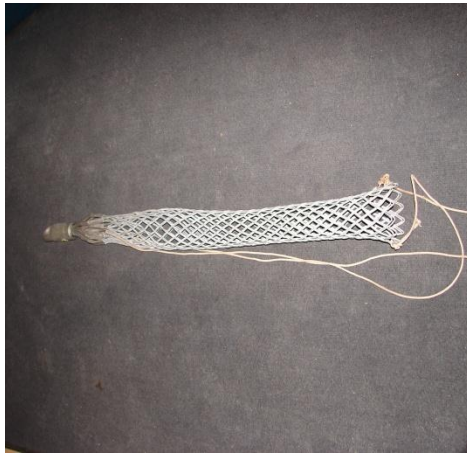


5. The post (405) should be lifted into position with the assistance of a Boom Truck. Place your post onto of the bolts with the double slotted (Side “A”) holes facing south and the inspection hole side “B” to the west. Tighten bolt #1, #4 and #6 so you can plum and level the post. Once plumb you can now tighten bolt # 7 followed by the rest.

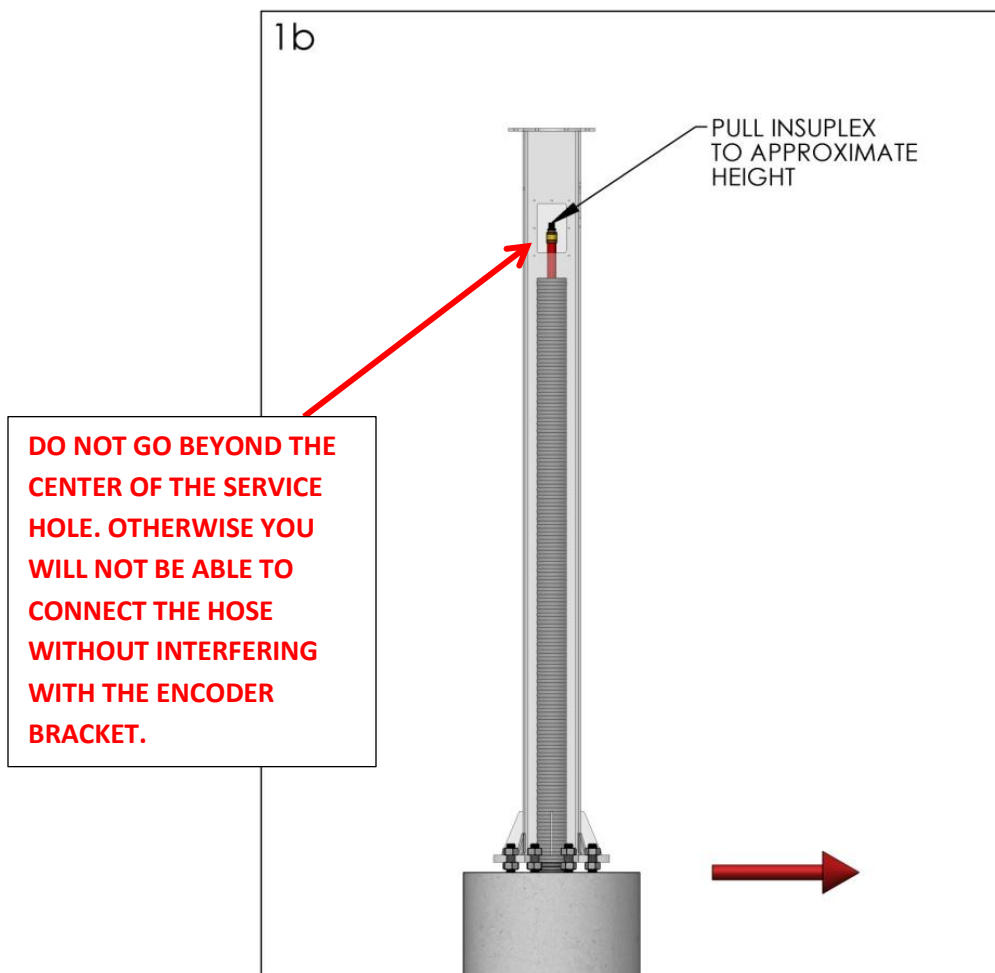
Ensure the pole is level on all 4 sides. Take measurements at the middle section of each side.



6. Attach the tool below (Kellems Grip) to the Insuplex, just go down about 6" so it is easier to remove the Kellems Grip. (**Attach ropes at the bottom of the Kellems grip so it can be pulled to release the Kellems Grip from the Insuplex. If this is not installed you will not be able to remove the Kellems Grip**).



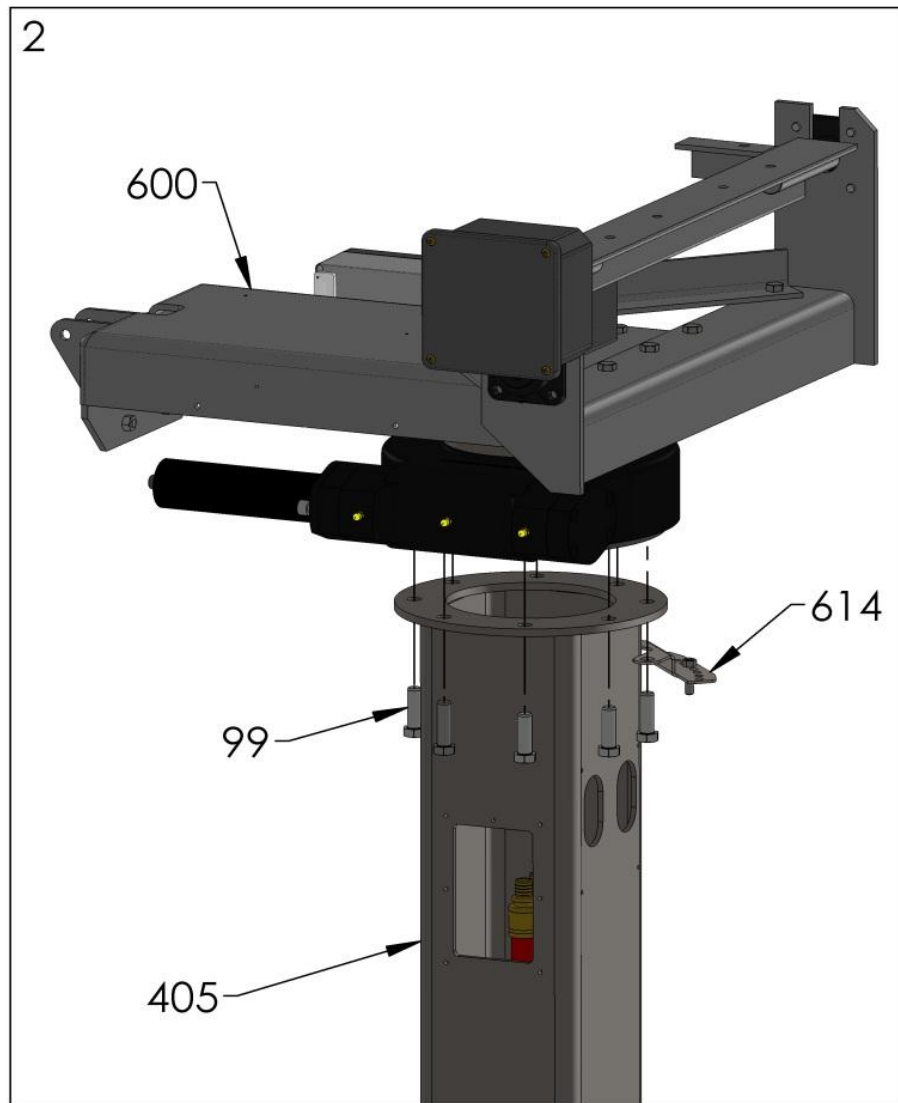
7. Feed a cable down through the center of the post and out the bottom part of the conduit. As you are pulling the Insuplex up through the post STOP, when the pipe is available through the service hole on the side of the post. Pull on the rope attached to the Kellems Grip to release it from the Insuplex.



Powertrain Assembly

1. Lift and attach the drive unit (item 600) onto your post. Bolt on using quantity 6: (item 99) 16mm x 50mm bolt and washer. Attach end switch bracket (item 614) to the pole using quantity 2 bolts (item 99) 16mm x 50mm bolt and washer.

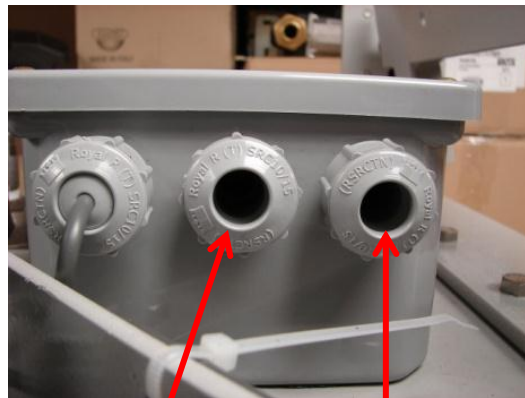
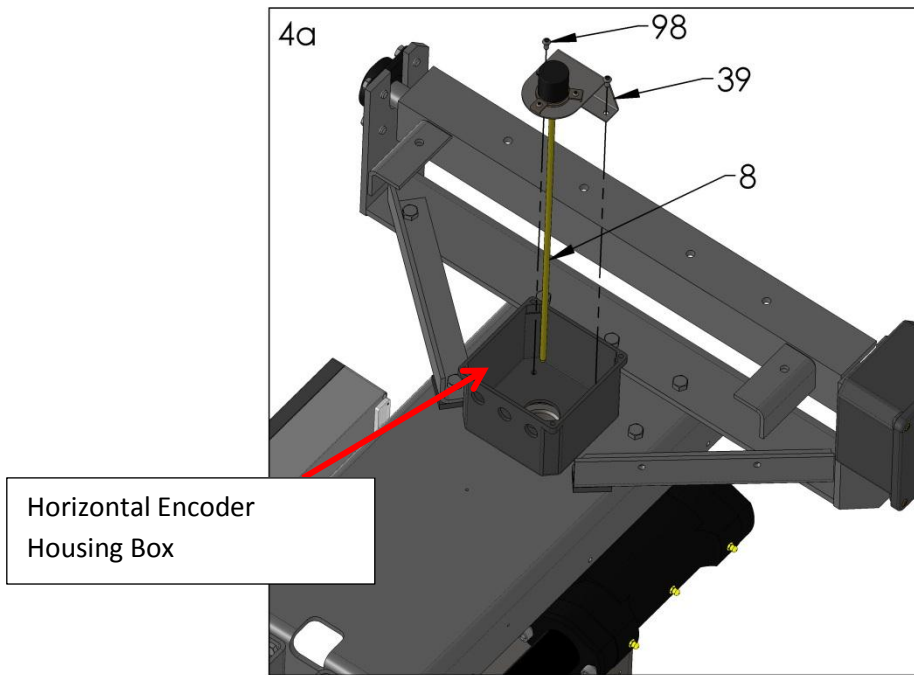
The bracket should be mounted in the direction of the sunrise.



2. The communication and power cable can be fed up through the centre of the post, through the horizontal encoder housing box and to the communication connection box.

- a. Loosen the 2 screws (98) holding the horizontal encoder bracket (39) to the powertrain frame and remove the bracket temporarily to make it easier to fish the wires through the pole. (Fig 4a below)

i. Note: At this point the encoder rod will not be installed (item 8).



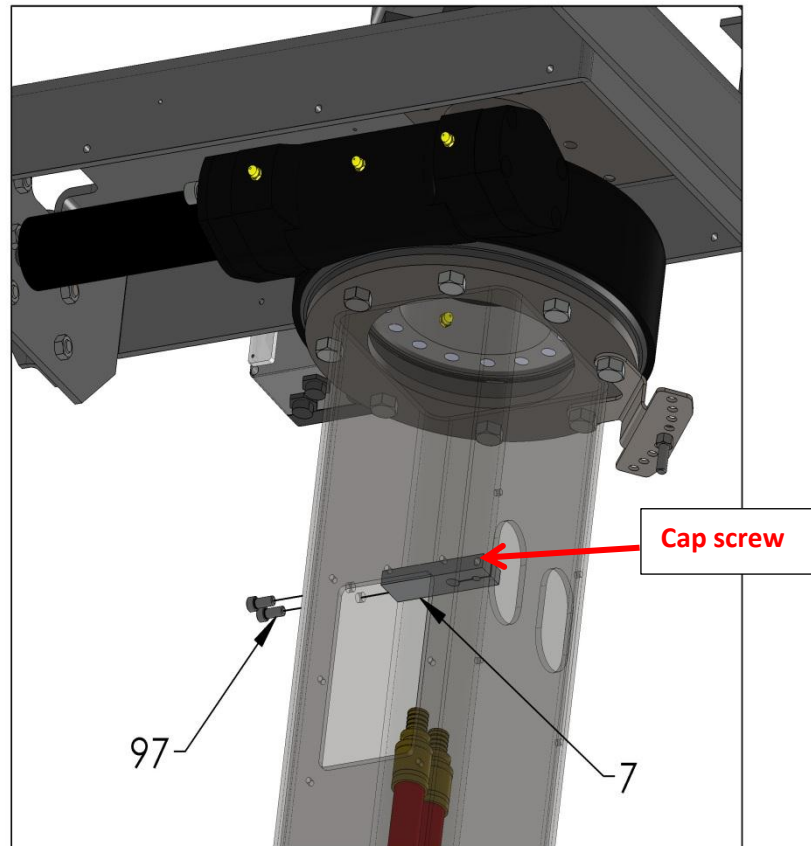
3. The power and communication cable can be fed through a conduit and fished through the bottom of the pole.



Communication wire fed through conduit and fished through the pole.

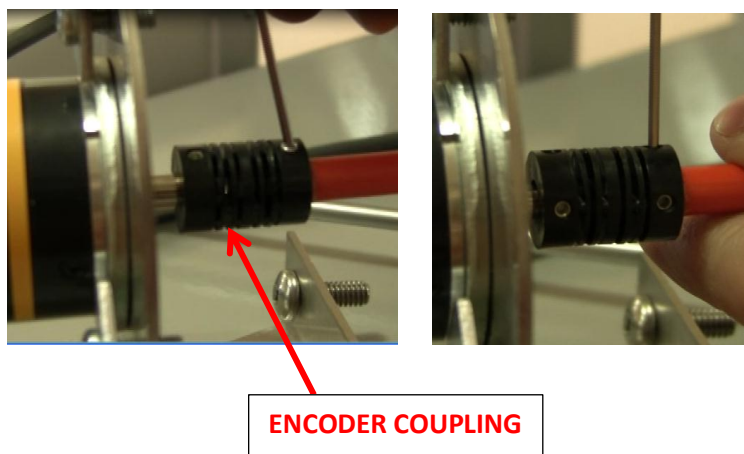
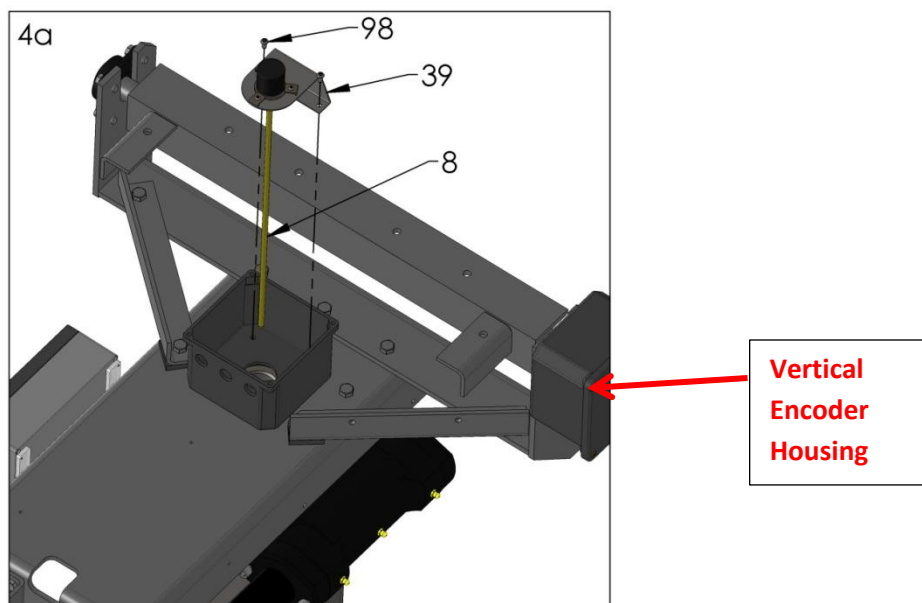


4. Attach the Encoder Rod Bracket (7) to the inside of the pole using (97) 2 - 5/16 – 18 x 3/4" (M8 X 1.25 SS BOLT - 20MM L) Stainless bolts adjustable nut side out so you can tighten when you install the fiberglass rod.
 - a. Note: Ensure that the position of the encoder rod bracket is correctly installed so you can access the cap screw.

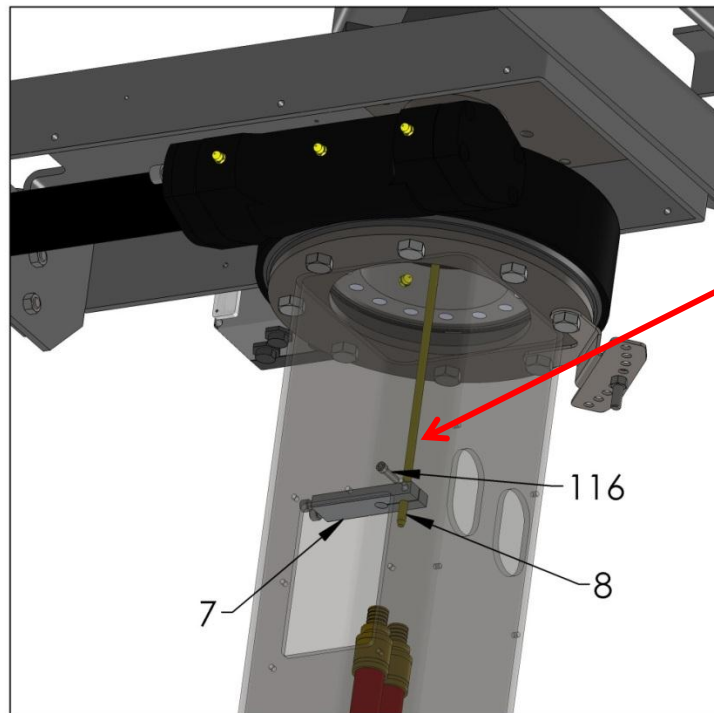


5. Loosen the 2 screws (98) on your horizontal encoder bracket and remove from the horizontal encoder housing (Fig 4a below). Install your fiberglass rod (8) (tapered end – only fits in one direction) onto the encoder's flexible coupling and tighten the 2 set screws with the provided Allen key.

Note: The Allen key is located in the vertical encoder housing box.



6. Place the encoder back in the horizontal encoder housing and ensure that the fiberglass rod has gone through the hole closest to the cape screw.
 - a. Once the fiberglass rod has been placed in the hole, screw in the original screws to mount the horizontal encoder bracket.
 - b. From the inside of the post, tighten the cap screw 1/2" X 1" (item 116) on the Encoder Rod Bracket.
Note: **Make sure your communication cables are not wrapped around the rod.**

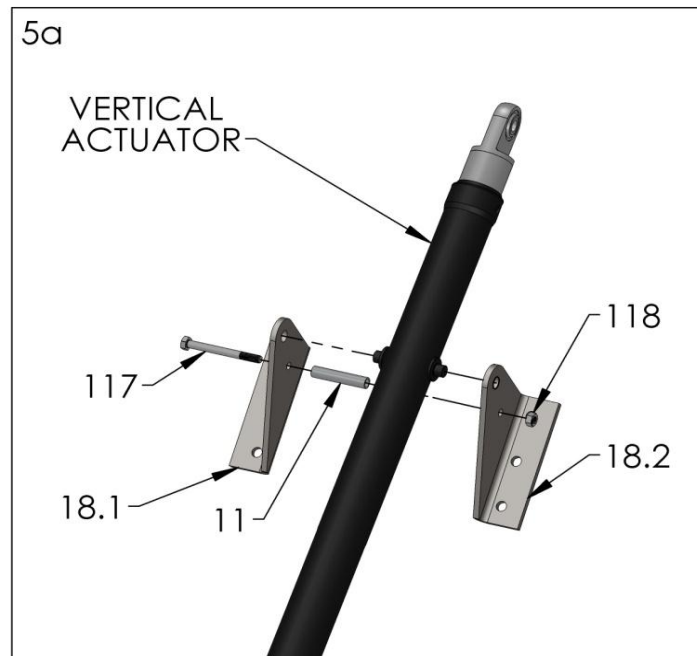


DO NOT FORCE THE ENCODER ROD THROUGH THE ENCODER ROD BRACKET. DAMAGE TO THE ENCODER COUPLING WILL OCCUR.

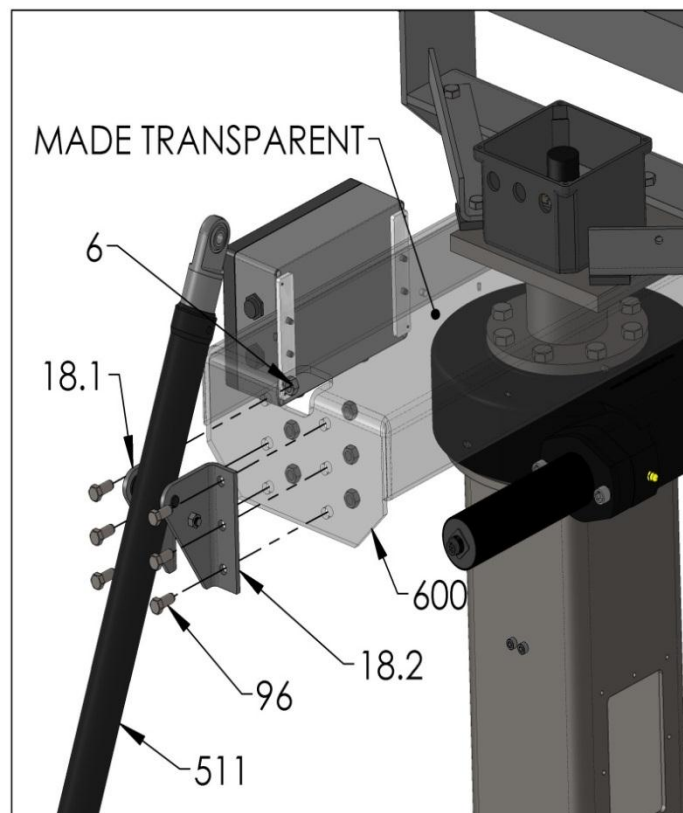


IF ENCODER ROD DOES NOT FIT THROUGH THE HOLE REMOVE THE ENCODER ROD BRACKET AND SLIGHTLY PRY OPEN THE HOLE OR DRILL IT SLIGHTLY LARGER.

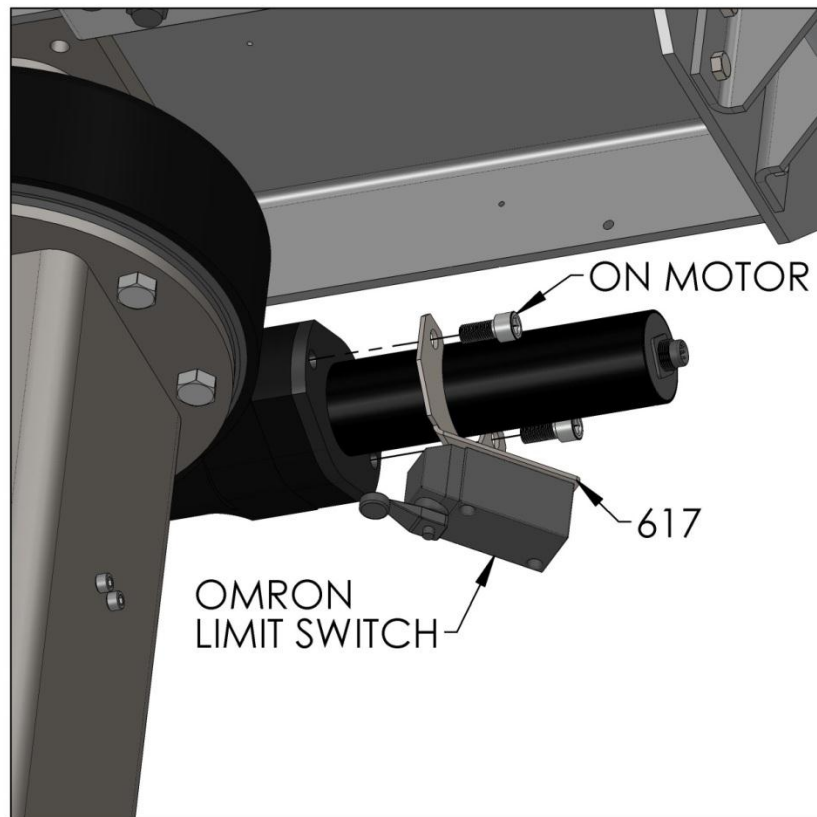
7. Take 3/8 - 16 x 3 1/2" (M10 X 1.5 SS BOLT - 80MM L) (item 117) stainless bolts and place it between the angles (item # 18) along with an aluminum collar (item 11). Place your Actuator (511) in between the angle brackets and put a 3/8" (M10 X 1.5 SS NUT) (item 118) nut on the end of the bolt.



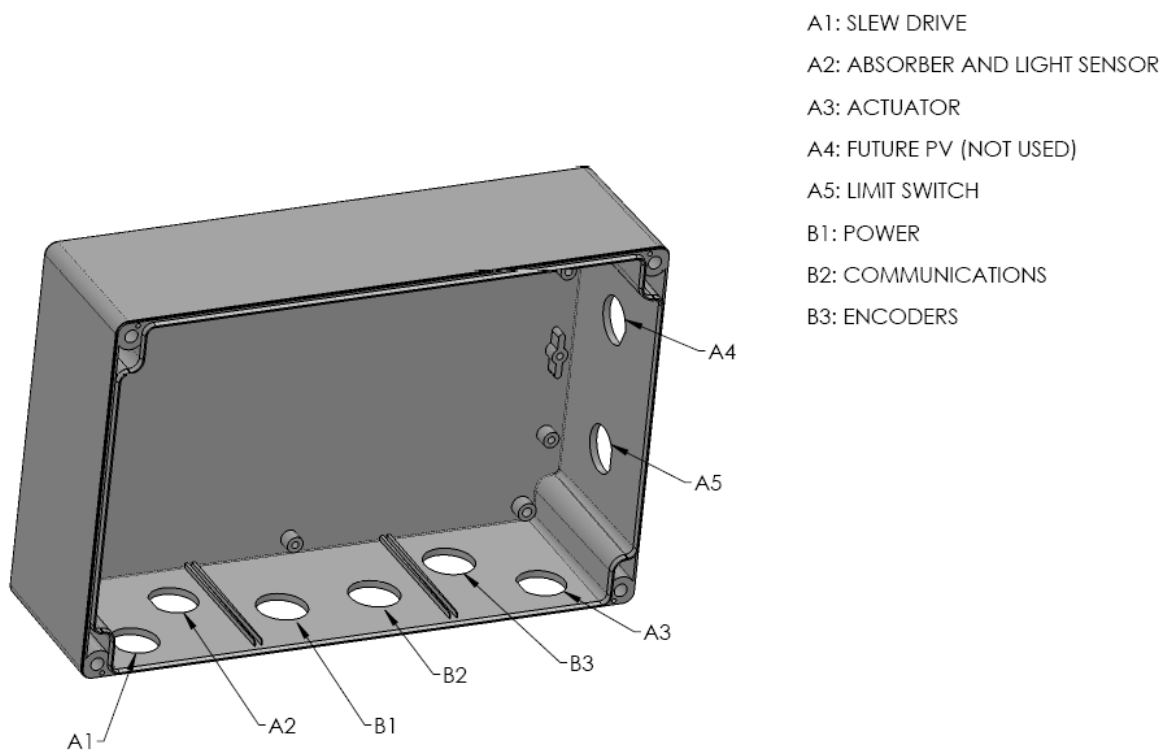
8. Mount the angle brackets to the frame and fasten with (item 96) 7/16" bolt and (118) 6-7/16" nuts (M10 X 1.5 SS NUT). Plug the actuator wire into connection box port A3 (see next page for port description).



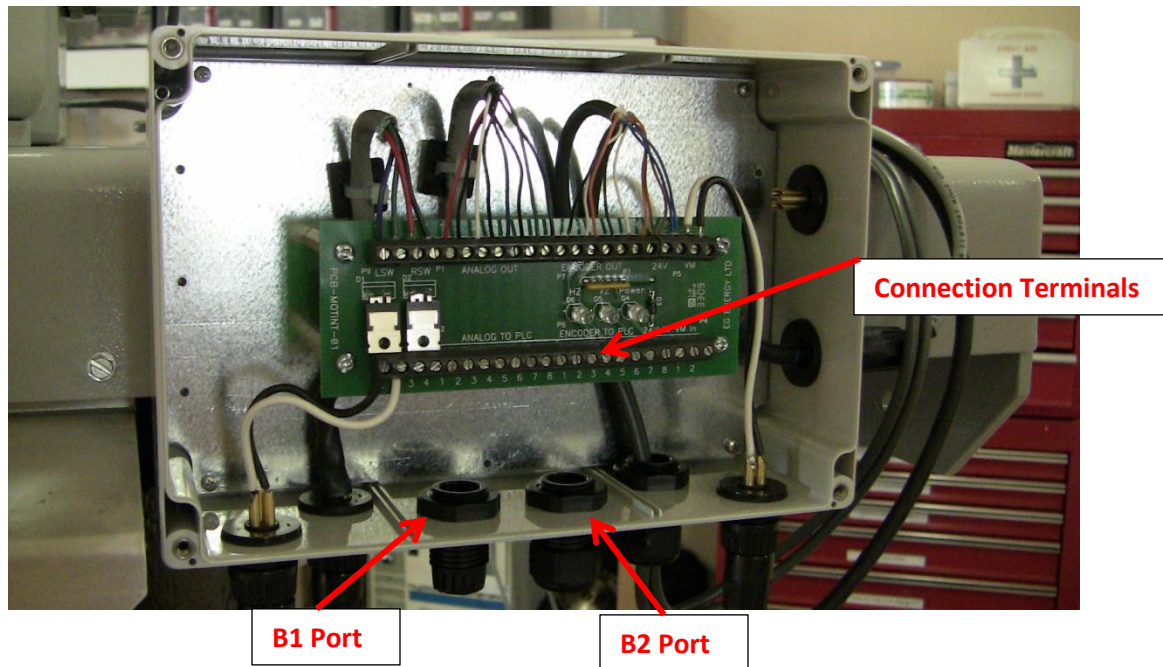
9. Attach the limit switch assembly by using quantity 2: 10-24 x 1" Allen Head Cap screw and nut.



10. Wire the power cable through port B1 and communication cable through port B2:



11. Connect the wiring for power & communication cables as per diagram WD-SENSOR-PCBOARD-XX-XXXXX (latest revision provided).



SolarBeam Dish Assembly

BEFORE YOU START:

IMPORTANT!!!

INSTALLATION OF THIS PRODUCT SHOULD BE PERFORMED ONLY BY A PROFESSIONAL CERTIFIED INSTALLER AND IS NOT RECOMMENDED FOR CONSUMER D.I.Y. (DO-IT-YOURSELF) INSTALLATIONS.

WARNING

DO NOT ASSEMBLE THIS SYSTEM IN DIRECT SUN! USE A PROTECTIVE BLANKET OVER THE PETALS TO AVOID CONCENTRATED SUN EXPOSURE.

WATCH FOR WIRES!!!

Installation of this product near power lines is dangerous. For your own safety, follow these important safety rules:

1. Perform as many functions as possible on the ground.
2. Watch out for overhead power lines. Check the distance to the power lines before starting installation.
3. We recommend you stay a minimum of 6 meters (20 feet) from all power lines.
4. Do not use metal ladders.
5. Do not install the SolarBeam Concentrator or post assembly on a windy day.
6. If any part of the SolarBeam Concentrator or post assembly comes in contact with a power line, call your local power company. DO NOT TRY TO REMOVE IT YOURSELF! They will remove it safely.
7. Make sure that the post assembly is properly grounded.

WARNING

Assembling the SolarBeam dish structure on windy days can be dangerous. Because of the dish surface, even slight winds create strong forces. For example, a 1.0m dish facing a wind of 32 km/h (20 mph) can undergo forces of 269 N (60 lbs.). Be prepared to safely handle these forces at unexpected moments. Do not attempt to assemble, move or mount dish on windy days or serious, even fatal accidents may occur.

SOLARTRON ENERGY SYSTEMS INC. is not responsible or liable for damage or injury resulting from SolarBeam dish and post installations.

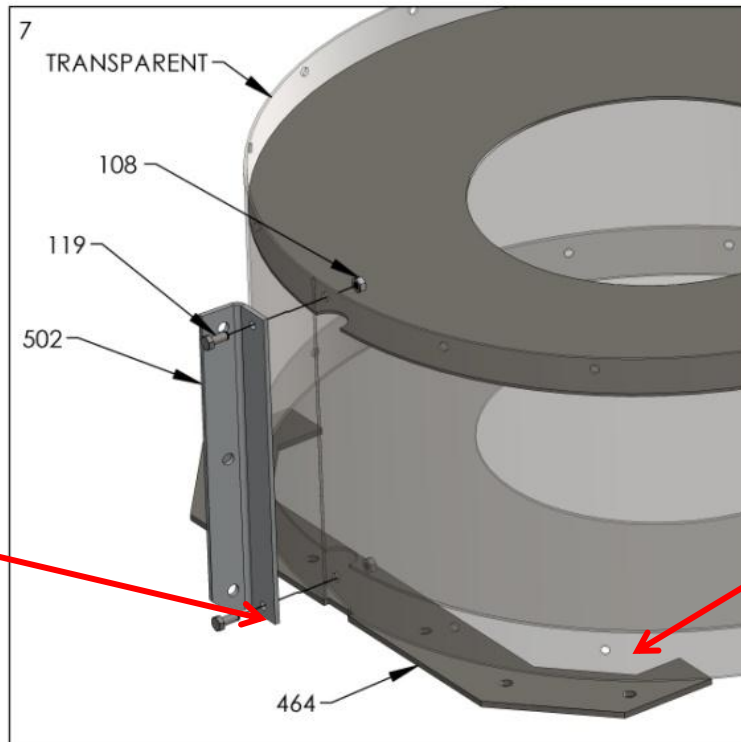
WARNING

The SolarBeam Concentrator improperly installed or installed to an inadequate structure are very susceptible to wind damage.

This damage can be very serious or even life threatening. The owner and installer assume full responsibility that the installation is structurally sound to support all loads (weight, wind & ice) and properly sealed against leaks. SOLARTRON ENERGY SYSTEMS INC. will not accept liability for any damage caused by a SolarBeam Concentrator system due to the many unknown variable applications.

Dish Assembly

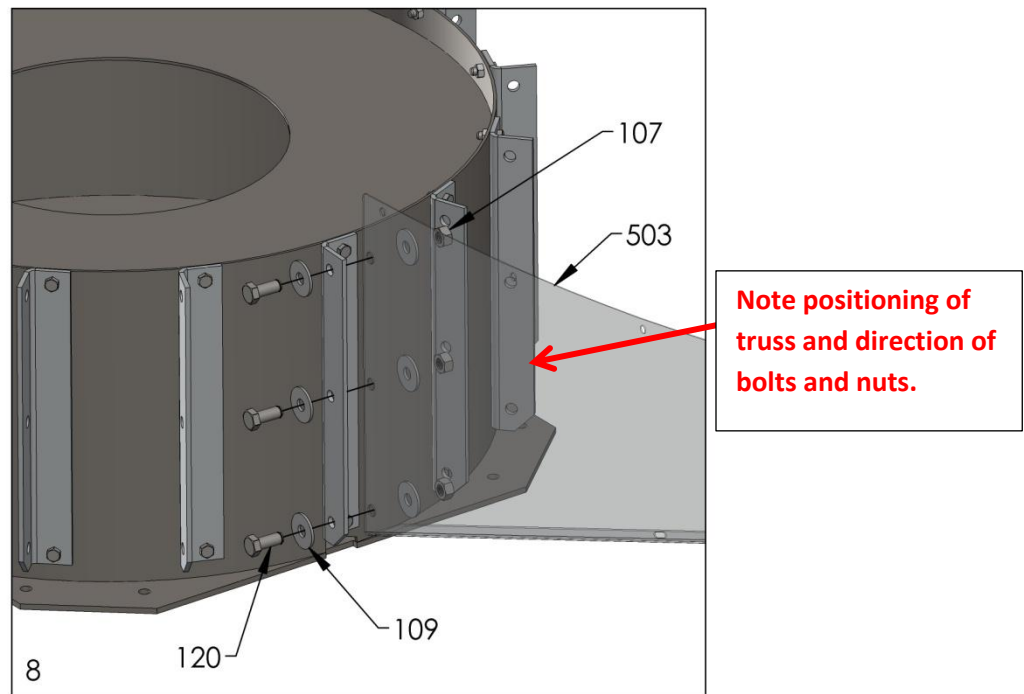
1. Mount 16 Truss attachment Brackets (item 502) to the side of the drum using (119) 2- 5/16 x 18 x 3/4" stainless bolts and (108) 5/16-18 SS Nuts (as seen below) **Angle pointing down toward bottom of drum.**



Bracket angled faces
bottom of drum.

Note position
of the drum.

2. Install the Truss (503) on the right end of the Angle using quantity 3: 5/16 x 18 x 3/4" (item 120) stainless bolts and nut (107) with a 5/16" Washer (109). Use 1 bolt, 2 washers, and 1 nut per hole. See Below.



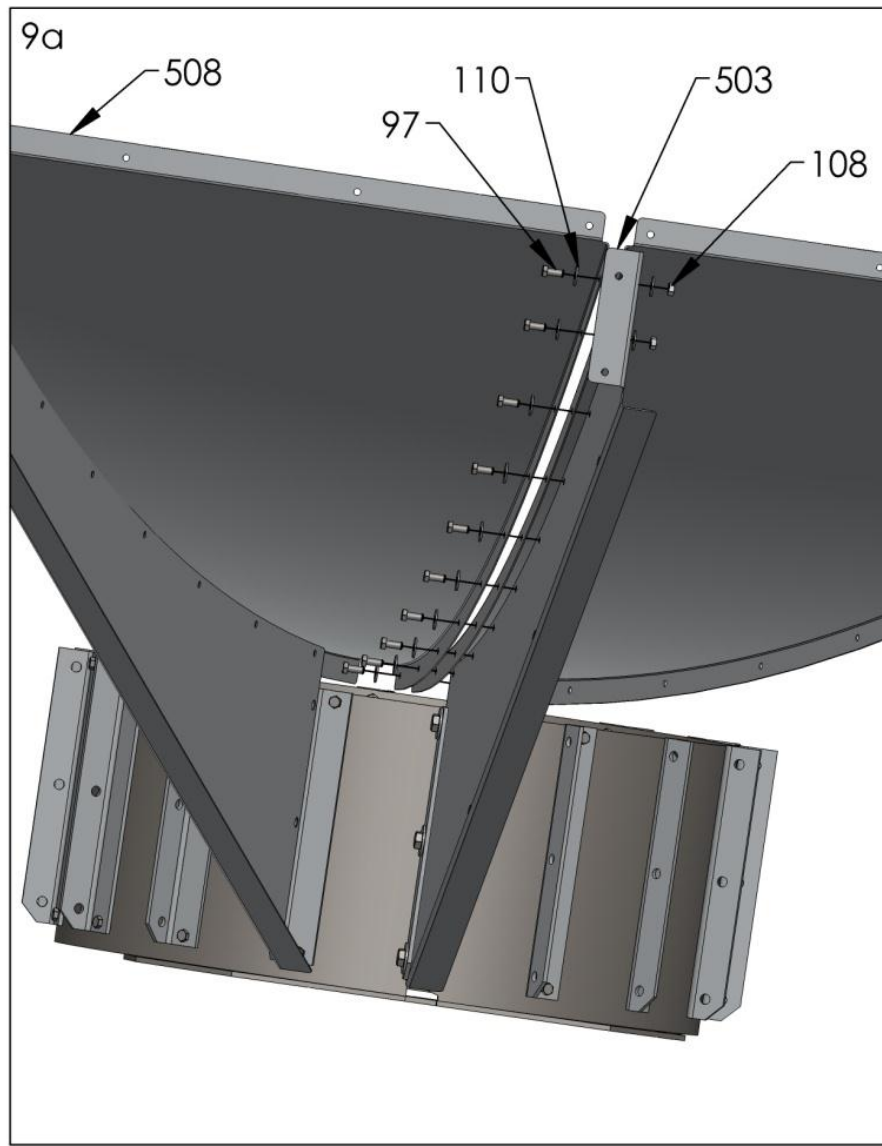
WARNING: Install petals out of direct sun reflection to avoid sun burn.
Eye protection MUST BE used at all times.

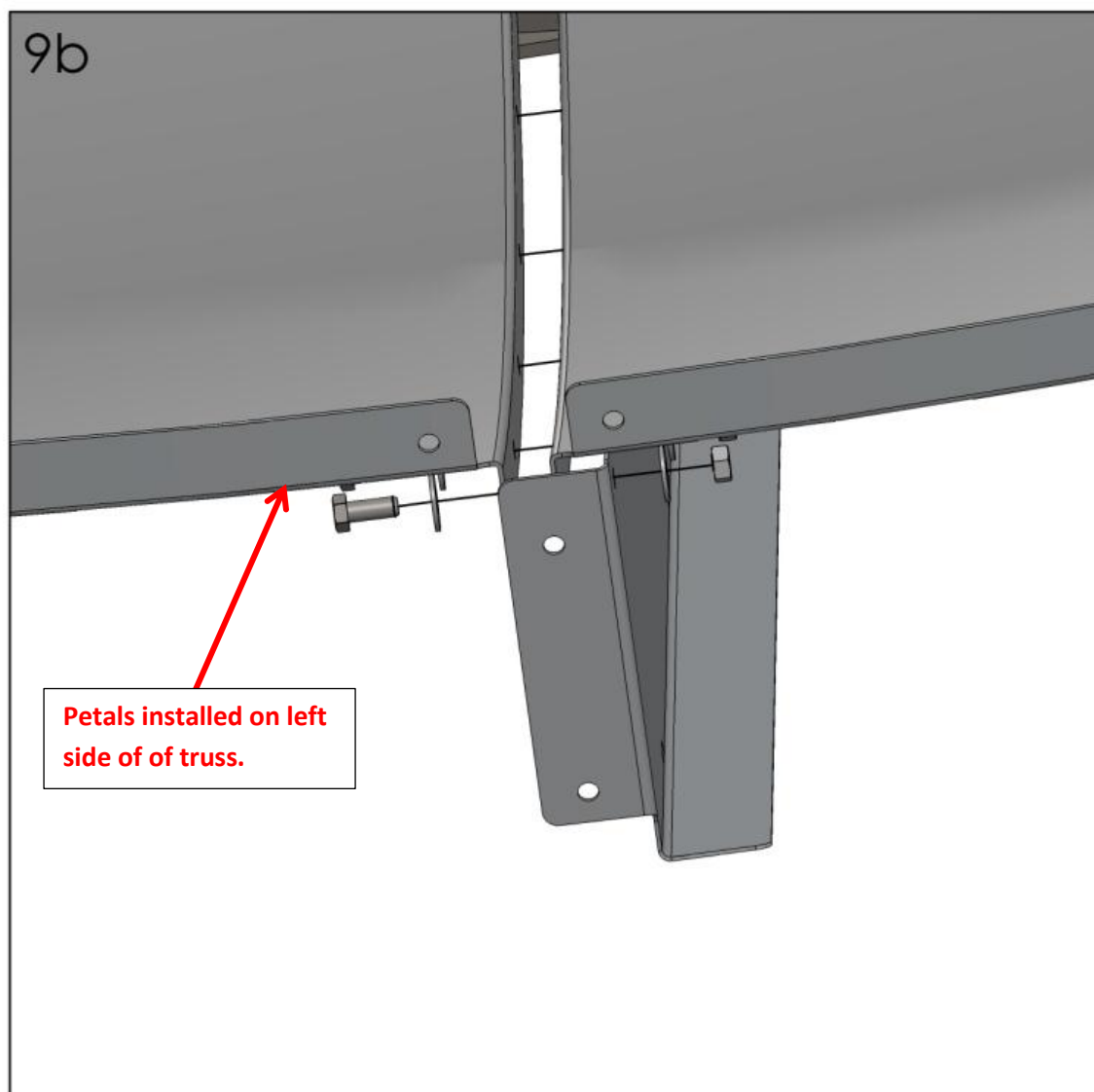
3. Install the reflective petals (508) to the radial beams truss (503) using 5/16 x 18 x 1" SS Bolt (97), Nut (108) and (110) Washers. Install the petal bend on the left side of the truss.

Note: Do not remove the blue protective wrap from the entire petal just the sides. You can remove the remaining blue protective wrap when the dish is fully assembled.

When installing the petals, use 1 bolt, 2 washers, and 1 nut per hole. Leave the petals loose at this time and continue installing the remaining petals.

The last petal may be a little harder to install than the rest. To make the installation of the last petal easier tighten the first 2-3 bolts on the inside of each petal. This will open the gap to make installation easier.



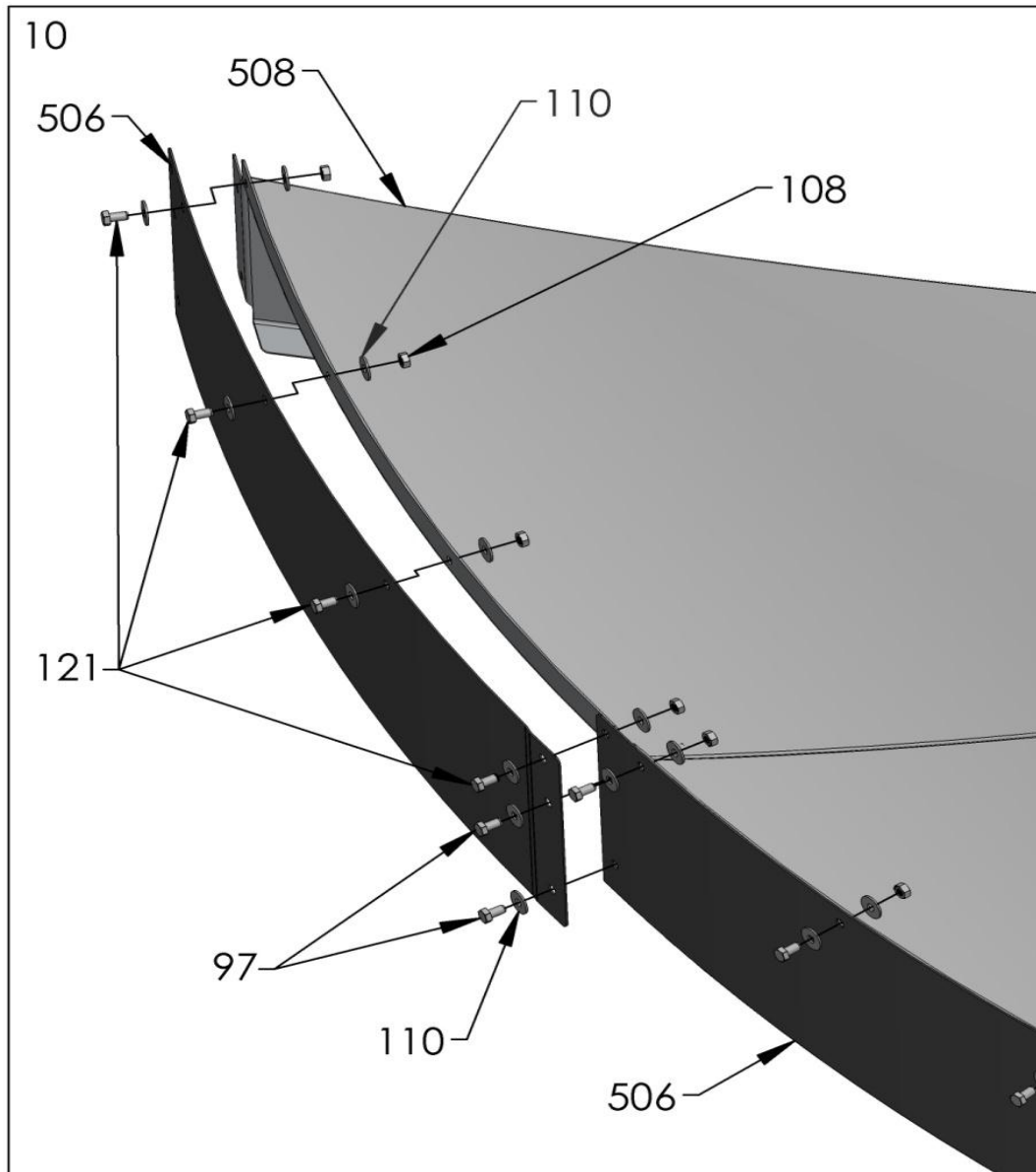


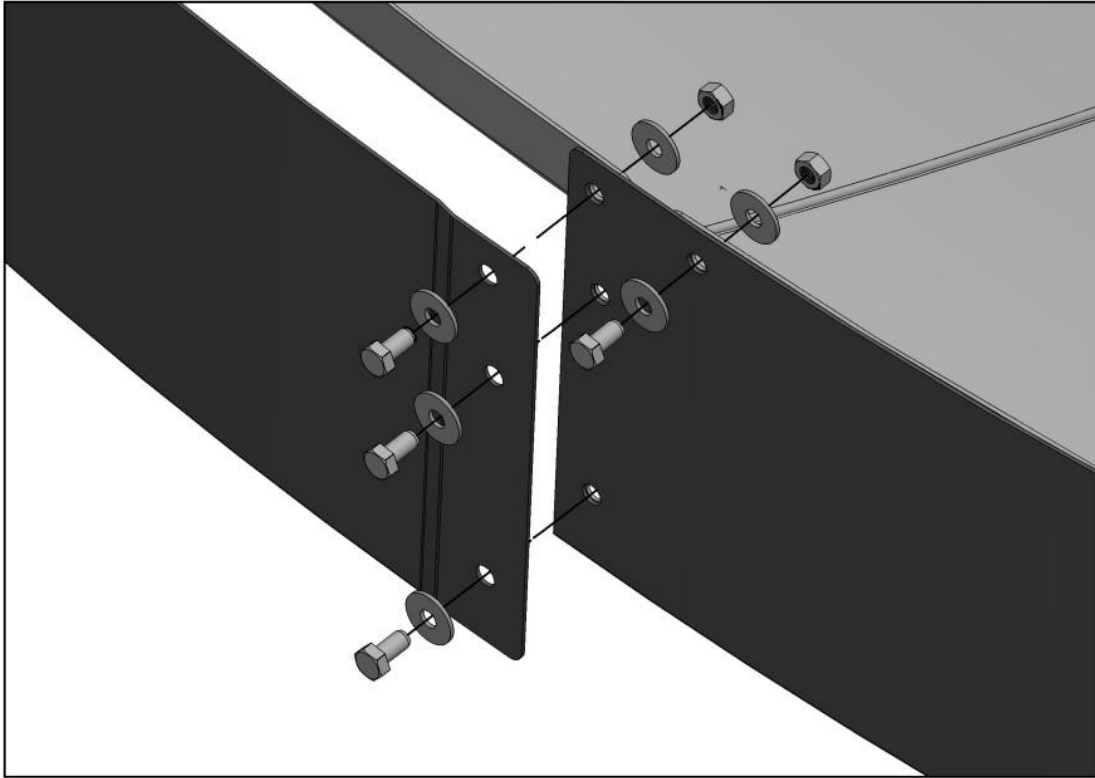
By using the adjustment tool (see below) included in your kit you can feed it through the hole in the petals and truss to line the bolts up easier.



4. To make the dish more stable during installation, start attaching the Skirting (506) after you add the 3rd petal.
 - a. Attach the skirting by using 5/16 x 18 x 1" SS Bolt (121), Washer (110), and Nut (108). Do not tighten them until the dish is complete.

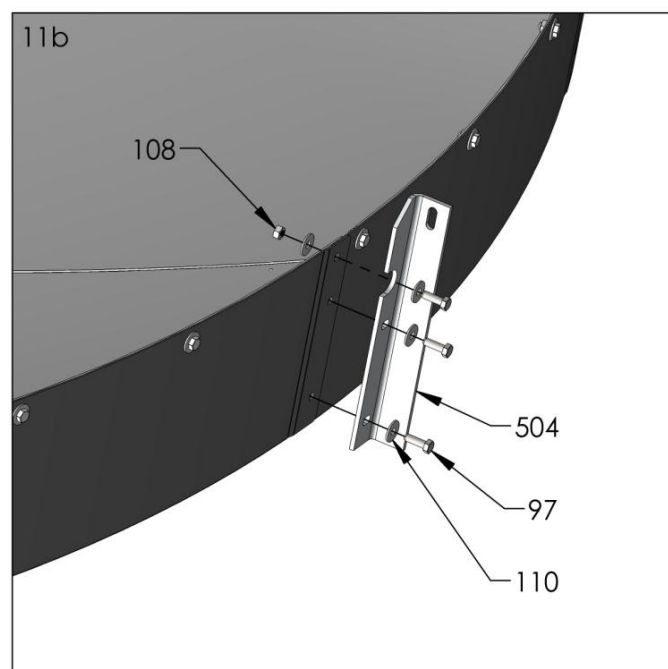
During the installation there may be a couple holes that will not line up properly. **Once everything has been installed and tightened the holes should line up. If the holes do not line up perfectly use a drill with a 3/8" bit to make the hole larger. This is typically done on the installation of the last skirting.**

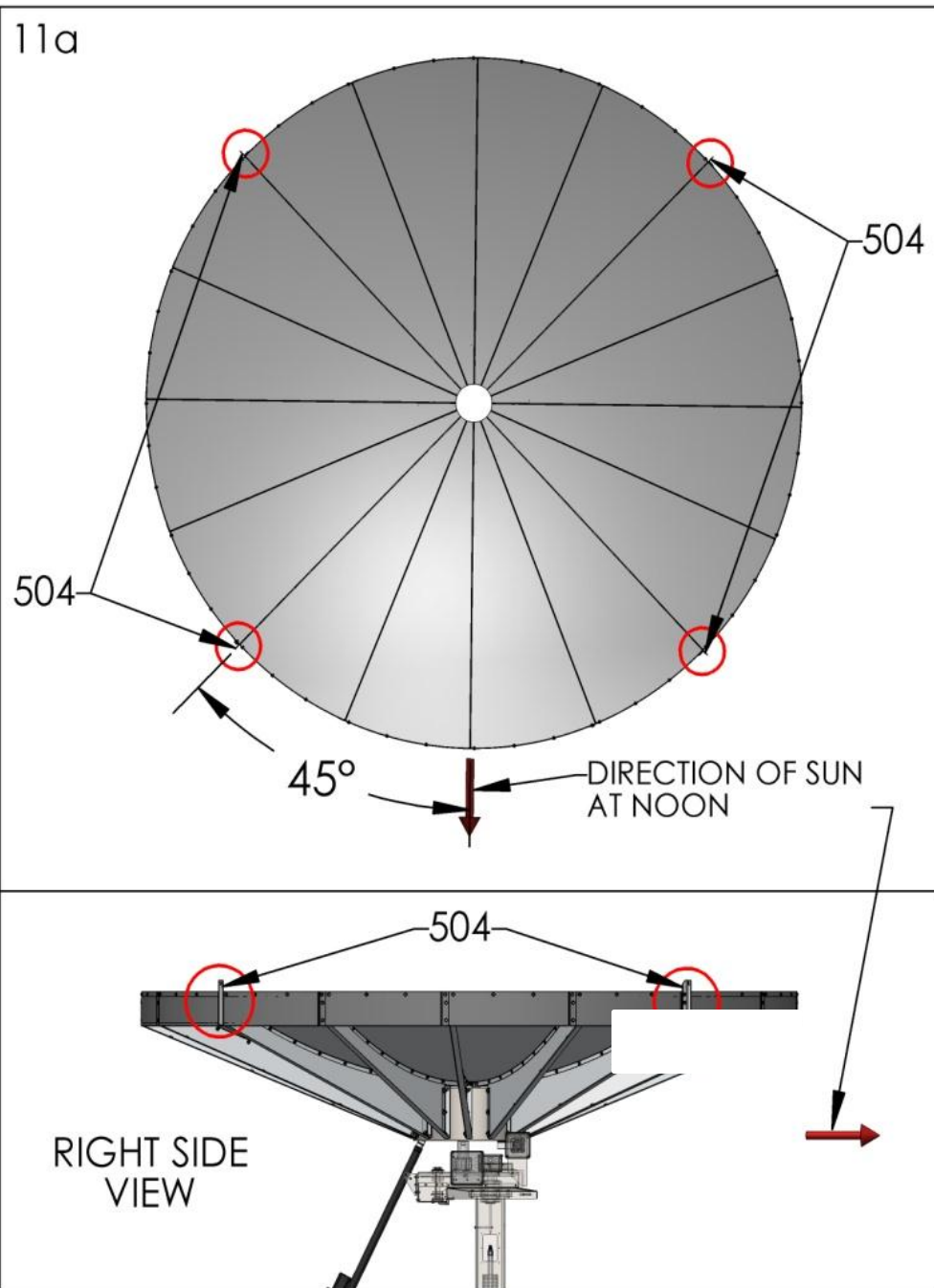




5. Mount Skirting side brackets (504) at every 4th Skirting location using 5/16 x 18 x 1" SS Bolt (97), (Nut 108) and Washers (110).

When determining the location of the side brackets, start from the center of the drum which faces the direction of the Sun when tracking. Install the side bracket to the 2nd truss on the left and 2nd truss on the right. Install a side bracket on every 4th petal. As seen below.





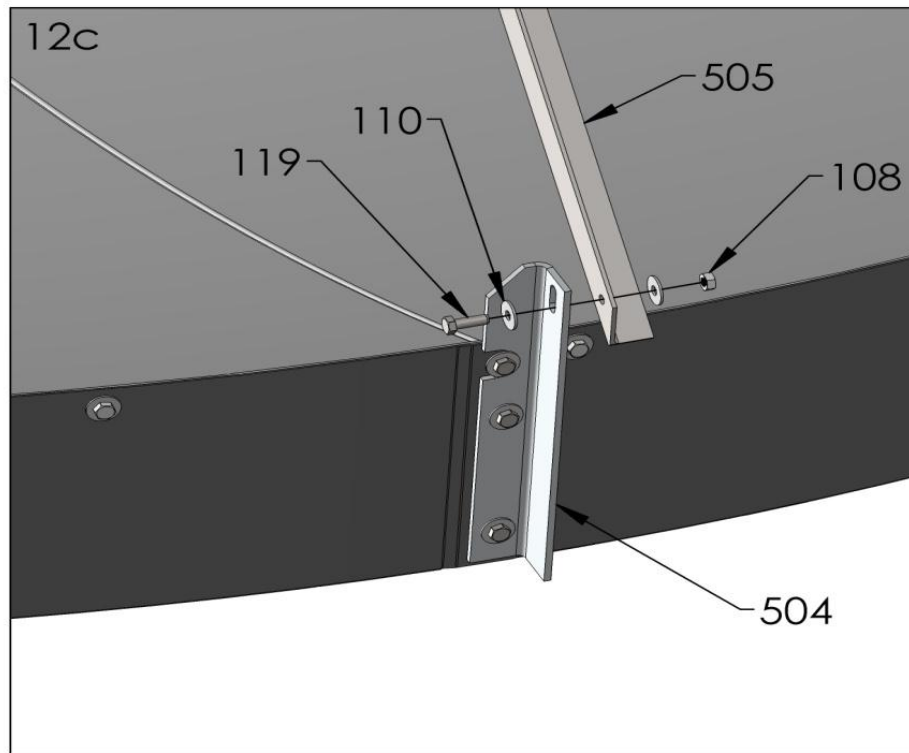
Once the dish is completed, tighten all the bolts and nuts.



6. Attach the supports to the Lifting Bracket using quantity 8: 7/16 Stainless Nuts (107). This should be done on the ground and then lifted into place with a lift truck using a material strap.

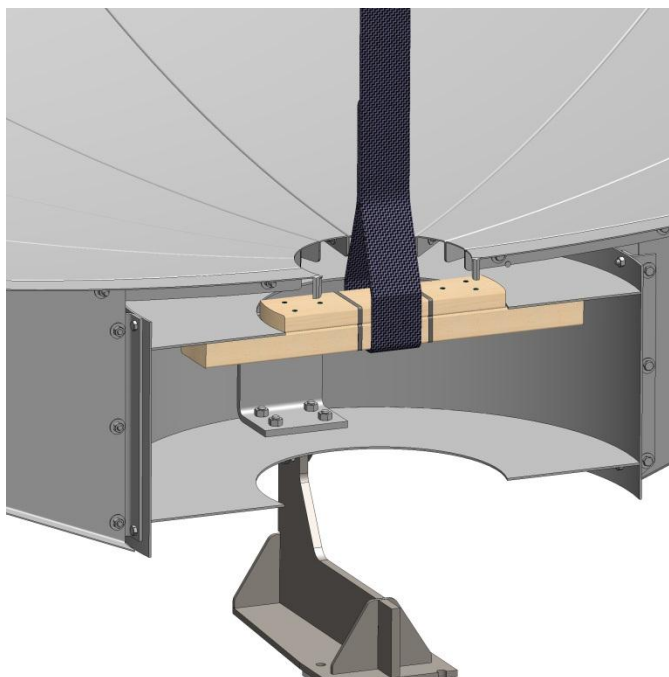


7. Attach supports (505) to the skirting side brackets (504) located on outboard skirt using 5/16 x 18 x 3/4" SS Bolt(119), Nut (108) and Washers (110).



Lifting of Dish

1. You can now lower the lifting strap into place. Feed the strap down through the center hole and secure it into place using the lifting assembly. (2 x 4) See below.

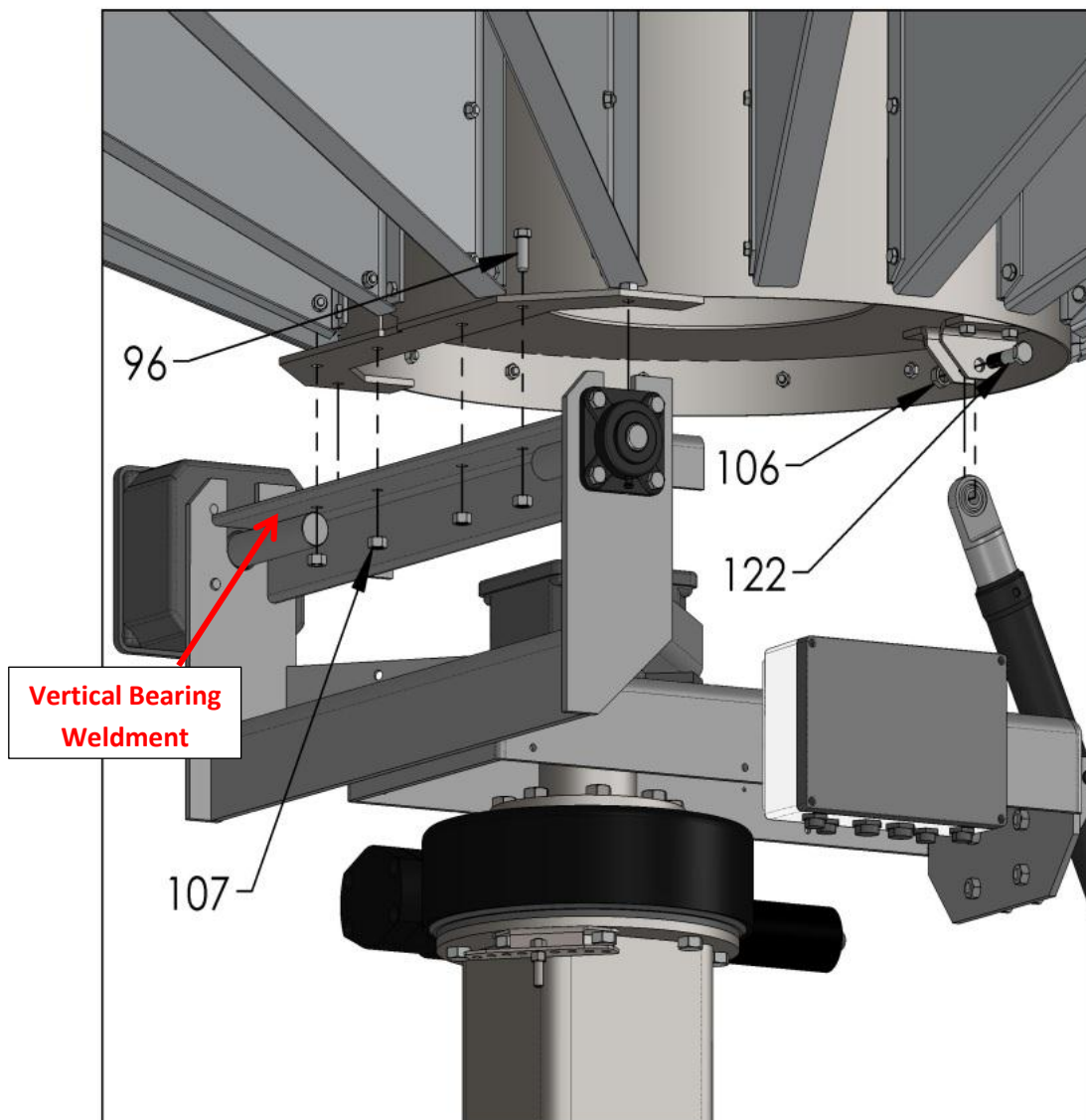




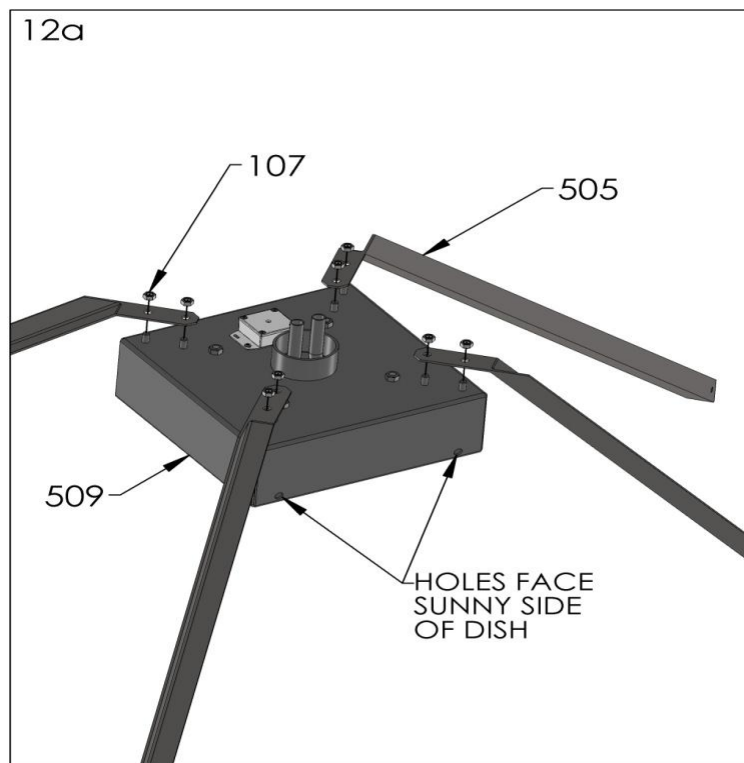
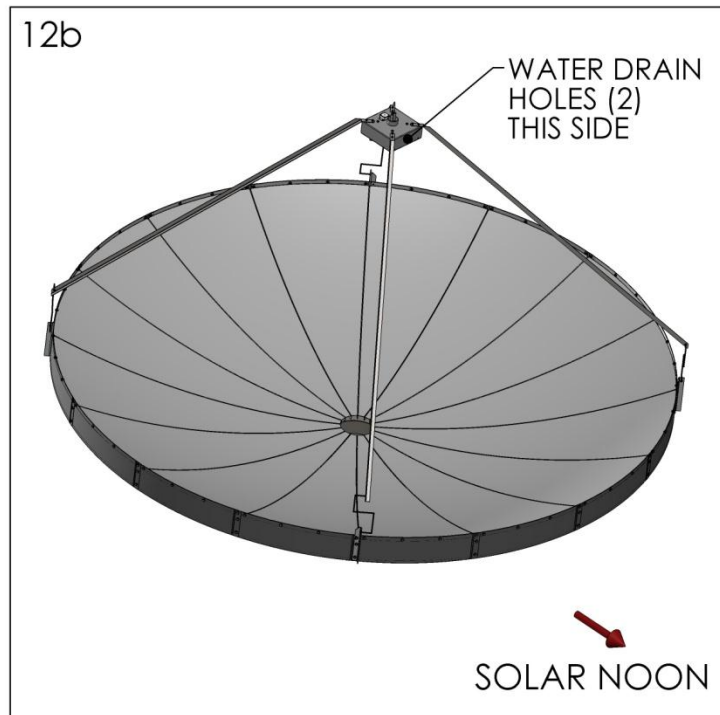
2. The assembled Dish can now be lifted into position. Once a strain has been taken onto lifting the dish loosen and remove the bolts holding it onto the assembly jig.



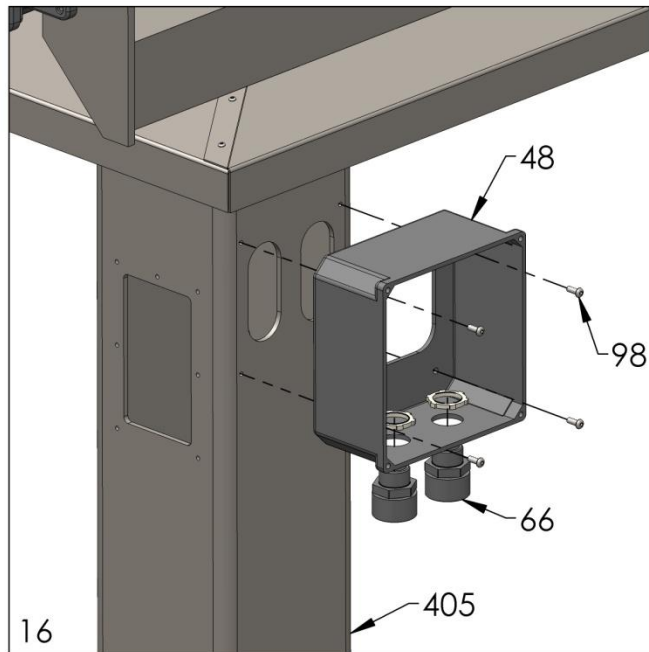
3. Insert 2 guide bolts 7/16 - 14 X 1" into 2 locations through the drum onto the vertical bearing weldment to help guide the dish into position. Once the dish is in place tighten the nuts (107).
 - a. You can now fasten the Dish by using the other 4 bolts : 7/16 - 14 X 1" (96) Stainless Bolts and 7/16 Nuts (107).
 - b. The actuator connects to the drum with 1: 1/2- 13 X 3 1/2" (112) and Nut (106) (included in actuator box).
 - c. Remove the strap once all bolts have been tightened and Actuator is in place.



- d. Tilt the dish forward and change the lifting bracket to the Heat Exchanger assembly. Make sure the drain holes in the bottom of the heat exchanger point down. Detach one arm at a time. This task **MUST** be performed by 2 people.

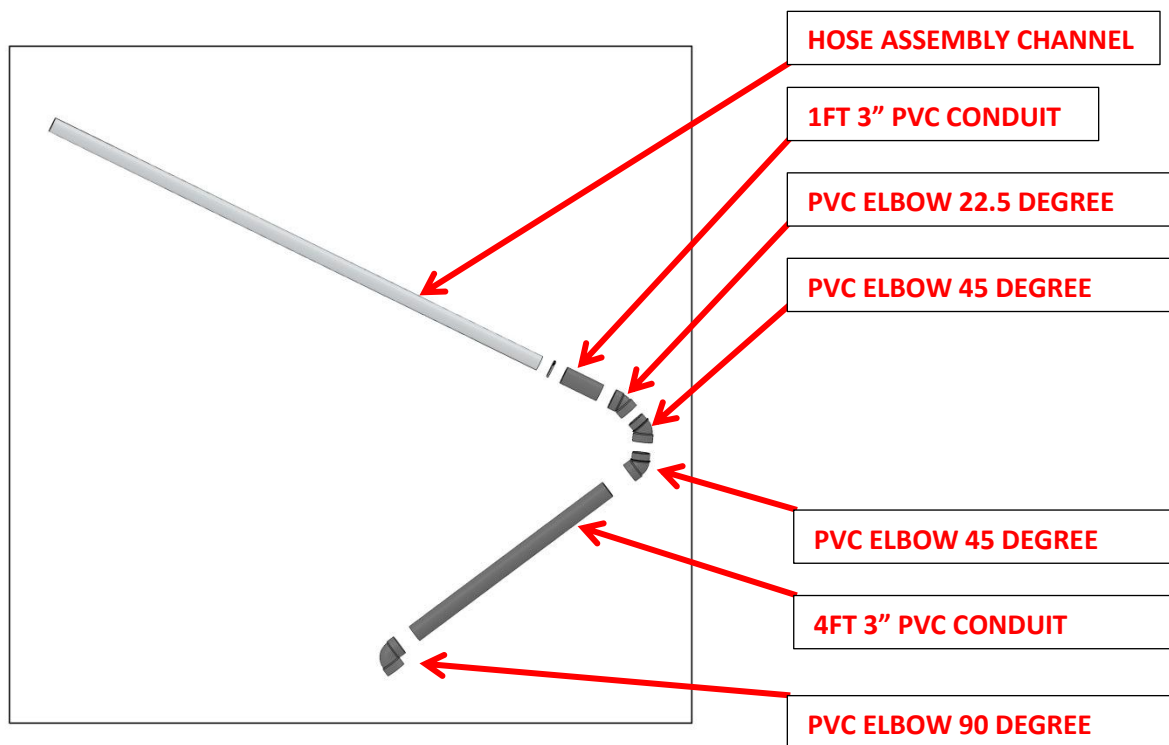


4. Fasten the Fluid Box to the pole using quantity 4: $\frac{1}{4}$ - 20 x $\frac{3}{4}$ " Pan Head Machine Screws.

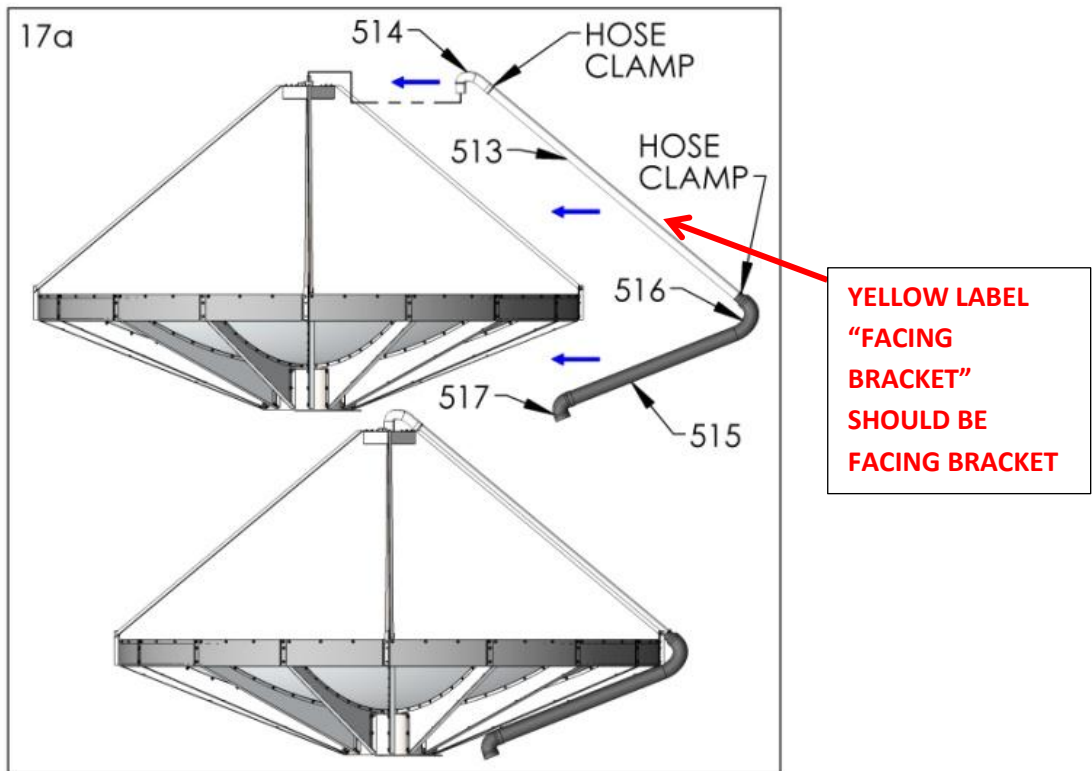


Installation of Hose Assembly

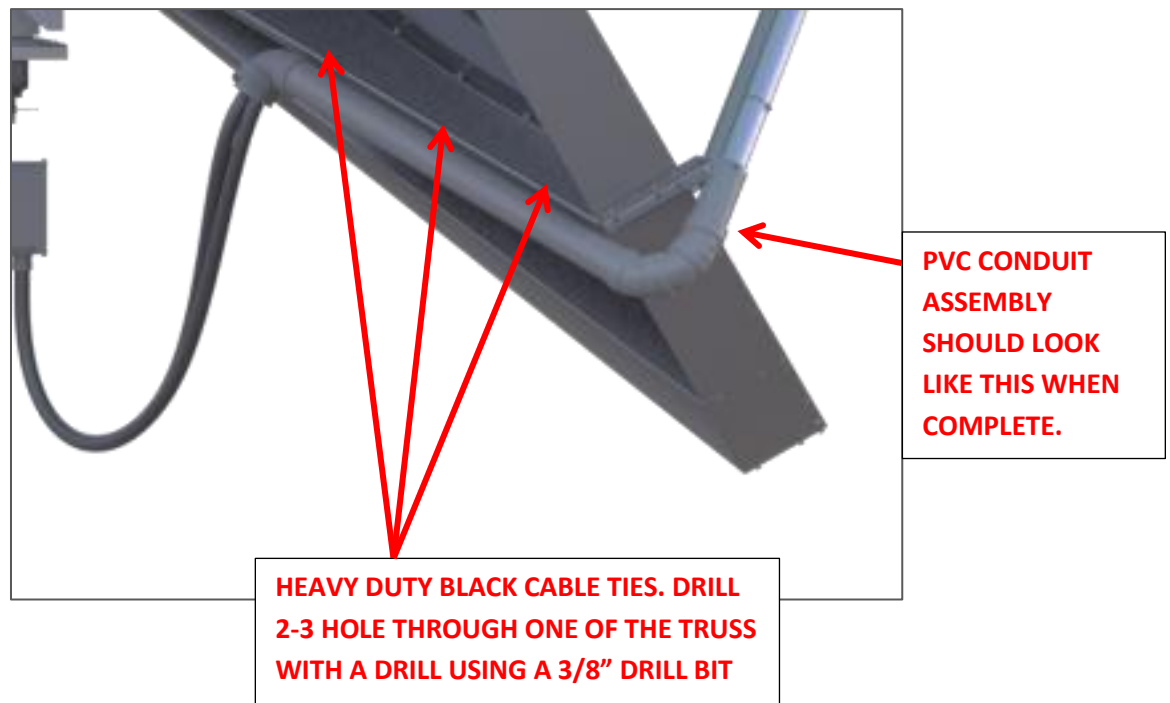
1. Keep the dish tilted down and fasten the 3" Pipe hose assembly(513) to the strut on the left handed side (direction facing reflective dish) using 3- 3-1/2" clamps.
 - i. LEFT HAND SIDE OF THE BRACKET FOR LOCATIONS ABOVE EQUATOR
 - ii. RIGHT HAND SIDE ON THE BRACKET FOR LOCATIONS BELOW EQUATOR
- b. Attach the elbows as shown below. **DO NOT GLUE PVC TOGETHER**



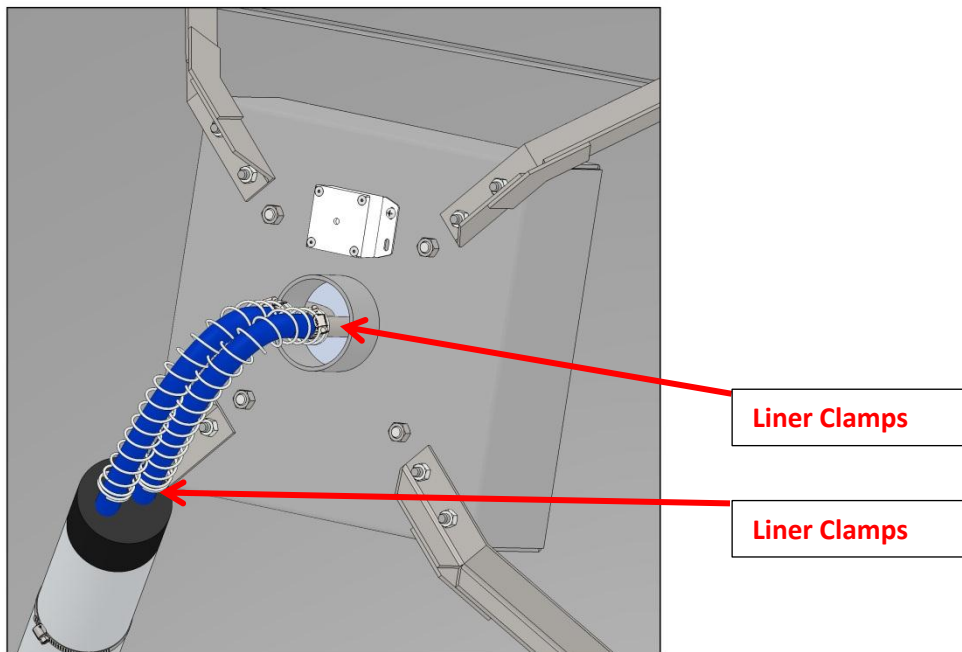
- c. Feed supply and return pipe through the PVC pipe assembly (515) and attach to one the Skirts. Attach the aluminum flex hose (514) to the top of the pole before you try to connect your hoses.



- d. Drill 2-3 holes in one of the Truss using a 3/8" drill bit. Secure with heavy duty black cable ties.



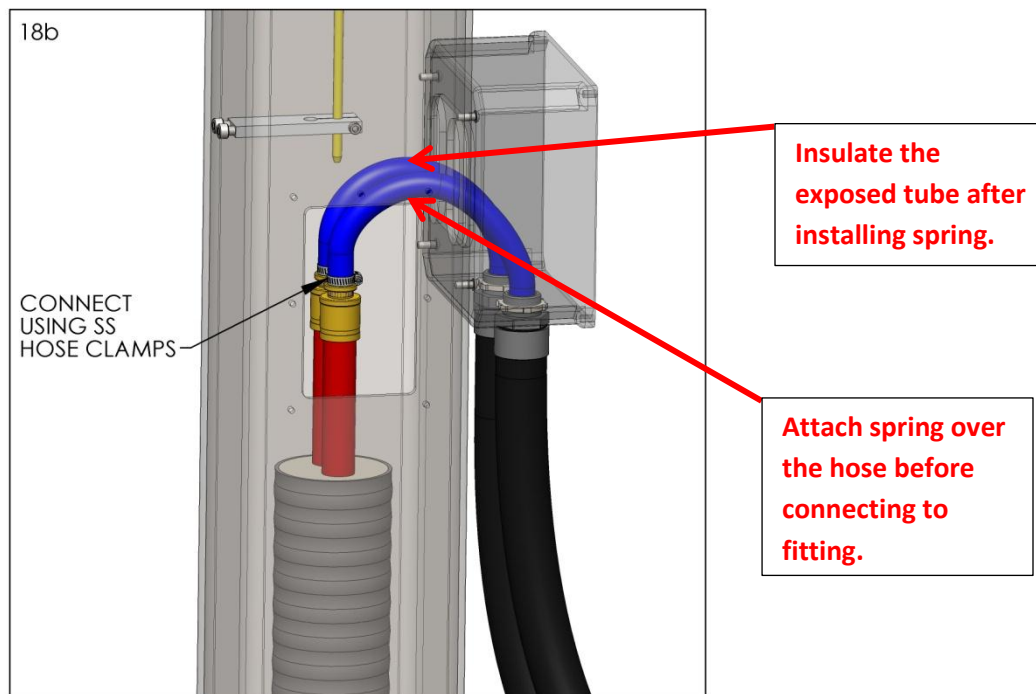
2. Slide the provided 4" spring over the hose and attach 2 – 1" liner hose clamps below the spring to ensure it will not slip.
 - a. Connect the supply and return hose to the fittings on the solar collector using 2 - 1" stainless liner hose clamps on each side.
 - b. **VERY IMPORTANT: Use only provided hose clamp that has a liner. Other hose clamps cut into the silicon.** At the same time you can now plug in the 8 prong plug into the Heat Exchanger.
 - c. It is important to note which hose will be the "supply" and "return"



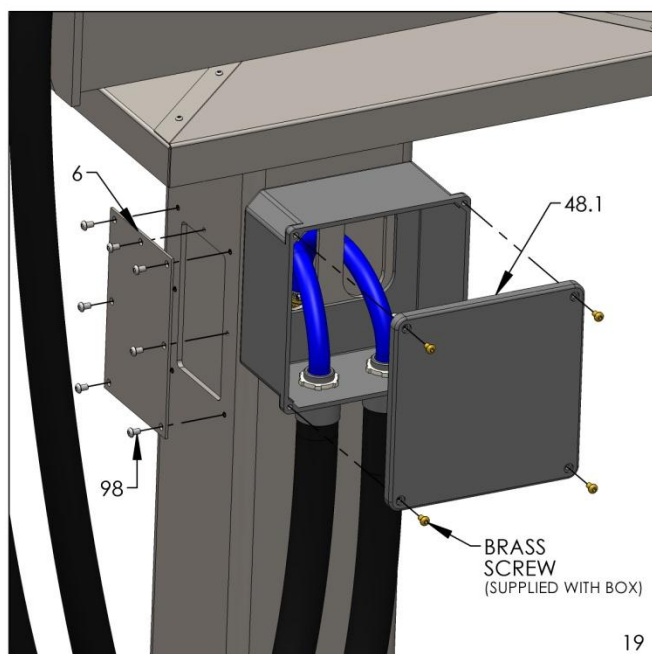
- 17b
-
- Diagram 17b is a side view of the antenna assembly. It shows the mounting structure, including the angle brackets and hose clamps. The diagram is labeled with "TUBE ATTACHES TO ANGLE BRACKETS WITH HOSE CLAMPS" and "HOSE CLAMPS". A red arrow points to the "HEAVY DUTY TIES" which are used to secure the assembly.

-
- INSULATED SILICONE HOSES
- SILICONE HOSES TO MEET CONNECTIONS INSIDE POLE

Confirm the pipe is firmly connected to the supply and return fittings as seen below. Slide insulation over the exposed hose before connection to the fitting. Use a 1" stainless liner hose clamp (if liner hose clamp is not used apply tape around the silicon hose to ensure the hose clamp will not cut through the silicon) on each side and tighten. **It is important to note which hose will be the "supply" and "return".**



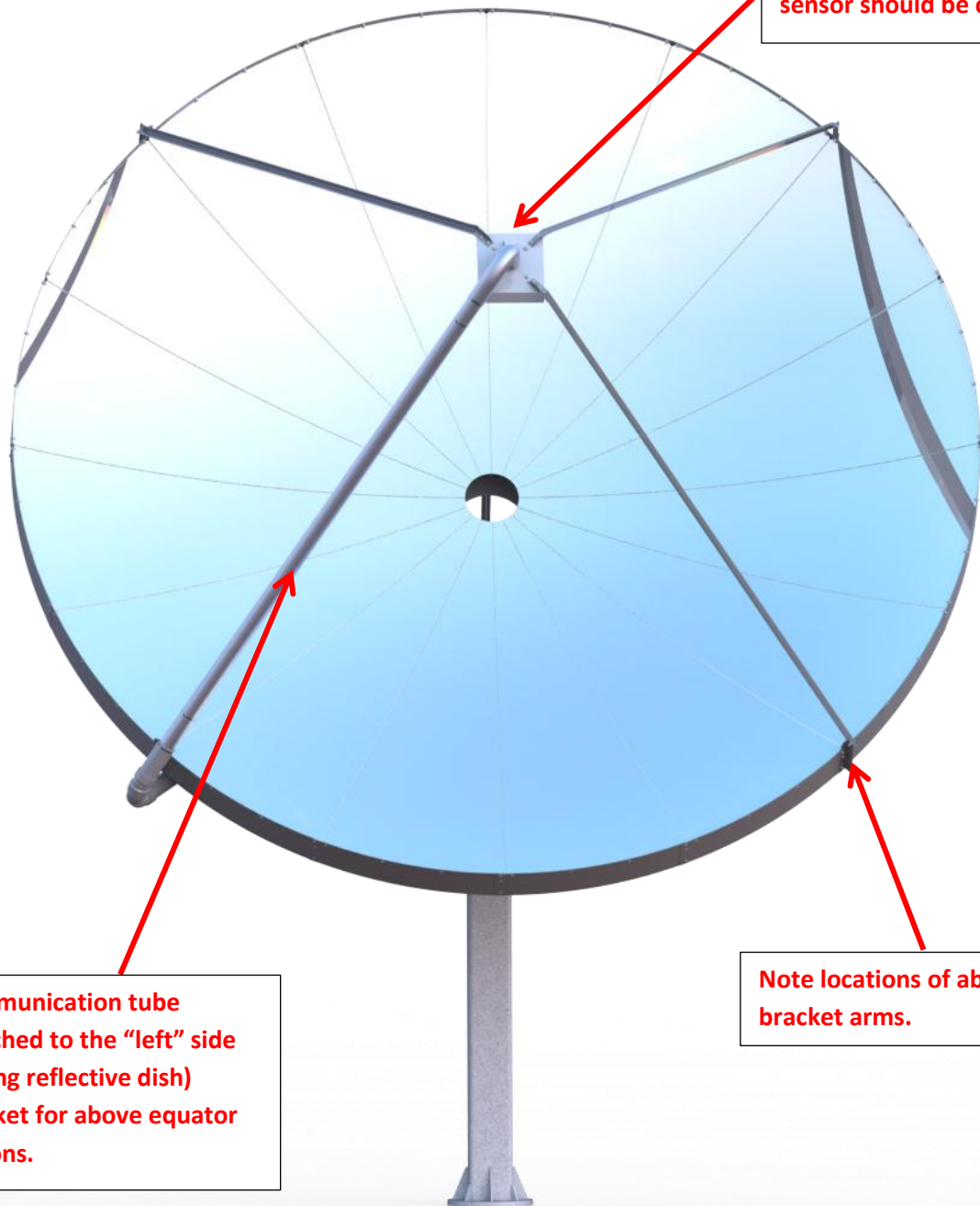
5. Attach the cover to the fluid box using the Brass screws provided. You can also now attach the cover plate (6) over the service hole using quantity 7: $\frac{1}{4}$ - 20 x $\frac{3}{4}$ " (98) Pan Head Machine Screws.



View of Completed SolarBeam

Once completed your assembly will look just like the final picture below.







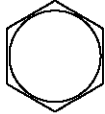
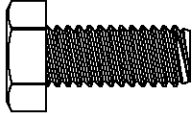
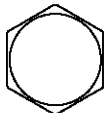
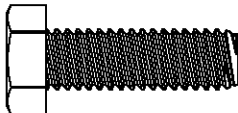
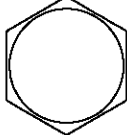
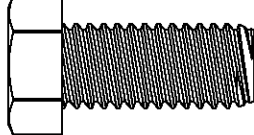
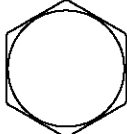
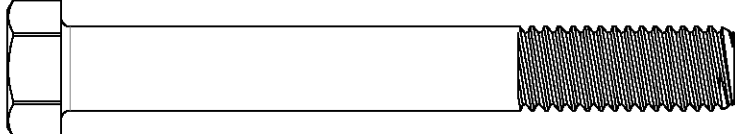
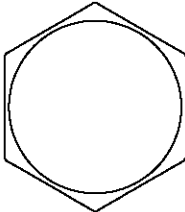
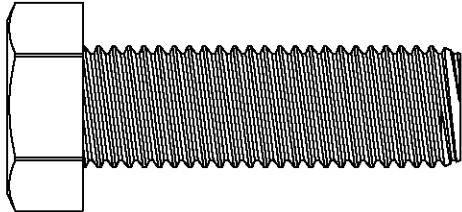
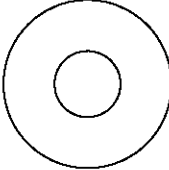


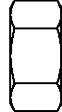
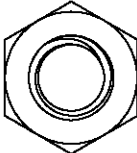

Absorber housing needs to be straight on all sides and light sensor should be on top.

Communication tube attached to the “left” side (facing reflective dish) bracket for above equator regions.

Note locations of absorber bracket arms.



Field Installed Fasteners

DESCRIPTION	IMAGE 1:1 SCALE	
1/4-20 - SHCS - BUTTON - 3/4" LONG		
5/16-18 - HEX BOLT - 3/4" LONG		
5/16-18 - HEX BOLT - 1" LONG		
7/16-14 - HEX BOLT - 1" LONG		
7/16-14 - HEX BOLT - 3 1/2" LONG		
M16-2.0 - HEX BOLT - 50MM LONG		
5/16 - WASHER		
5/16 - NUT		
7/16 - NUT		

High wind preparation of the SolarBeam

The following procedure will reduce the risk of damage to the SolarBeam. If the SolarBeam is installed in a hurricane or cyclone prone area; ground screws or anchors should be installed as well. Refer to the following diagram for installation instructions.

In situation of a category one hurricane (*category three cyclone*) or higher this tie down method should be followed.

Australian Region Tropical Cyclone Intensity Scale

Category	Sustained winds	Gusts
Five	>200 km/h	>279 km/h
Four	160-200 km/h	225-279 km/h
Three	118-159 km/h	165-224 km/h
Two	89-117 km/h	125-164 km/h
One	63-88 km/h	91-125 km/h
Tropical Low	<63 km/h	<91 km/h

Saffir-Simpson Hurricane Scale

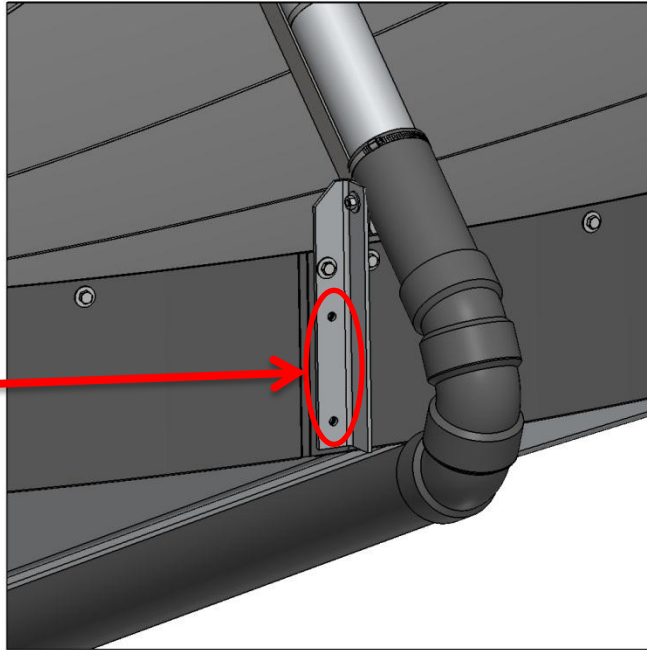
Category	Sustained winds
Five	>250 km/h
Four	210-249 km/h
Three	178-209 km/h
Two	154-177 km/h
One	119-153 km/h
Tropical storm	63-118 km/h
Tropical depression	0-62 km/h

Installation of High wind kit

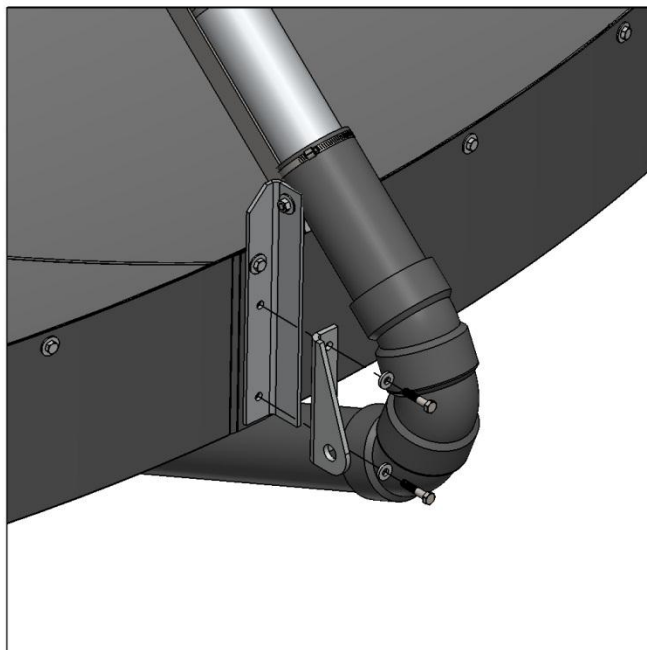
The following kit can be provided for hurricane/cyclone prone areas.

1. Remove existing bolts, nuts, and washers in the 2 locations shown below. This bracket with its fasteners is located in 4 different locations on the dish.

Remove these bolts from only one bracket at a time.

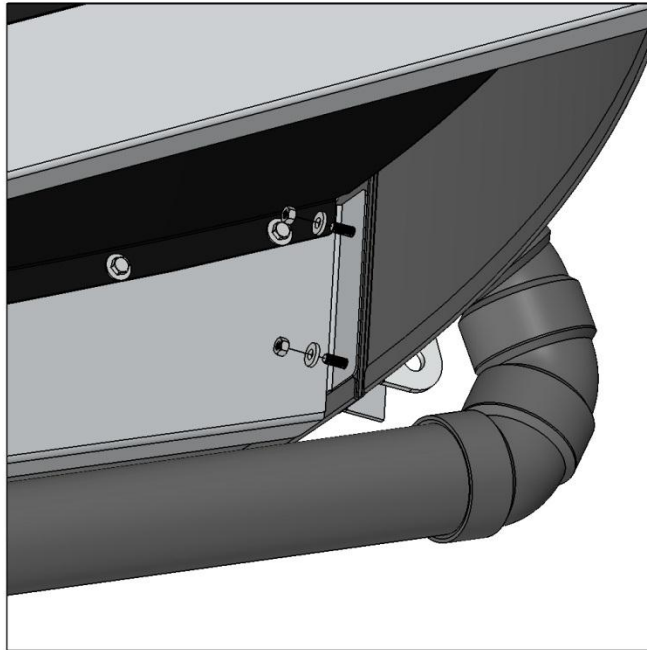


2. Attach bracket as shown with new hardware.
 - 2 ea. – 5/16-18 – Grade 8 Bolt – 1.5" Long - (Supplied in Kit)
 - 2 ea. – 5/16 – Heavy Duty Washer - (Supplied in Kit)



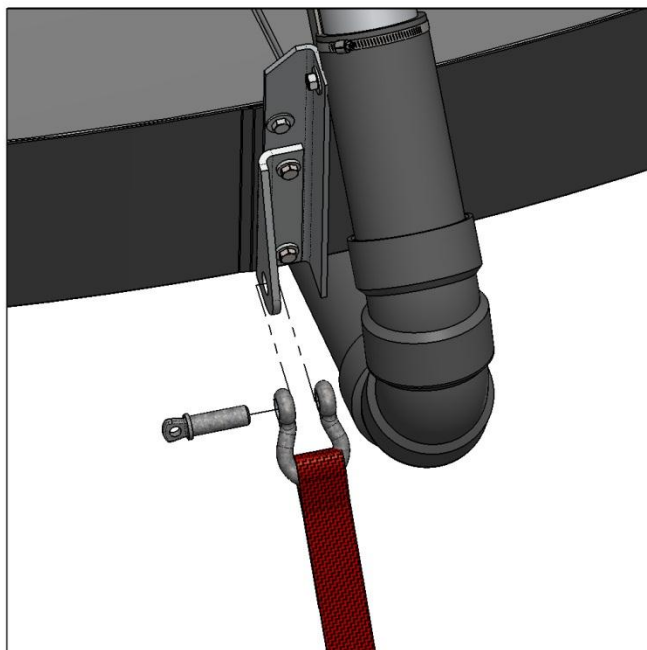
3. Fasten bolts with:

- 2 ea. – 5/16-18 – Grade 8 Nut - (Supplied in Kit)
- 2 ea. – 5/16 – Heavy Duty Washer - (Supplied in Kit)



4. Attach tie-down strap to the bracket as shown using:

- 5/8" Pin Dia. Shackle - (Supplied in Kit)
- Tie-Down strap – (Not Supplied) – 1500 lbs. (680 kg) Minimum work load limit

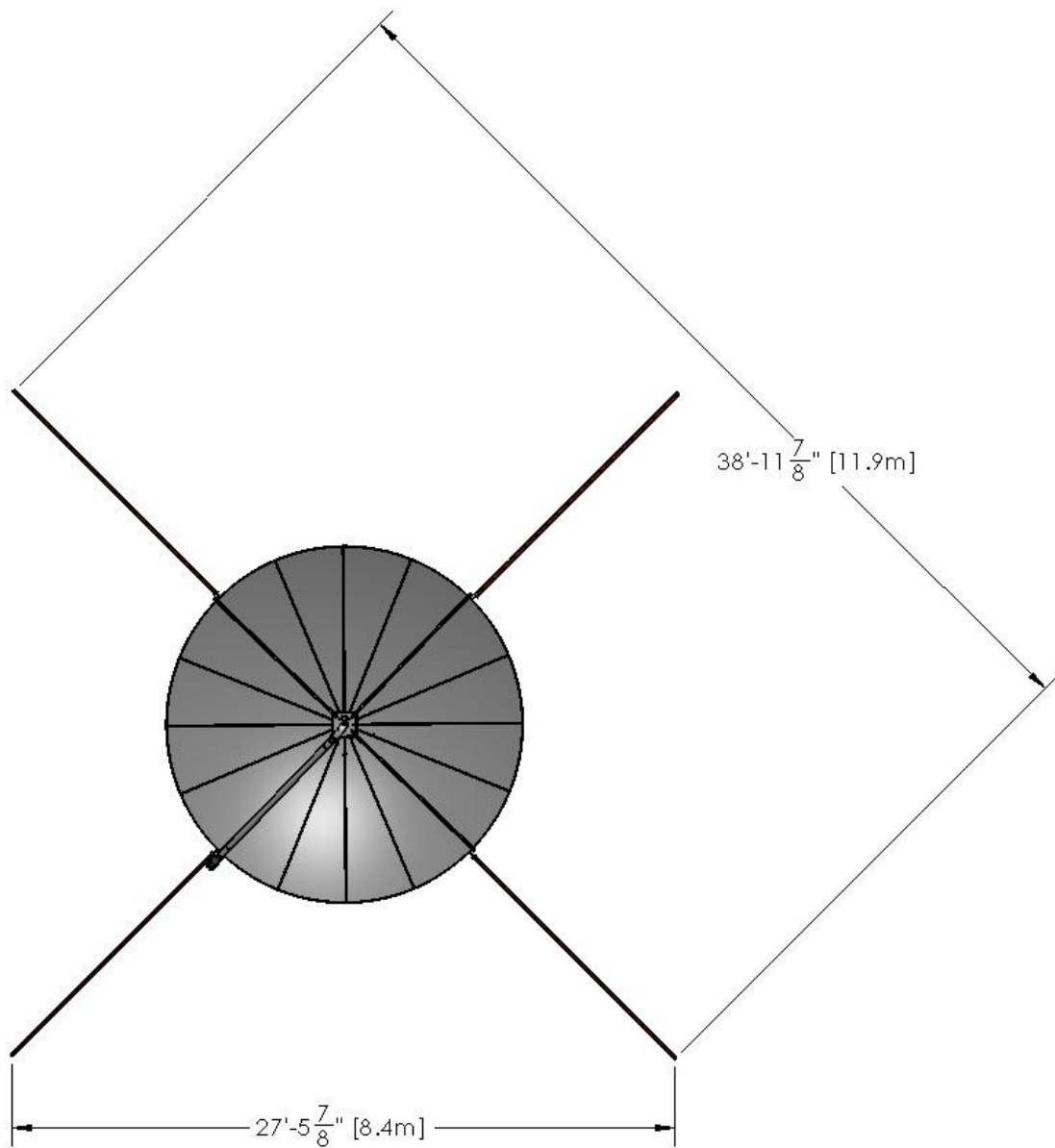


5. Repeat assembly of straps on all 4 locations as shown below.



6. The straps should be fixed to the ground using a permanent type of anchoring. The following are methods and products that can be used.
- Concrete foundation (Sono) tubes
 - Ground screws (<http://www.innotectrading.com/>)
 - Anchored to permanent foundations or heavy concrete blocks

7. See below illustration for strap anchoring dimensions.



Note: This method cannot guarantee the survival of the unit. It is only a method to increase its chances.