Sunpoint2GPS Tracker

Installation, Operation and Maintenance

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Throughout this manual, the terms WARNING, CAUTION, and NOTE are used to highlight hazards or unsafe practices or significant points worthy of emphasis, defined as:

WARNING
Hazards or unsafe practices that could cause damage, serious injury or death.

CAUTION
Hazards or unsafe actions or conditions that could cause personal injury or damage to the equipment and or PV components.

NOTE
Notes that will make assembly or operation easier and less prone to error or may avoid poor performance due to improper installation or adjustment.

Sunpoint2GPS Trackers are the highest quality and strength needed
to ensure years of safe and worry free use.
With single 12v drive motor, low power demand and self-powered, self-aware operation
Sunpoint2GPS offers the lowest possible "life cycle cost" of any tracking system

READ THIS ENTIRE DOCUMENT CAREFULLY BEFORE INSTALLING

READ POST INSTALLATION AND ALIGNMENT NOTE PAGE 5 BEFORE POURING CONCRETE OR INSTALLING POST OR DROPNGO

PV PANEL MANUFACTURER'S MOUNTING INSTRUCTIONS SUPERCEDE THOSE OF THE MOUNT ITSELF

ALL REFERENCES TO PV PANELS, ELECTRICAL AND GROUNDING INSTRUCTIONS CONTAINED IN THIS MANUAL ARE FOR INFORMATION ONLY
CONSULT THE MANUFACTURER FOR INSTALLATION INSTRUCTIONS

THIRD PARTY DESIGN, ANCHORING AND INSTALLATION OF THE POST IT MOUNTS ON IS ALSO FOR INFORMATION ONLY - ALWAYS CONSULT A PROFESSIONAL CIVIL ENGINEER

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DISCLAIMERS - GENERAL SOLAR PV PEDESTAL AND PANEL MOUNTING INFORMATION

1. Introduction

This document provides recommendations for the installation of a mounting system for virtually any photovoltaic panel and identifies the hazards associated with the handling and installation of these products. *Please read this document in its entirety before installing.*

1.1. Disclaimer of Liability

All True North Power NG products are designed and manufactured to comply with relevant international standards (refer to the product label for details). However, as the conditions or methods of installation, operation and maintenance are beyond True North's control, True North Power NG Inc. does not assume responsibility and expressly disclaims liability for loss, damage or expense arising out of, or in any way connected with, such installation, operation, use or maintenance. PowerSeries mounts are designed for easy installation and long life. However, the warranty can be invalidated, in the event of a claim, if there is evidence that the Strongback, rails or connectors have been improperly installed or damaged prior to or during installation. Refer to the Warranty Certificate, provided separately, for full details regarding the Limited Warranty. PowerSeries Pedestals with Channellox rails are intended to operate under normal climate conditions between -40 and +50degC.

2 Electrical Hazard

Photovoltaic (PV) modules generate electricity whenever they are exposed to light. Potentially lethal voltages can be present. PV modules produce DC current, special regulations may apply. Follow local building codes and panel manufacturer's instructions when working with or connecting PV panels. Sunpoint2GPS controllers operate at 12v at <500mA with a 12AH 12v AGM sealed battery pack and a 12v (590 mA) photovoltaic (PV) charging system.

2.1. Prior to Installation of the SunpointGPS Tracker

Ensure that the pedestal installation and wiring of solar modules is performed by a qualified installer in accordance with ALL local standards or engineering codes. The pedestal that the PowerSeries Strongback and rails attach to is NOT part of this installation guide and must be designed and installed by a qualified engineer/installer. Ensure that a structural integrity of the pedestal is sufficient to carry the weight and wind/snow loads of the entire structure including panels under all conditions anticipated in your area. Consult a qualified structural engineer. Before performing any operation involving the pedestal foundations or system electrical connections, perform a risk assessment paying particular attention to the soil and environmental conditions as well as personal protection equipment required. *ALWAYS* obtain approval from a certified professional engineer to verify the suitability of the pedestal itself to meet anticipated operating conditions such as wind gusts, snow collection and thermal expansion requirements. When connecting solar modules to other equipment (batteries, charge controllers, inverters, etc.) refer to the equipment manufacturer's instructions.

2.2. Handling Safety

Use appropriate protective safety equipment as recommended by local safety codes and practices (e.g. Hard hat, scaffolding, steel toed shoes, gloves and restraining harness) and exercise caution particularly when installing heavy steel components or when working at height. Strongbacks and rails are heavy and should always be handled by 2 or more people using appropriate lifting equipment to do the work.

CAUTION
Exercise CAUTION around the SunpointGPS unit whenever the power is ON. The slew drive moves very slowly but with extreme force. Watch out for pinch points and fingers, tools or clothing becoming caught or wedged between the slew drive and post or Strongback. ALWAYS turn the unit OFF (i.e. UNPLUG THE POSITIVE BATTERY TERMINAL AND SOLAR PV POWER CORD) before performing any servicing. Both battery and solar panel must be disconnected to remove all power from the controller. On a sunny day the controller and GPS will continue to function even without battery connected.

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2.3. Installation precautions

DO NOT attempt any installation in adverse weather conditions (when high winds, rain, ice or snow is present). Remove any jewelry or other metallic adornments to avoid accidental electrical contact and use insulated tools. If installation must be done in bright sunlight, cover the front surface of all modules with an opaque material to prevent the modules from generating electricity until they are connected to open breakers and grounded. Ensure that both the front and back surfaces of the module and the sheaths of the connecting cables are undamaged, before installing them on the rails. NEVER install solar modules where the protective back covering has been damaged. Ensure that appropriate barriers are installed to prevent accidental contact between rails or other active circuit elements. Ensure that all electrical connections are properly connected, secured to the frame and protected from unauthorized personnel or animals.

3. Mechanical Installation

PowerSeries and particularly SunpointGPS Slew Drive bolts requires strict attention to bolt torque specification. Check all slew drive and RetroFIT sleeve clamp bolt torques 3 days and again 3 weeks after initial installation and then annually to confirm they are correct. PV Panels normally have 4 mounting holes on the back of the panel as well as grounding points. PowerSeries mounts are designed to ensure a strong mechanical connection but avoid the stress or damage caused by top down "gripper" type clamps that may void your panel warranty. To comply with the requirements of UL1703 the modules must be fixed using hex-head bolts. Prevention of corrosive effect of dissimilar metals must be considered when mounting the solar module frame (Aluminum) against other materials. Always refer to your specific panel's mounting instructions for accurate advice on mechanical connections.

4. Wiring Considerations

Always use cables and connections consistent with the anticipated environmental conditions of the installation. Cables should be selected for sunlight (UV) stability and rated for at least 90°C. Cables should be fixed & supported with adequate strain relief. A local grounding device must be electrically connected (grounded) to the pedestal.

4.1. Special Considerations

To reduce the risk of an electrical shock, always connect the frame of the module to ground by fixing an appropriate grounding cable to one of the grounding points of the module. Refer to your panel installation guide for correct grounding methods. You may use a self tapping rail penetrating screw for connecting (grounding) to any point on the rails. This helps in electrically connecting (grounding) panel's frame and rails.

If the system is to be installed in USA, then grounding methods must comply with articles 690 and 250 of the NEC. Perform initial ground fault detection (Riso) before system start-up and immediately contact your installer in the event that a ground fault is detected. Ensure that appropriate measures are taken to prevent unauthorized access and employ appropriate over-current/over-voltage protection.

5. Care and Maintenance

True North Power recommends that system inspections are carried out on a regular basis. This inspection should include verification of the integrity of electrical and mechanical connections, confirmation of the system isolation (Riso tests), and checking that system alarms are operating correctly. The array should be set at an angle of at least 10 degrees from the horizontal to aid self-cleaning.

6. Useful References

- A5/ANZ 5033:2005 Installation of photovoltaic (PV) arrays
- 1EC61140 Protection against electric shock - Common aspects for installation and equipment
- IEC 60364-4-41: 1992, Electrical installations of buildings. Part 4: Protection for safety.
- IEC61 730-1 Photovoltaic (PV) module safety qualification-
-CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1
- NFPA 70 US National Electrical Code (NEC)

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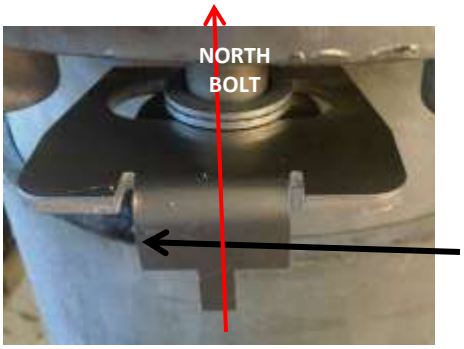
Sunpoint2GPS – Power Connection and Operations

Operations Overview

Sunpoint2GPS is self-powered, self-contained and self-aware. It uses its own 10-20W PV panel and charging system to keep a 12v AGM sealed battery charged. When full this battery will support at least 3 days of operation and after a further number of cloudy days it may be more than half depleted. If this happens the array will stop at SOUTH and wait for the sun to recharge the battery.

IMPORTANT CALIBRATION NOTE
It is important to initially orient the Lower Flange of the Sunpoint2GPS tracker Slew Drive, or the tower flange if directly attached, aligned GRID with 2 opposite bolts on the lower flange and the LEFT edge of the NORTH probe. The North Probe has a + or- 10deg adjustment so flange holes only needs to be roughly aligned to GRID N-S. N and S orientation is reversed in the southern hemisphere. With the North Probe adjusted correctly, the unit will always be able to correctly re-establish its orientation even after shutting down the unit for annual inspection.



ORDER of INSTALL

1. Dual Lock Washer
2. North Probe (Adjustable)
3. Large FLAT WASHER
4. Bolt

Adjust left or right up to 10 deg to align with GRID NORTH/SOUTH through the center of the post the array is mounted on. Tighten securely, do not use 200lb torque like the remaining slew drive bolts.

Each day, the Sunpoint2GPS controller moves the array in several discrete "steps" from horizon to horizon and when not actually moving it goes to sleep (powers down) and waits. The unit uses less than 2.4AH per day of its own power a day to operate. The Standard battery holds 12AH when full equal to about 3 days power with no charging. The 32AH 12v Battery has more than 7 days of stored energy in low sun days. When the power is turned on (fuse installed) it determines it's position and time from the GPS, points in azimuth just ahead of the sun and waits for the sun to go by, sleeping while it waits. It steps about every few minutes and therefore keeps the array always pointing at sun azimuth. At the end of the day, it will wait until "civil twilight", approx. 20 min after sunset, and moves to south. It sleeps there over night. The entire systems is asleep virtually 95% of it's life making it highly reliable. One half hour prior to sunrise, if the battery power is sufficient, it moves back to its known EAST reference point, re-calibrates and goes to Sunrise Azimuth just before dawn.

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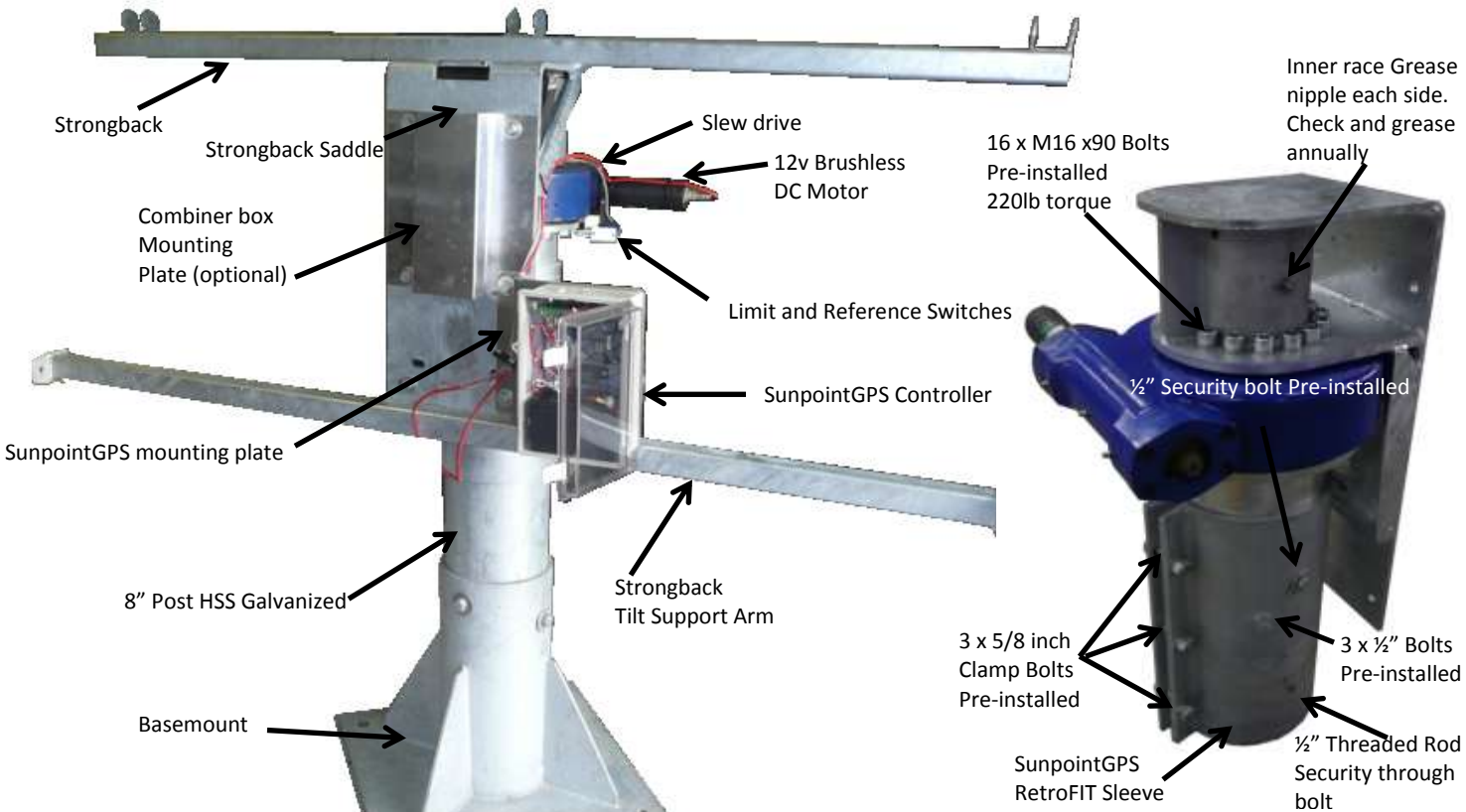
Two additional emergency stop limit switches will stop all motion should the motor somehow attempt to go too far east or west. You can restart the program at any time to recalibrate its position. Simply remove the RED BATTERY POS terminal wire, (or remove the fuse briefly) and also disconnect the PV IN (during daylight) or the 120v Plug-in if used, wait a couple of seconds and reconnect. The system will restart, move to east reference to recalibrate and then move to the current sun position. If the system is sitting at south however it is likely low on battery so if solar/battery power is the only source, resetting the system will only deplete the battery further.

On 16 panel (PS3200) and smaller models, elevation is set seasonally by hand at any time by loosening bolts on the tilt arms and tilting the array to the new angle. SP3600 and SP5000 have a tilt actuator with hand-held remote for tilting the array. All True North Power arrays are balanced at the tilt pivot point for easy handling. Two tilt changes per year (shallower for summer, steeper for winter) are all that is really needed to gain the most useful effect. Adjusting tilt more monthly may add no more than 0.8% additional energy capture. Keeping panels clear of ice, snow, dust and bird debris have a much larger impact on energy production.

Studies show that in diffuse light regions, so called “dual-axis” tracking systems are of limited extra value. Detailed performance analysis done in conjunction with the University of Guelph show that the difference in annual collected energy between dual-axis trackers and azimuth tracking with seasonal adjustment is less 4% and Sunpoint2GPS accomplishes this without the wear and tear of the constant motor drive motion needed by other systems that always point at the brightest spot in the sky. Choosing the right panel inverter combination has a bigger impact. The dual-axis tracker concept does add value in “specular light” regions like desert and equatorial regions but they generally use much more energy, are less reliable in harsh cold climates due to environmental and mechanical wear and tear on components and the need for multiple sensors. This means there are more systems that can cause maintenance issues and does not add significant value, when used in the diffuse light environment of southern Ontario. [See the True North website for details.]



CAUTION
All PowerSeries arrays are designed to handle simultaneous loads of up to 50lbs/Sq Ft of ice and snow at 45degrees of tilt, in winds up to 90 mph (145km/hr). This means that the array must be tilted 45 degrees or more during months when snow fall can exceed about 2.5 feet (~750mm) of fluffy fresh snow or about 12-15 inches (~300-400mm) of heavy wet snow accumulation.

Tools Required for SunpointGPS RetroFIT

1) Backhoe or small lifting device capable of up to as much as 3500lbs
2) Two 24ft ropes for steadying the lifted array
3) Extension ladder, step ladder or scaffolding
4) A set of standard Metric Hex Keys (Allen Wrenches)
5) A set of standard Metric Open End or Adjustable Wrenches
6) T-Square or framing square and a hand held drill
7) Torque Wrench and a set of standard Metric sockets
8) Strongback lifting kit (Optional for SunpointGPS RetroFIT tracker)

Installation – Sunpoint2GPS Retrofit - adding a Sunpoint to an existing installation

Disconnect

1. Disconnect and make safe all existing PV Panel output wires, connectors, combiner box and/or connections to the main solar array. Tilt the array horiz. and tighten tilt arm bolts.

CAUTION
Do not do this operation in windy conditions as serious damage or injury can result from an array being detached from the post with the panels mounted.

Assemble Trapeze

2. **OPTIONAL EXTRA: Lifting Trapeze** - Measure the length between the outer edges of the two center panels as installed and cut the 50x75mm ~2m Channellox “spreader ” to size.

Attach hooks Lift

3. Attach each of the two Lifting Hooks to a titanium clip with a single M8x20 Hex bolt and nylock nut.
4. Attach the “spreader rail” horizontally between the two Lifting Hooks with 4x#10 Tek screws in each titanium clip.
5. Place the Strongback Lifting Hooks between the adjacent panels and attach to the Strongback 3x2” Galvanized Steel horizontal support tube by closing the openings with 2 “L” angle iron rails with ½” bolts and nuts. (Fig 1) Typical weight of a PS3200 Strongback with panels is approximately 1420kg (3130lbs). Other arrays will be less.

Remove Array

6. Use locking chain links or suitable crane hooks to lift the array. Using a backhoe or other suitable lifting device attach a sling to the Lifting Hooks and take out any slack in the straps before removing the 3 U-Bolts from the Strongback saddle.
7. Raise the array and remove it a few feet away using corner ropes to prevent swaying.

Go to SunpointGPS install section

8. Now follow the SunpointGPS Installation instructions on page 9.
9. To remove the trapeze after lifting, remove the ½”bolts under the Strongback support tube.

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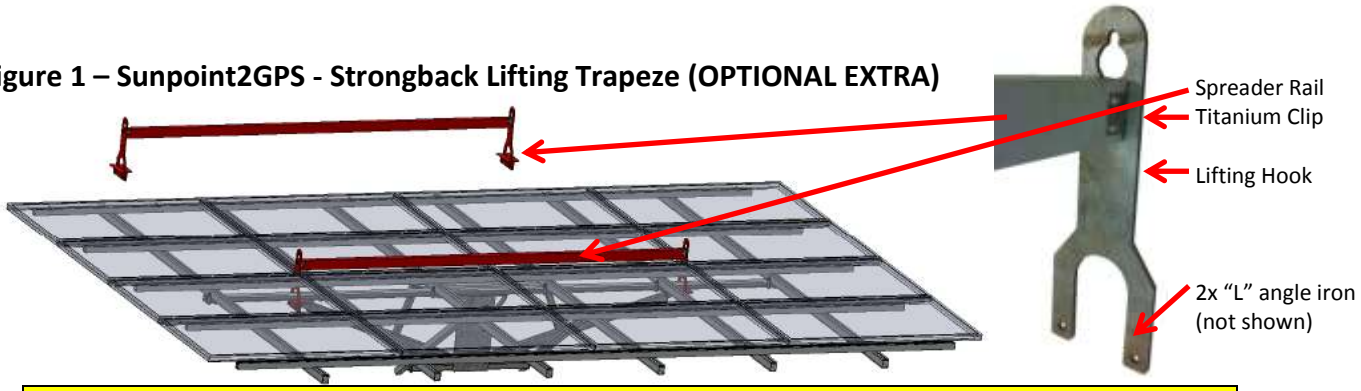
Figure 1 – Sunpoint2GPS - Strongback Lifting Trapeze (OPTIONAL EXTRA)



CAUTION

Installation of the Sunpoint2GPS should only be attempted on a calm day with little or no wind. Sudden wind gusts can catch the array and result in costly panel damage and/or personal injury. There is a significant pinch hazard to fingers and skin. Wear gloves.

Setup of this solar panel mount and the installation of the Sunpoint2GPS is not a one person job and require at least 2 or more people to be done safely. The Strongbacks, the Sunpoint2GPS drive unit will require a small lifting device to put the unit in position safely.

WARNING

Unconnected PV panels can build up dangerously high voltages especially when they are wired together in series. Exercise caution around PV panel connectors and follow the manufacturer's instructions when connecting and disconnecting panels. Always incorporate an OPEN breaker when making the final wiring connection of high voltage strings.

Never loosen U-Bolts or remove the nuts completely unless the steel Strongback or array is attached to the lifting device with no slack in the lifting straps as this poses a significant injury risk. If the Strongback or array is not supported by the lifting straps when the bolts are removed the entire unit may fall off the pole and cause SERIOUS INJURY OR DEATH.

In northern climates snow monitoring and regular snow and ice clearing should be an important part of maintaining good solar production. Heavy ice and snow accumulation and loading should be avoided anyway. If you have a remote tilt feature this should be done only when necessary since extensive use of the actuator can deplete the controller battery. Otherwise use a long handled broom or squeegee if the array tilted 45 degrees or more fails to allow the snow to slide off by itself. Avoid using shovels or other metal objects to clear the array of snow. Scratching the panel surfaces will reduce panel efficiency.

Under certain weather/temperature conditions the array may accumulate ice ridges along the lower edges of the array on the panels or the support rails. Care should be taken when removing this rime or clear ice. Use only plastic or softwood objects to scrape or chip the ice free if needed.

In summer dust, dirt and bird droppings should be removed with water and a non-metallic brush. In rural or urban areas, dust accumulation of only a few days can reduce your array output by as much as 5%.

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Tools Required for Sunpoint2GPS

1) Extension ladder, step ladder or scaffolding
2) A set of standard Metric Hex Keys (Allen Wrenches)
3) A set of standard Metric Open End or Adjustable Wrenches
4) Torque Wrench and a set of standard Metric sockets

Installation – Sunpoint2GPS (To a plain post – no flange)

Install Sleeve

Install probe and Drive

Align Sleeve

Secure mounting Sleeve

Mate Strongback

Go to controller install section

1. Place the Sunpoint2GPS assembly on top of the post so the grease fittings and clamp opening faces roughly SOUTH. Partially close the 3 x 5/8 inch clamp bolts to assure stability. Install the Titanium probe underneath in the one open bolt location. Refer to Figs 2 and 3. The required extra M16x70 SHC bolt and washers come with the controller probe.

The center of the aluminum switch probe (GRID North) must align with the Right side of the opposite bolt. The adjustable aluminum NORTH probe is then attached underside of the Slew drive north bolt hole with a single M16x70 stainless bolt (provided in the bolt pack that is shipped with the controller). Do not over-tighten. Slew drive bolts are torqued to 220ftlbs. This NORTH Probe bolt only needs to be about 30lbs.

   Move the sleeve opening roughly SOUTH, as long as the lower south bolt in the slew drive flange remains SOUTH. Tightening the 3 x 5/8 inch galvanized steel bolts with flat washer and lock washer. Torque all 3 clamp bolts in sequence until they are uniformly tight. Torque to <75ft-lb (100nM). Now torque the 2 side upper security bolts to 75 ft-lb (100nm).
2. Locate and drill 2 x 5/8" a hole through each side of the original post using the lower security bolt holes in the sleeve as a guide. Insert the ½" threaded rod and secure with nut, lock washer and flat washer on each end. Apply medium strength (Blue Loctite) thread locker. Torque to 75 ft-lb or 100nm. Now re-torque the 3 main clamp bolts to 150ft-lbs (200nm).
3. Lower the Strongback saddle onto the top of the Sunpoint2GPS saddle and mate to the Strongback saddle by lining up the 6 holes. Install the Sunpoint2GPS Controller Mounting Bracket at the same time, (include the PV Combiner panel bracket if used). Fasten the saddles together with 6 x 1/2" bolt and hex nut, flat washer and split lock washer. Torque to 75 ft-lb (100nm). The Controller mounting bracket uses 2 x #10 Tek screws to affix it to the lower tilt support arm. Drilling a pilot hole is recommended.
4. Now follow the Controller and Sensor Wiring instructions on page 11.

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Installation – Sunpoint2GPS (To a BasePost Tower with Flange)

Install Sleeve

Install probe and Drive

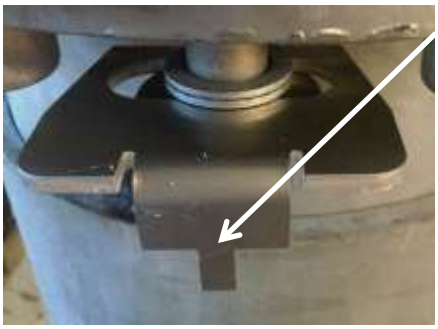
Align Drive

Mate Strongbacks

Add controller mount and bolt

Go to controller install section

1. Ensure the Base Post already installed with the flange has 2 opposite bolt holes aligned GRID NORTH-SOUTH (Pg5) and place the Sunpoint2GPS assembly on top of the post so the grease fittings and clamp opening faces roughly SOUTH and align the Slew Drive holes with the Flange holes. Install the 16 M10x 70mm SHCS bolts with double lock washer on each bolt except the North bolt hole. Install the titanium in the "North" bolt hole location between the flange and the flat washer. The M16x70 (NOTE: If there is no room to reach the missing bolt hole, the North Probe can be installed later after the controller has moved the array 45deg. Just unplug the power after this first move, install the probe and restart.



The CENTER of the titanium switch probe must be initially installed aligned with GRID NORTH on the underside of the Slew drive flange with a single M16x70 stainless bolt).

If the array seems to always track behind the sun move the probe to the LEFT an equal amount. To the RIGHT if it seems to always be ahead.

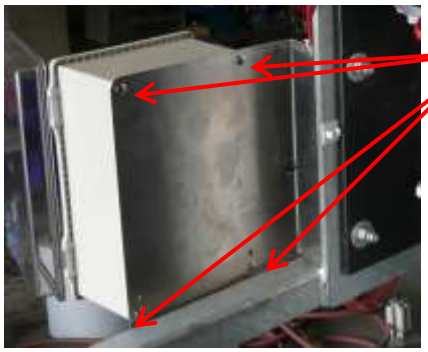
Bolt comes with probe shipped INSIDE the Sunpoint2GPS controller box.

For Base Post installs care must be taken in aligning the post flange and concrete anchors while pouring concrete. With the use of the adjustable probe, this is now less critical to align the post as well.

The slew drive motor should now align approximately EAST/WEST. This alignment does not have to be precise at this time since the critical alignment of the probe on the flange it is attached to is adjustable plus or minus 10 deg and the bolts are 22.5 degrees apart.

2. Lower the Strongback saddle onto the top of the Sunpoint2GPS saddle and mate to the Strongback saddle by lining up the 5 or 6 holes depending on the mount chosen.

3. Install the Sunpoint2GPS Controller on the Mounting Bracket and secure the assembly and Combiner panel bracket (if used) to the strongback saddle. Fasten the saddles together with 6 x 1/2" bolt and hex nut, flat washer and split lock washer. Torque (75 ft-lb/100nm)



3 or 4x M4 x 10mm Phillips head mounting screws

If retrofitting the larger controller box (LEFT) you will need to drill 2 additional holes in the mounting plate to accommodate the larger bolt pattern.

Controller mounting bracket also uses 2 x #10 Tek screws to affix it to the lower tilt support arm. Tek screws come in the hardware bag taped INSIDE the Sunpoint2GPS controller box. Even though these are self-tapping screws you should predrill a 1/8 or 3/16th" pilot hole (3-4mm) since this is heavy steel.

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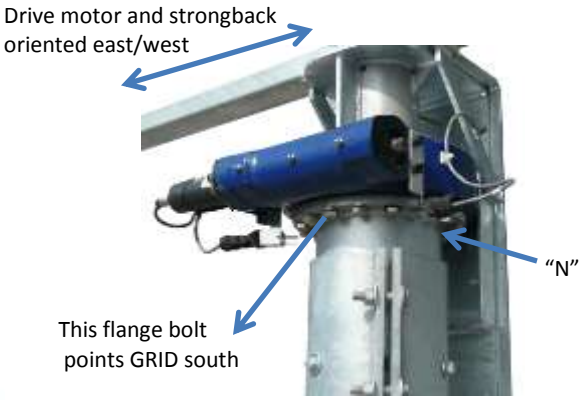
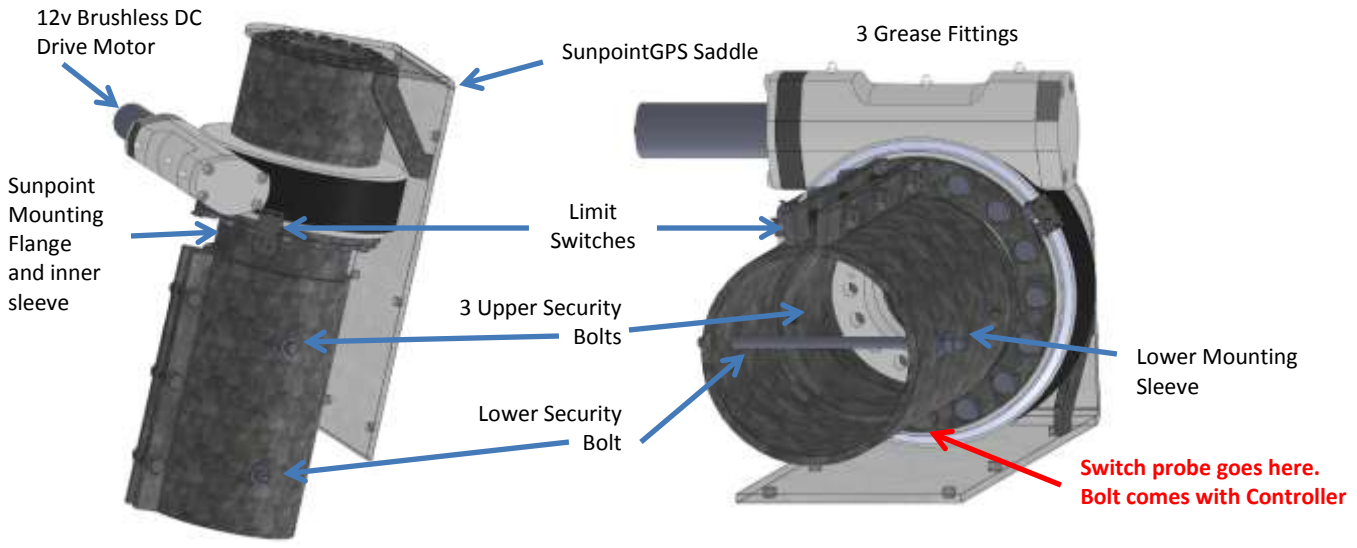
Figure 2 – Site Orientation and Sunpoint Attachment



Opposite NORTH bolt hole is missing until titanium probe installed. Probe and bolt comes with controller.

Figure 3 – Sunpoint2GPS Attachment Features



Installation - SUNPOINTGPS Controller and Sensor Wiring

1) Install the Sunpoint2GPS controller box using the mounting bracket with the 4 screws (Bag taped inside the controller box).
2) Install the 10-20w PV panel onto the 600mm Channellox rail with 2 x M8x16mm HHCS, ribbed lock washer and square nut. (Fig 4 next page)
3) Mount 2 F-Clips to the short piece of rail as shown (Pg13 - Fig 4) with M8x16mm HHCS, ribbed lock washer and square nut.
4) Mount the assembly at either end of one of the horizontal rails on the main array a few inches outboard of the panels with 4 x #10 Tek screws. Choose a higher horizontal rail to mount it on, where it is less likely to get bumped or damaged. For landscape mounts attach to a vertical rail.
5) Install Slew Drive (WEST REF) Limit Switch Assembly with the large hole harness to the motor, connect the black motor cable and secure the cable with zip ties. Replace drive bolts with larger ones supplied in the controller hardware bag.
6) Install the other (EAST REF) Limit Switch Assembly and secure with the 2 end cap bolts already installed in the ends of the drive. **MAKE SURE ALL CONNECTOR WIRES ARE ROUTED "UP" AND ZIP TIED SECURELY ABOVE THE SLEW DRIVE BLUE OR BLACK PART OF THE HOUSING.**

WEST **EAST**

7) Ensure the power connection to the BATTERY is disconnected (Remove 5A fuse). DO NOT connect sunpoint Solar PV panel or Plug-in power yet.
8) ENSURE NO FINGERS, TOOLS, WIRES OR OBSTRUCTIONS ARE AROUND OR UNDER THE SLEW DRIVE.
9) Install battery (terminals to the right for small 12AH battery or the front for 32AH), connect the cables and install 5A fuse to provide power to the controller. ***Be sure the POS PV panel terminal goes through the plug to the YELLOW FEMALE plug going into the controller.*** IF NOT – DO NOT PLUG IN with Reverse polarity or you will damage the controller. *Resolve the problem by checking polarity with a multi-meter(Pg 14).* Now plug the PV panel POS NEG wire ends onto the POS NEG plug coming from the controller box they should only go in ONE WAY and wire colour should continue across the plug.
10) Some LEDs will light up and within a few seconds the array will move to the left counter clockwise and contact the EAST REF switch and stop. A short test sequence will follow and the array will move left and right a few seconds and then go back to EAST Ref and stop. As soon as the GPS acquires a signal a BLUE LED will blink to indicate it is processing and finding sun azimuth. This may take from 1-5 min initially.
11) ***The array will move fully eastward to the EAST Reference Point to calibrate before moving to the current sun position and commencing normal operations. This startup and TEST sequence only happens on initial start-up and will not be repeated unless there is a power failure in the controller. See also NORMAL OPERATIONS NOTES. (Pg 15).***

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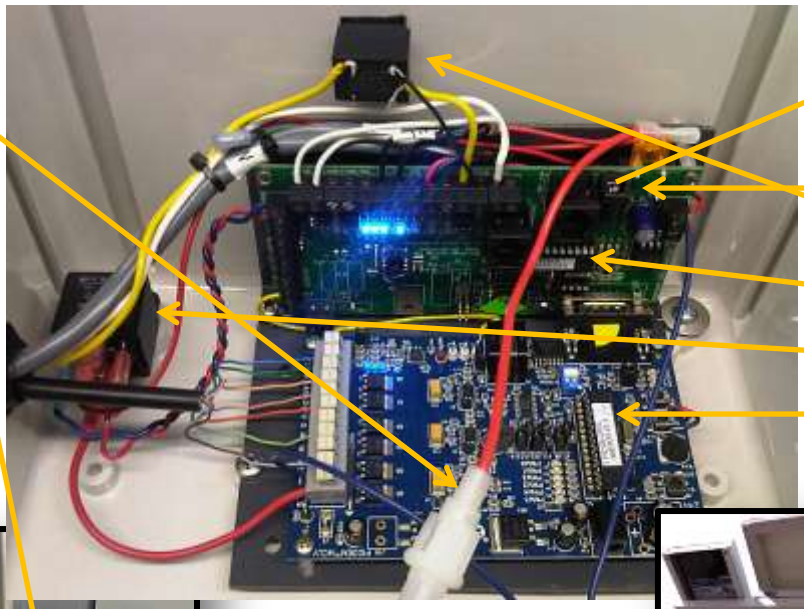
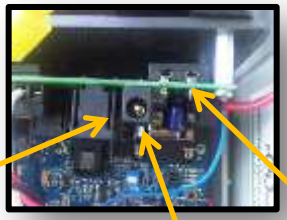
Figure 4 – Sunpoint2GPS Controller and PV Panel Installation





Battery 5 A Glass fuse holder

East/West Ref Switch Wires

Solar IN FEMALE YELLOW POS BATTERY

12v DC Plug-In and 5A Fuse holder

SolarPV charging Relay

Sunpoint2GPS ASTRO CHIP

Motor Board Control Relay

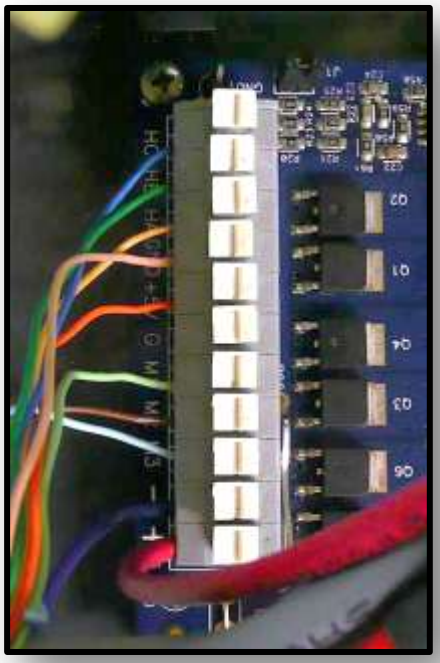
Motor Control CHIP

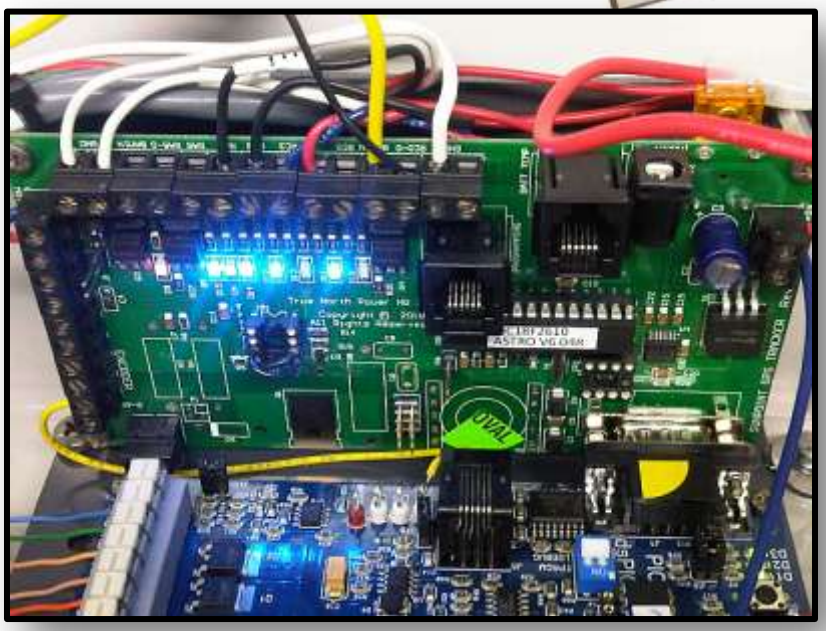
ABS Lockable Cabinet (See-thru Cover)

12AH ore 32AHAGM Battery 12v
NOTE: Connect NEG BAT Terminal to array or tower ELECTRICAL GROUND

Sunpoint PV Panel mounted with F- Clips with M8x16mm SHCS to small rail and 4 self-tap screws to the array rail

Motor Controller Wiring





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SunpointGPS Solar Panel Connection and Settings

Once the small 10-20w panel is installed check the voltage of the 2 leads of the bayonet plug coming from the panel (at the controller other end of the long grey panel wire) when the panel is in sunlight, (DO THIS BEFORE IT IS FIRST PLUGGED IN), to ensure there is voltage there (should be 13-20vDC) and check polarity. Make sure the yellow lead is both Male on the panel side and POS (+). On the small PV panels check to be sure the BLACK and white wires are zipped tied to the back of the panels for security. Also be sure to check the YELLOW/WHITE plug on the other end mates with the YELLOW/WHITE plug coming from the controller AND that YELLOW mates with YELLOW and WHITE with WHITE. If they only plug in reverse DO NOT INSTALL. Call True North Power NG for advice. You can simply reverse the Panel ends but this is non-standard and can lead to problems in the future if someone does not know with has been done. You should obtain the correct mating plug that takes POS (+) from the panel + to the controller "BMAIN" terminal of the green board on the controller.

EQUIPMENT MONITORING

Solar arrays, trackers and small wind turbines are mechanical devices that operate in all climate and weather conditions. As such they are prone to wear and tear and damage caused by the elements.

Small changes in the condition of the system can lead to catastrophic system failures and severe damage if left unattended for extended periods without observation or correction of the loose part or wear.

Owners should pay attention to weather conditions and observe the equipment on a regular basis. If components become loose they can wear to the point of failure over a few days or weeks or sometimes within hours if there has been a major storm or ice, snow, wind or lightning.

Always inspect the condition of the tower, slew drive or panel attachments or the turbine as it flies. Listen for unusual noises, particularly with turbines. Regular annual inspections are mandatory and more frequent close inspections are recommended especially before or after a major storm. Check torques and condition of bolts and attachments and grease slew drives at least annually.

No bolt can be considered torqued properly once and then never inspected again. It is the owner's responsibility to ensure the equipment remains serviceable. If you as an owner do not or cannot perform this activity regularly, then please hire a professional whom you trust, that can do it for you. Regularly means at least be aware of it every day if you live on the property. Pay attention to the status of the equipment and look at it closely once in a while. Regular visits can be less frequent for maintenance contracts, every month for the first 2-3 months after installation and thereafter 6-12 months intervals or after major storms.

Panels may need to be cleaned of dust and dirt in the summer and cleared of snow or ice in winter. This is a good time to inspect the condition of fasteners and equipment. Pull on a few things and if they move or rattle tighten them immediately to the proper torque. (see the maintenance notes and torque specs in the manual). Lack of appropriate anchoring, electrical grounding or improper assembly can possibly destroy the entire PV array including the mounted PV panels in a single high wind event. You may also find additional installation and maintenance tips in the current Technical Bulletins on the website. ***Long and incident free operation is your responsibility after installation.***

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SUNPOINTGPS POWER AND FAULT CONDITIONS

1) With a full charge, the 12AH battery contains enough power to run the slew drive for about 2-3 days of low sun and poor charging from its own PV panel. The 120v wall plug power supply is standard with all sunpoint controllers. Solar charging system is OPTIONAL. If the battery is more than 50% depleted the unit will move to face SOUTH at the end of the day and wait for the sun to recharge the unit above about 70% before returning to normal tracking operations*. (NOTE: If this happens following days of sunny weather call True North Power to determine the cause.)*

2) If the array seems to be pointing away from the sun, first check the north probe is aligned the:
   a. The 5A fuse may have blown and must be replaced. (possibly caused by heavy loads or a jammed slew drive due to some obstruction of drive such as ice, frost, foreign object or high winds loads)
   b. Array is facing SOUTH during the morning but tracks afternoons only. The battery is likely marginally low ie not getting a full charge. You can normally either wait for more sun to increase battery voltage or replace or recharge the battery from an external charger, or plug is the standard external AC charger. AC Charger became standard power after October 2011 and solar PV became the OPTIONAL Power source.
   c. Extreme cold. Under extreme cold temperatures (-30-40Deg C) all batteries have substantially reduced capacity. In extreme cold the electrochemical reactions simply cannot take place and so very little if any energy can be extracted. Either warm the battery or hook up a 12v DC power source that does not depend on battery chemistry temperature.
   d. Ice or heavy frost under the slew drive or around the switches may have activated one of the limit switches. Check and carefully remove all ice/frost around the underneath of the slew drive and around the switches to allow the switches and probe to operate freely. If the array is within limits, unplug the battery POS+ AND the solar panel connector. Reconnect the batter and the system will reset. Then reconnect the Solar PV.
   e. Unknown software/GPS fault. Make sure the GPS chip (located on top of the green controller board) is fully seated and no pins have been bent during insertion. Press down with your finger or a non-conductive probe so no pins are visible. RESET the controller as described above .

3) **FAULT CONDITION -** SunpointGPS trackers have two (2) safety LIMIT switches that monitor the position of the slew drive. They are located just below the maximum EAST WEST Reference points and activate to cut power off. Either safety switch will stop the motor by turning off all power to the drive unit if it attempts to travel beyond the EAST or WEST limits. Should this happen the system must be brought back within travel limits manually by manually reversing the drive travel back within limits. FIRST disconnect all power to the system. Remove the 2 motor/limit switch bolts and the motor control cable and without removing the motor gently rotate the motor to any position. Reinstall the bolts and cable. *(Always investigate thoroughly as to why this failure may have happened before manually moving the system to ensure it does not happen again. Call true North Power if this happens.)*

4) **DC MOTOR FAULT CONDITION: OVERCURRENT**
   a. If the motor stops and LED D1 on the motor board is blinking, (indicates overcurrent). Reduce the R14 speed adjustment R14. Normal R14 setting is 3- 3:30 o'clock position or slightly past clockwise and not beyond 4 o'clock position. R60 should point to the 1 o'clock position.

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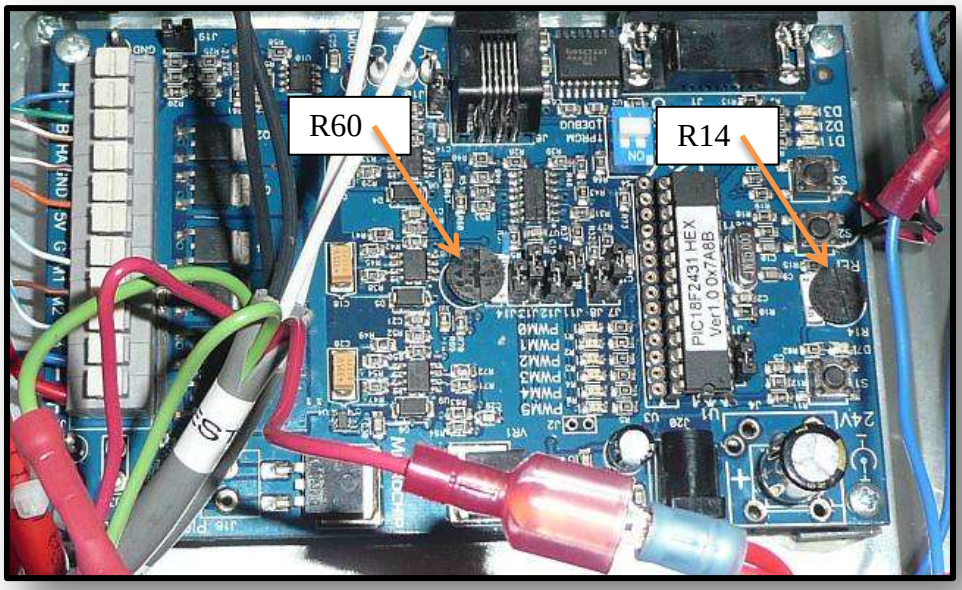
b. **STALLS and WIND BUFFETING** – under certain gusty winds, when the slew drive is running, there may be momentary loads experienced by the DC drive motor and relayed to the BLUE Board (motor controller) causing it to STALL. When this happens the Sunpoint2GPS controller will shut down the slew drive and wait a few seconds before trying the command again. Usually it will not have the same gust or stall condition on the second try but after 4 STALLS it will again shut down the motor controller and wait until the next day and reset itself before trying the command again. If there is a serious obstruction (ice or snow or something in the way) it will attempt this restart several days until either the obstruction is removed or the ice or snow melts or the wind dies, and then return to normal operations.



5) **MANUAL DRIVE OPERATION AFTER EMERGENCY SWITCH SHUTDOWN**

a. Unplug 10-20watt Sunpoint PV Panel and unplug 12v DC Battery terminal (RED connector or separate the glass fuse holder) or the power supply.
b. Remove the mounting plate bolts only on the motor Drive/WEST REF and unscrew the black Motor control plug wire. DO NOT REMOVE THE MOTOR. *Be careful not to pull the motor or shaft out as you may drop and lose the keyway from the motor shaft.*
c. Simply rotate the motor either way in it's mount and replace the motor wire and bolts.
d. Motor mounting bolts must be replaced or the slew drive may turn in the wind.

6) REPLACING OR UPGRADING THE SUNPOINT CONTROLLER CHIPS

a. As new Sunpoint2GPS controller software is introduced you may be offered an upgrade for FREE or at a nominal charge either by replacing the controller chip or by a True North Power technician site visit, where the technician may upgrade the program from a laptop without removing the chip. If you receive a new Sunpoint2GPS program chip:
    i. Unplug the Sunpoint2GPS PV Panel
    ii. Unplug the battery and AC Plug-in of used (this will power down the controller)
    iii. Use chip puller to remove the old chip carefully and install the new one. Do the same for the BLUE motor controller (above) if your controller has one. Be extra careful to pull the chips out "under control" so as not to bend the delicate pins

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iv. NOTE: the notched LEFT end of the chip should match the white notch printed on the controller board. Press gently at first to ensure all 14 pins are aligned to the socket and then firmly grasp the chip and board together to seat the chip
v. The green board Sunpoint2GPS is version 7.0 or higher on the label. The blue motor controller chip should be 5.52. Later models do not use a programmable motor chip.
vi. Then plug or turn on the battery switch, wait for RESTART and reconnect the PV panel. (newer models have 2 switches BATTERY and SOLAR).

7) **Solar Charging –** When solar is plugged in and the SOLAR switch is ON solar charging is normally feeding charge to the battery and is only turned OFF at 13.8v when the program energizes the small black Solar RELAY. The YELLOW solar lead is POSITIVE. To confirm the PV Panel is actually connected and charging: Unplug and measure the voltage on the leads coming FROM the PV panel. YELLOW male from the PV panel should be positive and in good sun should be 15-22v. While the PV is NOT plugged in measure the continuity on either side of the RELAY between the incoming and outgoing YELLOW wires inside the controller case. They should be connected internally causing a BEEP or showing a connection. Note that YELLOW from the RELAY output should be wired to BMAIN on the green controller board and the smaller black/brown or blue TRIGGER wire from the RELAY should go to the terminal RC0-0 to the right of BMAIN. See page 13 or 14 photos of this manual. With this confirmed, when the solar PV is plugged in then either YELLOW terminal on the RELAY should measure BATTERY voltage and in good sun you should notice it rising slightly over what was measured when the small PV panel was NOT plugged in. This confirms the PV panel is both connected properly and charging normally.

Service Call Checklist

1. **Where is the array pointing?** If it is daylight an NOT pointing at or near the sun.
    a. The North Probe may not be aligned exactly. More obvious when all three arrays are always slightly off from each other or some are ahead or behind all the time.
    b. If generally south the battery may be low (<12.0v).
    c. Still sitting WEST in the morning. Check Battery voltage and RESTART if above 12.2v.
    d. Never left EAST REF? Check GPS is seated and criss-crossed GPS black Jumpers are in place on the GREEN board under the GPS. (jumpers are just below the BLUE LEDs in lower right photo on Pg 13)
2. **What is the resting battery voltage?** If it's below 12v,(like really low 8v or less) the solar panel is not charging. Check PV polarity and confirm charging. If it's freezing cold (<-10degC) plug in Aux Power Supply. If BATV is >12.6 then charger likely working.
3. **Are there lights on the Sunpoint3GPS controller board.** Normally only 2-3 Green LEDs are on. One BLUE may be blinking. This means GPS signal is being received and processed. If the GPS LED is blinking very slowly (2-4 seconds) then this is the STALL condition. It means the controller had to reissue a command more than 4-5 times and is now waiting for tomorrow to try again. If the battery is >12.2v then you can also RESTART and it will try again now. See STALLS and WIND BUFFETING above.
4. **Is the array STALLED at EAST REF?** The GPS chip may not be seated properly (When seated properly no metal pins are showing - ie black-to-black plastic only. Use a non conductive tool like a pencil or plastic probe to press down on the GPS gently to seat it.
5. **Are there no lights at all?** (check the fuses, there are 2, one for battery, one for plug in)

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6. **Is the small PV panel making 14-20v with correct polarity?** Unhook the PV plug and use multi-meter to prove the MALE YELLOW (panel side) is POS+ and at least 14-20v DC)
7. **Is the charging relay and circuit working?** While the PV is unplugged and the motor not moving, measure the BATV and look for a rise in BATV as you plug the PV back in. You will need to have a multi-meter capable of 00.00V resolution and should see a slight rise in low sun and fairly rapid rise in full sun. In good sunny conditions you may hear the charge relay clicking on an off between approximately 13.8 and 12.8.v dc.
8. **What is the Firmware version of the Controller Chip?** Confirm the green board Sunpoint2GPS is version 7.0 or higher on the label. The motor controller chip should be 5.52. Later models do not use a programmable motor chip. Newer models will not have a BLUE board chip that needs to be replaced.
9. **Current Limit and Speed Control Rheostats not set properly.** R14 speed rheostat arrow should be between 3-4 o'clock and R60 arrow should be at 1 o'clock. See photo Pg 16.
10. **Is either the EAST REF or WEST REF switch engaged?** Array stuck at EAST REF is indication GPS signal is poor or missing. WEST REF is only engaged when SUNSET Azimuth is north of about 290 deg TRUE. In mid-summer this is normally engaged while the array waits for sunset before returning to south overnight. This move happens 20min after sunset.
11. **Are the EAST REF or WEST REF switch wired hanging below the Slew drive?** Use zip ties or other means to ensure no wires hang below the slew drive casing because they can get caught or damaged by ice or north probe or other obstructions.
12. **Is the North Probe properly installed and aligned on TRUE NORHT/SOUTH?** An adjustable North Probe (+- 10degAzimuth) can be moved to correct alignment. Do not torque this bolt the same and the other slew drive bolts. Tighten firmly with a small hand wrench.
13. **If the motor board will not light up or drive at all** . . . Are there any loose wires or burned MOSFETS on the GREEN board or the blue motor controller? It must be replaced. Call your Dealer/Installer for warranty advice.

System Maintenance

During Installation:

1. Follow recommended installation procedures and as a last order of business before leaving the site recheck all panel bolts and slew drive bolts have ribbed washers and are torqued to spec, paying particular attention to the slew drive attachment bolts. These are M16 x 90mm Socket Head Cap Screws (SHCS) and should be torqued to 185 ftlb (240nm)
2. *Once the screw is tightened, please permanently mark the position of the screw head to that of the stationary structure. This will be used later during inspection to be sure the screw head has not unwound.*
3. Check the tilt arms attachment to the vertical rails have M8 x30mm SHCS with a nylock nut on the inside of the rail with at least 2 threads showing through the nut.
4. Ensure all cables are tied down and attached with zip ties or peel and stick pads (ie. attached directly to steel components that rotate WITH the array and are ABOVE the North Probe.)

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3 days AFTER Installation:

1. Recheck both upper and lower slew drive bolt torques to spec.
2. If using RetroFIT sleeve adapter recheck bolt torque specs, especially the 3 x 5/8th Galv bolts

3 weeks (21days) AFTER Installation:

1. Recheck both upper and lower slew drive bolt torques to spec.
2. If using RetroFIT sleeve adapter recheck bolt torque specs, especially the 3 x 5/8th Galv bolts

Annually:

1. Recheck both upper and lower slew drive bolt torques to spec.
2. If using RetroFIT sleeve adapter recheck bolt torque specs, especially the 3 x 5/8th Galv bolts
3. Grease both inner and outer slew drive nipples as described below.

Lubrication Instruction

Provisions about handling the respective lubricants must be observed.

While rotating the slewing drive, inject grease into all the cleaned grease nipples consecutively until a continuous collar of fresh grease forms at least on one sealing lip.

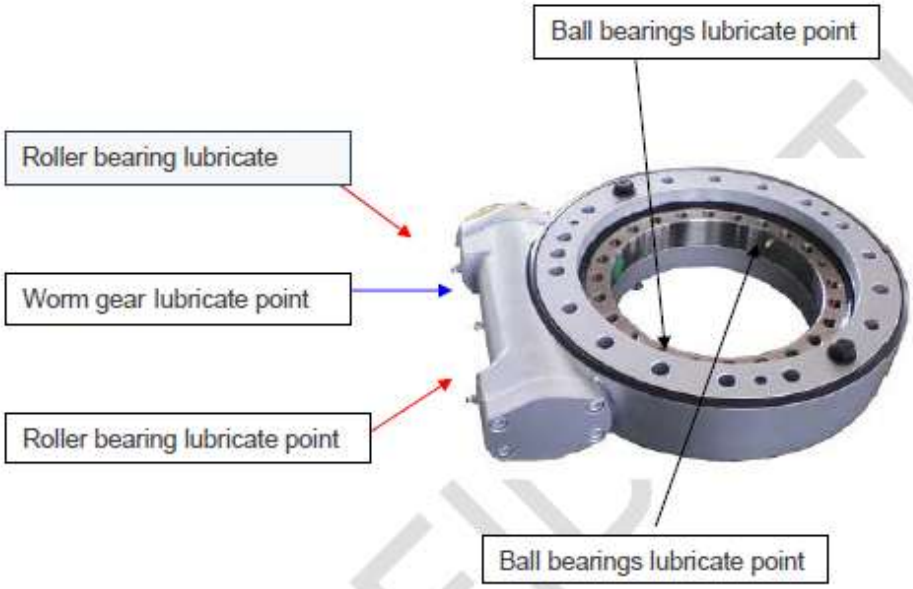

Figure 4.3 lubricate point

- The roller bearings and worm gear are open to the same cavity, but it's suggested to fill them using the separate grease points to be sure each is hit directly. The ball bearing is enclosed separately.
- While rotating the slewing drive, inject grease into all the cleaned grease nipples consecutively as follows:
- Roller Bearings - 40 cc of grease
- Worm Gear - 80 cc of grease
- Ball Bearings -100 cc of grease

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Greasing technique.
Pick a time at the end of day (fall is best) when the array is facing westward. Remove the battery and solar connectors and power down the Sunpoint2GPS. Now reconnect the battery + cable and the array will begin moving back to EAST Ref. You will have about 15 -20min to apply several grease injections as the slew drive moves eastward.

Do the inner race grease nipples once to start with. Then do the worm and roller nipples. Then go back to the inner race and add a bit more every couple of minutes until it stops. This may be 8 or 10 injections. You may see fresh grease around the seals and this indicates good lubrication. Don't forget to reconnect the solar panel, and your done.

Grease Spec

There are four places which are lubricated, they are (1)slewing ring ball bearings, (2)worm gear, (3)taper roller bearings and (4)planetary gears. Slewing drives are supplied fully lubricated.

Table 5: Eco Friendly Grease Specifications

Parts needed to be lubricated	Taper Bearing Ring raceway Worm Gear Thread
Condition of Lubricate	Pre-lubricated by manufacturer
Recommended Grease Product name	Mobilux EP 2
Applicable temp. range in ºC	-40 to +130C
Color	Brown
Four-ball test	250 kg ASTM D 2596
Viscosity (-40 °C, 10 s-1) Pas	160
Dropping Point °C	190
Penetration, Worked 0.1 mm	280

Grease nipple on either side
Plus 3 on front

Mobilux EP 2 is a lithium hydroxystearate baesd grease. It's formulated to provide extra protection against wear, rust and water. It is applied in heavy-duty application where high unit pressures are present. It provides excellent protection against rust and corrosion.

Mobilux is suitable for the lubrication of enclosed gears and bearings, and for applications where conventional oil cannot be retained, or should not be used for environmental reasons.

The grease helps to provide reduced wear under heavy load and vibration, protection against rust in the presence of water, extended bearing life in wet environments.

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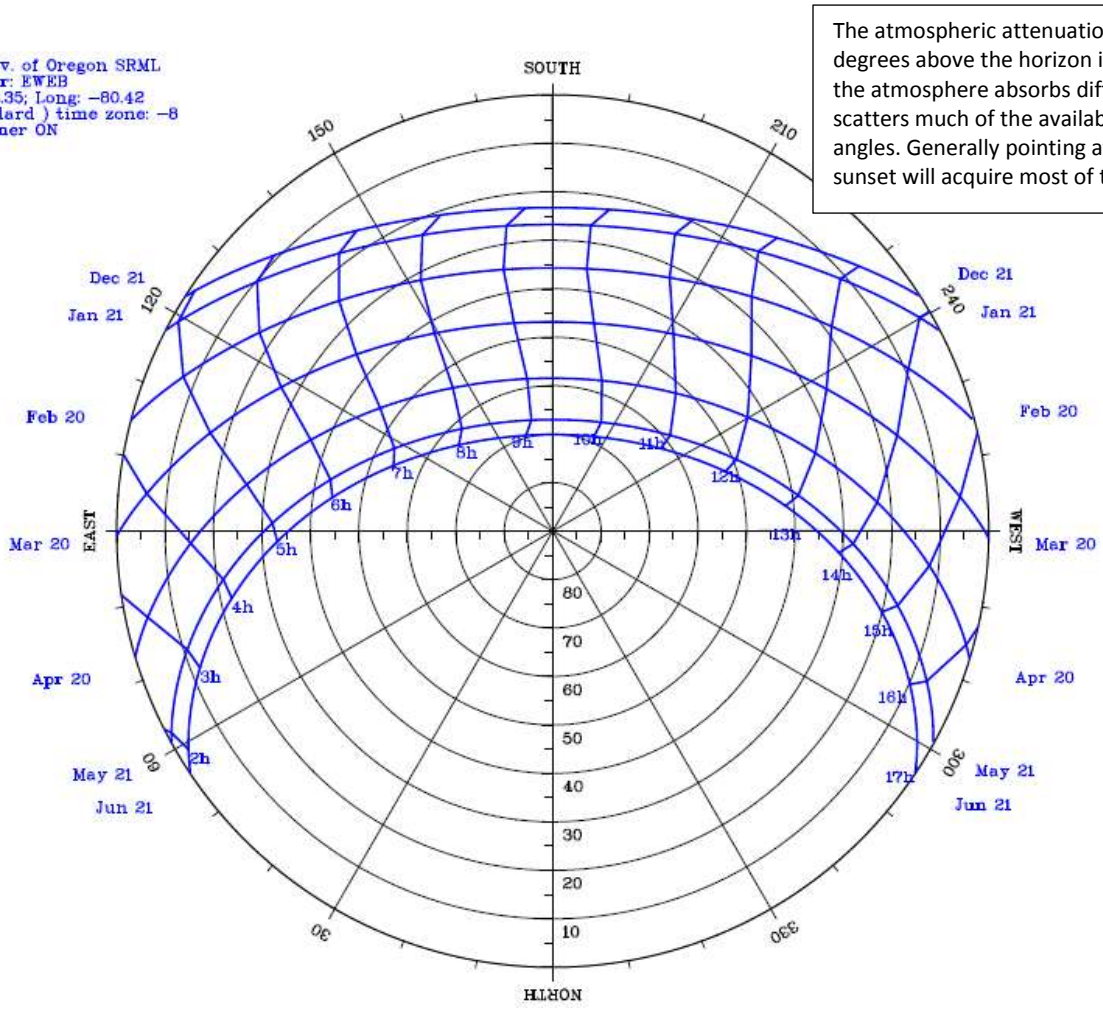
Adjusting the Solar Mount Direction - Finding GRID SOUTH and TRUE NORTH

Locate the pedestal/mounting pole where it is completely clear of shadow as much as possible in all seasons of the year. Professionals will use a "Solar Pathfinder" or similar device but, if you don't have one it helps to have a diagram of the sun angle, as it might be at every time of the day for all days of the year. Google now has a great java application for visualizing solar transit for any day of the year and any location on earth, called Suncalc. http://www.suncalc.net/#/43.2873,-80.4519,14/2010.11.21/07:51. Another interesting visualization tool can be found at http://pvcdrom.pveducation.org/SUNLIGHT/SUNCALC.HTM . If you wish to see an entire year of sun angles for your specific LAT/LONG a simple chart like the one below can be generated from a website at Oregon State University. http://solardat.uoregon.edu/SunChartProgram.html . It shows the azimuth and elevation that the panels should face in order to get maximum solar energy. A "Solar Azimuth" of 180 degrees will face GRID or TRUE SOUTH in the northern hemisphere. Use "Zero" degrees to create a chart for GRID or TRUE NORTH in the southern hemisphere. You can find TRUE SOUTH or TRUE NORTH on your property by noting the direction of the solar shadow at noon. (Standard time not Daylight Savings). You can also use a compass but don't forget that Magnetic South can be off by several degrees from GRID SOUTH so a compass alone will not give you an accurate angle. Using a compass you must account for "magnetic deviation" in your location. It is different everywhere on the planet. Just Google it.



The atmospheric attenuation below about 15 degrees above the horizon is dominant where the atmosphere absorbs diffracts, reflects and scatters much of the available energy at low sun angles. Generally pointing at the sunrise or sunset will acquire most of the available energy

Once you have determined GRID SOUTH or NORTH, adjust the Strongback to be GRID EAST WEST that is 90 degrees to NORTH SOUTH which is the direction the panels must face. Face the array GRID SOUTH in the northern hemisphere and GRID NORTH in the southern hemisphere. With the Strongback secured you can now adjust the angle of the array to something close to the highest point of the curved lines in the chart above (based on the time of year). The closer you follow the maximum elevation of the blue lines throughout the year, the more power your array will produce, but adjusting it more than 2 times a year does not add significant amounts of energy (possibly <1-2%) for azimuth tracking arrays. If you do adjust the angle of the array seasonally, it should only be done once after the snow is gone (set the angle to Latitude -10Deg) and again in the early fall (set the angle to Latitude + a max of 5-10 degrees), or change the angle as often as you like if you just like playing with wrenches. Be sure to retighten all bolts to proper torque before leaving the array at a new angle.

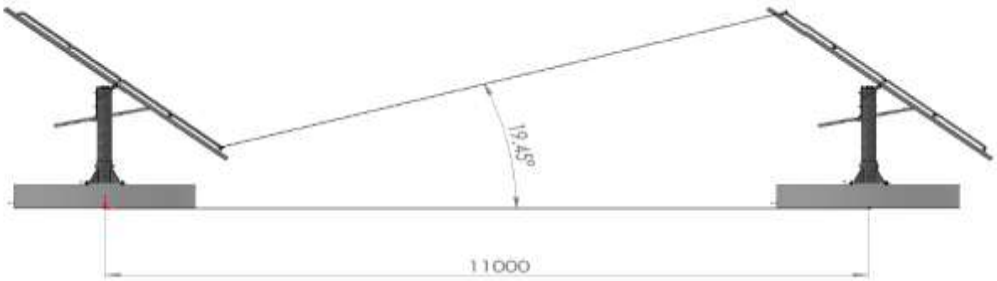
Siting Multiple Pedestals

If two or more pedestals are located near each other you will need to provide spacing for them so one does not shadow the others during various times of the day or the year. This is especially important for tracking systems where early morning and late afternoon shadows are longest. Below is a typical array siting analysis that you will have to create for yourself based on the location, the ground slope and the panels you choose. This “IDEAL” case shows how the shadows from one pedestal can interfere with production of the ones around it based on how close they are. Remember however that the low sun angles of winters solstice in the Northern hemisphere occur for only a few short days per year when the solar hours are fewest all year and when you can expect a lot of cloud cover anyway.

Designing systems for this limited case is more of an academic exercise rather than offering significant performance improvements, and practical spacing of closer distances can be just as operationally productive as the ideal case. Changing the height of the front row of pedestals and reducing the maximum tilt angle of just the front row can significantly shorten the row spacing requirement of the pedestals. Perhaps mounting the panels in landscape can reduce the height of each pedestal and likewise reduce the spacing required. Also check your ground slope on site as just a few degrees of slope can reduce the spacing significantly. In addition, siting for solar production below 15 degrees above the horizon is of limited value due to atmospheric attenuation. Consider all of these parameters before choosing pedestal spacing.

This is a minimum spacing of pedestal spacing for PS 2400 mounts, with 12 (1300x99mm) ~200w panels mounted, 2 up and 6 across, in Portrait mode, at various azimuth angles. You will have to study your own location, panel setup and spacing to determine what works best for you. Using your site angles chart you created from the University of Oregon website, with a piece of squared paper and a protractor may be all the accuracy you need. The example here shows best minimum shadow separation. (distances in mm)

PS3200 – E.g. 45deg tilt with 1640x994mm panels and about 20 degree winter noon or sunrise solar angle.



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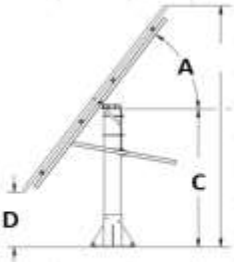
Site preparation and post or concrete installation is not always part of the equipment supplied by True North Power NG Inc. ALWAYS consult a qualified professional engineer.

BasePost
8.625”OD

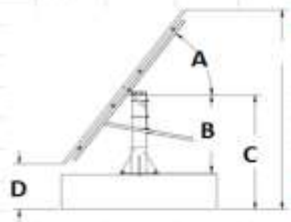
BaseMount (20” centers)
1inch holes

Separate Post (typically 5ft or 6.5ft with DropNGo)

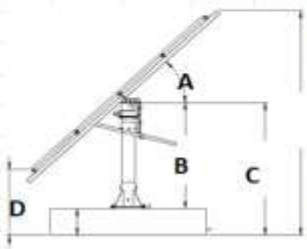
Height Options - With and Without Drop*N*Go Stack or SunpointGPS



Array Panel/Orientation			10 Panel 5x2 Portrait	12 Panel 6x2 Portrait	15 Panel 5x3 Portrait	16 Panel 4x4 Landscape	18 Panel 6x3 Portrait
IN-GROUND PEDESTAL			**PS2000P**	**PS2400P**	**PS3000P**	**PS3200L**	**PS3600**
Post Length			12' (3.66m)	12' (3.66m)	15' (4.6m)	15' (4.6m)	15' (4.6m)
Array Angle		A	55° Tilt From Horizontal				45° Tilt
Top Of Pole	Above Grade	C	8ft (2.44m)	8ft (2.44m)	8ft (2.44m)	8ft (2.44m)	8ft (2.44m)
Ground Clearance		D	49.6" (1.26m)	49.6" (1.26m)	25.5" (.66m)	29.9" (.76m)	25.5" (.66m)
In-ground Concrete			Local Design only				



DropNGo			PS2000	PS2400	PS3000	PS3200	PS3600
Post Length			5Ft	5Ft	6.5ft	6.5ft	5Ft
Array Angle		A	45° Tilt From Horizontal				45° Tilt
Array Center	Above Ballast	B	5' (1.52m)	5' (1.52m)	6.5' (2m)	6.5' (2m)	7.23' (2.21m)
	Above Grade	C	6.4' (1.95m)	6.4' (1.95m)	8.3' (2.53m)	8.3' (2.53m)	8.9' (2.7m)
Panel Ground Clearance		D	36.9" (.94m)	37.6" (.96m)	37.4" (.95m)	50.4" (1.28m)	40.84'(1.04m)
8.6ft Diameter Ballast			1.2ft thick	~10,780lbs	1.67ft thick	~14,450lbs	2ft thick ~17,400lbs



DropNGo with SunpointGPS			PS2000	PS2400	PS3000	PS3200	PS3600
Post Length			5Ft	5Ft	5Ft	5Ft	5Ft
Array Angle		A	45° Tilt From Horizontal				45° Tilt
Array Center	Above Ballast	B	5' (1.52m)	5' (1.52m)	5' (1.52m)	5' (1.52m)	7.6' (2.3m)
	Above Grade	C	7.8' (2.38m)	7.8' (2.38m)	8.2' (2.5m)	8.2' (2.5m)	9.6' (2.9m)
Panel Ground Clearance		D	53.4" (1.36m)	53.4" (1.36m)	35.9" (.91m)	48.9" (1.24m)	47.8'(1.2m)
8.6ft Diameter Ballast			1.2ft thick	~10,780lbs	1.67ft thick	~14,450lbs	2ft thick ~17,400lbs

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Steel Post (Pedestal) Requirements

PS400 & PS800	PS1200 & PS1600	PS1800, PS2000 & PS2400	PS3000 & PS3200	Post Type
4" Post 4.5" OD	6" Post 6.625"OD Up to about 6.5ft above Grade	8" Post 8.625"OD Up to about 6.5ft above Grade	8" Post 8.625"OD Up to about 8ft above Grade	Hollow Structural Steel (HSS) Round .322" 5/16th wall ASTM Standard Grade 500C Typically >70,000psi

CAUTION

Any analysis data provided is typical of civil engineering calculations and is offered for reference only. Such analysis must account for local soil conditions and peir design data neither of which is available to True North Power. True North Power only provides the top of pole load parmeters and moment requirements at the base of the post.

Consult a qualified civil engineer before deciding the location and size of the supporting pier, concrete strength and/or post.

WARNING

This is not a one person job even if you have lifting devices or winching equipment as the mount is heavy and unwieldy. It can only be safely done with at least 2 or 3 people.

Strongback and Channellox Rail Materials Specifications
Including Wind, Snow and Load Bearing Test Data is available on request

Engineered stamped drawings from Ontario engineers are also available at a nominal cost.

Contact info@truenorthpower.com

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