PROGRESS SOLAR SOLUTIONS®

Progress Solar Light Towers HELIOS™

Operators Manual HELIOS-1 & HELIOS-2

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Progress Solar HELIOS™ Light Tower

Operator Manual

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WHO WE ARE

Progress Solar Solutions is a veteran-owned American manufacturer headquartered in Raleigh, North Carolina.

Founded in 2008, the company began with a simple but powerful idea: create reliable, mobile solar power solutions that could perform in the harshest conditions without depending on diesel or the grid.

What started as one of the very first mobile solar light towers has grown into a full product offering of rugged, off-grid products proudly designed and built in the USA.

Progress Solar Solutions is recognized as an innovative industry leader in delivering clean, cost-effective energy to construction sites, government projects, military operations, and remote locations. Our HELIOS™ family of Solar Light Towers, Solar Surveillance Systems, and Power Cubes combine technology with real-world practicality — helping customers save money, reduce maintenance headaches, and making operational supply chains less complex.

Guided by customer feedback, a strong commitment to continuous improvement, and a focus on products that matter, Progress Solar Solutions remains intentional in its mission to build reliable, American-made, equipment. We seek to improve user experiences while providing sustainable and cost-effective energy solutions for projects around the world.

Thank you for the opportunity to serve.

INTRODUCTION

- HELIOS works by capturing energy from the sun and storing it in the on-board battery bank. When the lights are turned on, the energy is then consumed from the battery bank. This charge/discharge cycle happens every day/night. Set HELIOS up properly on your project site, and its autonomous operation features mean you will not have to touch it again for a long time. You'll notice it makes no sound.

  Compared to diesel light towers that need to be refueled every 6-7 days, HELIOS is a far superior option to preserve natural resources while reducing noise and emissions. Fuel costs alone for diesel light towers total about $16 per day. Over the course of 5 years of daily operation, a diesel light tower will require approximately 6,400 gallons of fuel and 260 re-fueling operations, maintenance intervals at every 250 hours, and ongoing checks of filters and coolant levels. Over the course of 5 years, the cost of operating a single diesel light tower is at least $47,000. With HELIOS, you don't have to do any of those things and you get to keep that $47,000 to reinvest elsewhere. Congrats on your more sustainable and profitable operation.

- **Do not attempt to operate this unit without reading and understanding the Operator's Manual.**

- It is strongly encouraged that any person using, operating or working on the unit reads and studies the Operation Manual carefully. Information included in the manual instructs the user how to operate and maintain the unit safely.

- This Manual contains current specifications and is subject to change without notice. Any updates will be published to electronic versions of this manual. This manual is current as of the date published.

- Make this information available to all who may use or will be working around equipment.

- WARNING: Although the unit once understood is very easy to use and maintain, improper operation may result in permanent damage to the unit.

- **The unit should never be without a power source.** Solar breakers should be kept in the on position, or the unit should be plugged into an AC power source.

- **All Batteries should be replaced at the same time with identical specs.**

- To request a digital copy of this manual or additional information, contact our Parts and Service email at help@ProgressSolarSolutions.com with your unit VIN number and a detailed request.

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SAFETY INFORMATION

Alert symbols are located where danger is present, a warning is necessary or cautionary measures need to be taken. Be aware of these symbols and follow advised safety instructions to avoid harm to yourself, others or the unit. The following symbols identify the level of exposure to the operator of the unit.

DANGER **WARNING** **CAUTION**

DANGER: INDICATES HAZARD, UNSAFE ACTION OR PROCEDURE **MAY CAUSE** SERIOUS INJURY OR DEATH.

WARNING: INDICATES HAZARD, UNSAFE ACTION OR PROCEDURE **COULD POSSIBLY CAUSE** SERIOUS INJURY OR DEATH.

CAUTION: INDICATES HAZARD, UNSAFE ACTION OR PROCEDURE **COULD POSSIBLY RESULT** IN INJURY OR DAMAGES TO PROPERTY.

WARNING:

- ALWAYS TURN OFF ALL ELECTRICAL BREAKERS PRIOR TO SERVICING OR MAINTENANCE OF ANY ELECTRICAL COMPONENTS.
- MAKE SURE UNIT IS LEVEL BEFORE ERECTING THE LIGHT TOWER. EXTEND ALL OUTRIGGERS BEFORE TOWER IS ERECTED AND KEEP OUTRIGGERS EXTENDED THE ENTIRE TIME THE TOWER IS ERECTED.
- DO NOT ATTACH ANYTHING TO THE LIGHT TOWER MAST.
- KEEP AREA CLEAR WHILE RAISING OR LOWERING THE LIGHT TOWER.

CAUTION:

- DO NOT OPERATE THIS UNIT WHILE UNDER THE INFLUENCE OF MEDICATION, FATIGUE, ILLNESS, ALCOHOL OR DRUGS.
- CHECK FOR LOOSE BOLTS, CONNECTIONS AND OTHER LOOSENED MATERIAL BEFORE TRANSPORTING OR USING THE UNIT.

- BEWARE OF TRAFFIC HAZARDS; STAND CLEAR OF TRAFFIC WHEN POSITIONING THE UNIT ROAD SIDE. SECURE ALL FASTENERS ON TRAILER BEFORE MOBILE UNIT IS IN TRANSIT. RETRACT MAST AND ALL OUTRIGGERS, STOW / LOCK IN CORRECT POSITION BEFORE TRANSIT.

- DO NOT CLIMB ON TOP OF THE MAIN HOUSING UNIT.

- THIS UNIT SHOULD ONLY BE OPERATED BY QUALIFIED AND TRAINED PERSONNEL.

- Replace safety and instruction decals when they become difficult to read.

- Unauthorized modifications to the unit or removal of manufacturers labeling will void the warranty and may be unsafe and any accident resulting from unauthorized modifications will not be the responsibility of the manufacturer.

- Always store equipment properly when not in use.

- Repair damage to unit and replace any broken parts immediately.

- SOLAR PANELS ARE MADE OF GLASS. BROKEN PANELS CAN CREATE SHARP/DANGEROUS CONDITIONS.

- 5 @ outriggers/jacks stabilize the unit. These should be deployed any time the tower is deployed. This stabilizing outriggers/jacks are also helpful during certain high wind weather conditions.

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BATTERY SAFETY

WARNING: BATTERIES MAY CONTAIN EXPLOSIVE GASSES. SHIELD EYES. EXPLOSIVE GASSES CAN CAUSE BLINDNESS OR INJURY. DO NOT EXPOSE BATTERIES TO SPARKS OR FLAMES. CHEMICALS WITHIN THE BATTERY CAN CAUSE BLINDNESS. IF AN ACCIDENT OCCURS FLUSH EYES WITH WATER AND SEEK MEDICAL ASSISTANCE. DO NOT CHARGE BATTERIES WITHOUT PROPER INSTRUCTION.

- BATTERIES ARE LOCATED INSIDE THE CONTROL BOX OF EACH UNIT. THE CONTROL BOX IS DESIGNED IN A WAY TO DISCOURAGE WATER INTRUSION INTO THE CONTROL BOX.
- THE BATTERY CHEMISTRY CAN VARY BY UNIT. IT IS IMPORTANT TO UNDERSTAND IF YOUR UNIT HAS AGM LEAD ACID BATTERIES OR LiFePo4 BATTERIES. THE USER SHOULD UNDERSTAND THE HANDLING PARAMETERS ASSOCIATED WITH THE SPECIFIC CHEMISTRIES.
- THE NUMBER OF BATTERIES CAN VARY BY UNIT. EACH UNIT IS DESIGNED TO OPERATE PROPERLY GIVEN THE NUMBER OF BATTERIES ORIGINALLY INSTALLED AT THE FACTORY.
- DO NOT ATTEMPT TO CHARGE A FROZEN BATTERY. ALLOW BATTERY TO WARM TO >40°F (16°C) BEFORE CHARGING TO AVOID DAMAGE, EXPLOSION AND/OR SERIOUS INJURY TO BODY OR PROPERTY.
- LiFePo4 BATTERIES MAY CONTAIN INTERNAL BMS SYSTEMS, SELF-HEATING OR OTHER ADVANCED FEATURES THAT CONTROL THE BEHAVIOR OF THE BATTERY IF CONDITIONS ARE NOT TO WITHIN ITS INTENDED PARAMETERS.
- WEAR SAFETY GLASSES WHEN WORKING WITH BATTERIES.
- ALLOW FOR ADEQUATE VENTILATION. DO NOT BLOCK VENTS ON BATTERIES.
- DO NOT ALTER OR MODIFY BATTERIES IN ANY WAY. DO NOT PIERCE BATTERIES.
- DO NO CHANGE THE ORIENTATION OF BATTERIES.

- MAKE SURE ALL CONNECTIONS ARE TIGHT. DO NOT OVER-TIGHTEN CONNECTION ON THE BATTERY TO DETER DAMAGE TO TERMINALS OR BATTERY CASE.

- DO NOT LEAVE THE BATTERY ON SHORE CHARGE FOR EXTENDED PERIODS EXCEEDING A FEW DAYS. BATTERIES PERFER TO CYCLE AND DO NOT LIKE TO BE HELD AT FULL CONSTANT CHARGE.

- BATTERIES SHOULD BE KEPT CLEAN AND FREE FROM ANY CORROSION. USE A CORROSION DETERRENT SPRAY ON THE BATTERY TERMINALS TO ENSURE LONGER LIFE.

- **THE UNIT SHOULD NEVER BE WITHOUT A POWER SOURCE.** Solar breakers should be kept in the on position, or the unit should be plugged into an AC power source.

- **ALL BATTERIES SHOULD BE REPLACED AT THE SAME TIME AND WITH IDENTICAL SPECS AND IN IDENTICAL QUANTITIES.**

- MPPT AND BATTERY MONITOR ELECTRONICS ARE PRE-PROGRAMMED AT THE FACTORY TO PERFORM WITHIN THE OPERATING PARAMETERS OF THE BATTERIES THAT WERE ORIGINAL TO THE UNIT.

- USED BATTERIES SHOULD BE DISPOSED OF IN ACCORDANCE WITH LOCAL LAWS AND REGULATIONS.

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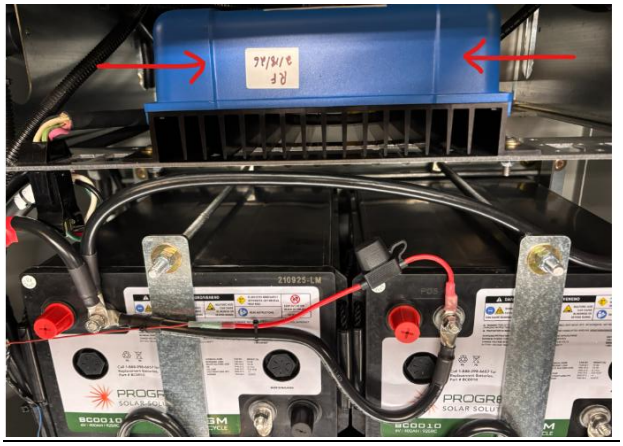
MPPT CONTROLLER SAFETY

WARNING: MPPT SHOULD NOT GET WET. IT CONTROLS THE SOLAR INTAKE TO THE BATTERIES. IT UTILIZES A BREAKER ON THE CONTROL PANEL. THIS BREAKER SHOULD BE LEFT IN THE "ON" POSITION UNLESS THE UNIT IS UNDERGOING SHORT-TERM MAINTENANCE.

- THE MAXIUM POWER POINT TRACKING (MPPT) DEVICE, HIGHLIGHTED BY RED ARROWS IN THE PICTURE BELOW, IS LOCATED INSIDE THE CONTROL BOX OF EACH UNIT. THE CONTROL BOX IS DESIGNED IN A WAY TO DISCOURAGE WATER INTRUSION INTO THE CONTROL BOX.

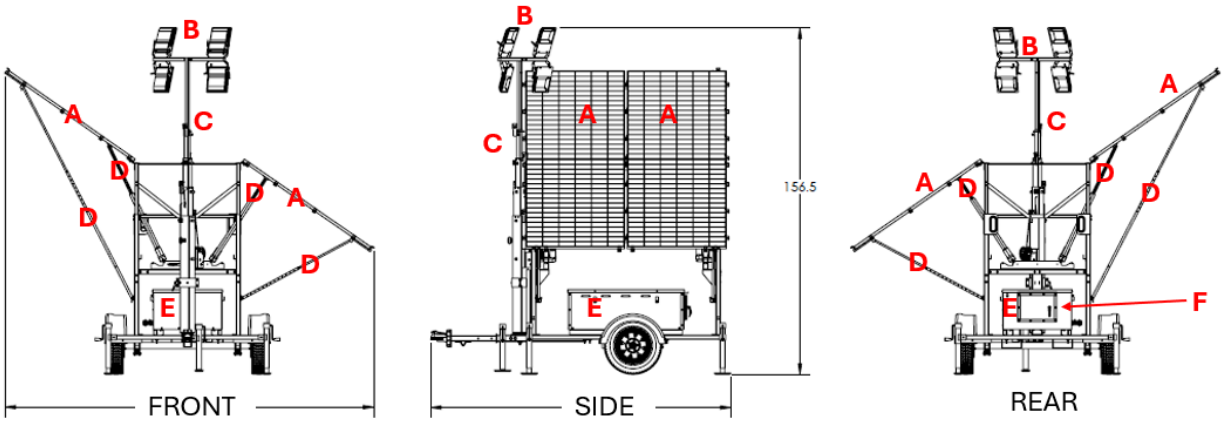


DO NOT ALLOW WATER TO ENTER THE CONTROL BOX VENTS

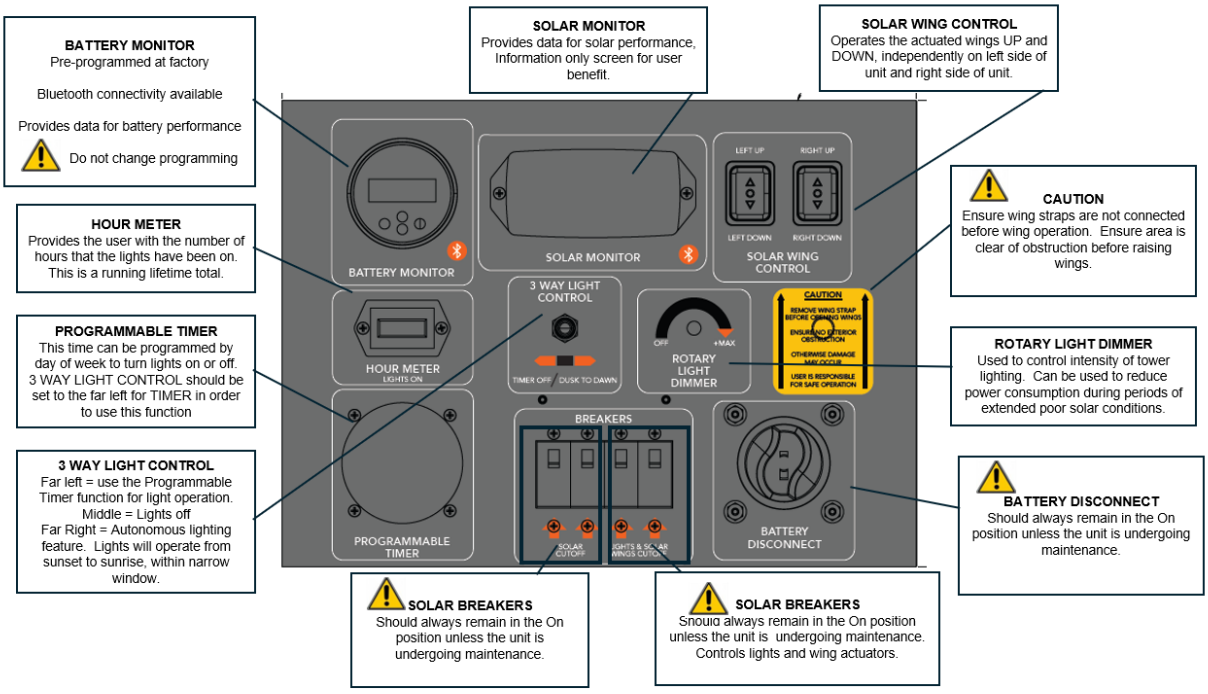
- EACH MPPT IS PRE-PROGRAMMED AT THE FACTORY TO OPERATE WITHIN THE PARAMETERS FOR WHICH THE PARTICULAR UNIT IS ELECTRICALLY DESIGNED. REPLACING A MPPT REQUIRES PROGRAMMING FOR PROPER OPERATION.
- INCORRECT MPPT PROGRAMMING WILL ADVERSELY IMPACT OPERATION OF THE MACHINE AND MAY CAUSE PERMENANT DAMAGE TO THE BATTERIES.
- ALWAYS KEEP CONTROLLER DRY AND COVERED FROM ELEMENTS. CLOSE DOORS WHEN NOT ACCESSING ANY INTERNAL COMPONENTS.
- MPPT MODEL MAY VARY DIFFERENT DEPENDING ON HELIOS MODEL TYPE.

MACHINE ORIENTATION & OVERVIEW

A = SOLAR PANEL(S)/WINGS
B = 24V, HIGH EFFICIENCY FLOOD LIGHTS
C = TELESCOPING TOWER
D=TELESTRUT X 4 (if equipped)
E = CONTROL BOX
F = LOCKABLE CONTROL PANEL



CONTROL PANEL/USER INTERFACE CONTROLS (if equipped)



HELPFUL INSTRUCTIONAL VIDEOS

Set-Up and Take-Down Information

YouTube

https://www.youtube.com/watch?v=67CZvU8Y93c

- Progress Solar Solutions Main Page: https://www.youtube.com/@progresssolarsolutions

  Find short instructional videos here for rapid learning

- Each HELIOS unit includes helpful information, including QR code links inside the door of the control box.

- Scan the QR code to locate a video detailing key unit set up information.

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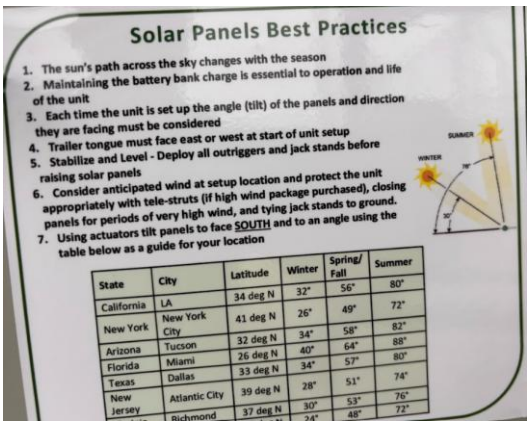
<td> 
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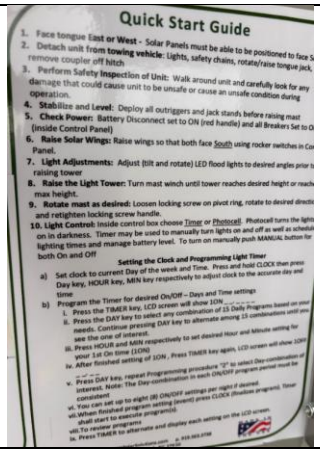
<td> 
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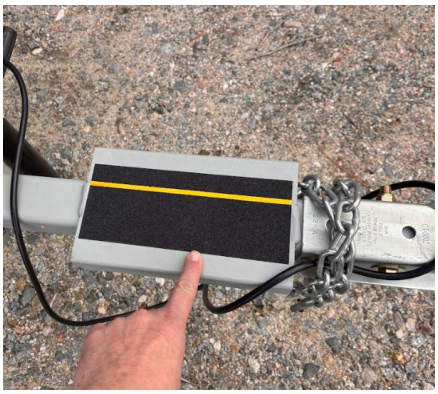
SET UP FOR OPERATION

User is responsible to choose best location for unit set up. Set up is an easy 1 person operation. Set up time is approximately 10 minutes. Face the tongue east or west to begin setup of the light tower. This allows the sun to travel the full length of the unit throughout the course of the day. Extend the tongue stand to remove the trailer. After removing the trailer from the tow vehicle, adjust the tongue stand to level the light tower. The tower should be generally level with tires in contact with the ground for best operation.	
Deploy the outrigger jacks to secure the light tower. This is an important step to stabilize the unit and compensate for mild slopes. It is also an important feature to stabilize the tower when fully extended. This feature is also key should high winds arrive unexpectedly.	
If you move your trailer with a forklift, use the YELLOW fork inserts located at the rear of the light tower. Weight of unit is 2,000 – 2,600 lbs. depending on model.	

Adjust the lights to the desired position. Your unit may include a non-skid step at the tongue. This feature can be helpful when adjusting light angles.	
Extend the light tower until your desired position or until the locking pin snaps into place. ⚠ Be mindful not to overextend the light tower.	
Rotate light tower to the desired location by loosening and retightening the locking screw handle. ⚠ It is important to secure the tower in a fixed position once desired orientation is achieved. Failure to do so may allow wind to spin the tower and will effectively move the lights from the desired orientation.	

Remove wing straps before opening wings. Failure to do so will result in damage to the solar array. Ensure no exterior obstructions are present that the wings will hit when raising and lowering. 	
Using the SOLAR WING CONTROL located at the control panel, deploy the solar array. General Reference Examples: Optimal Angle by Latitude (Approximate): Low Latitude (e.g., Florida/Texas): ~25°–30°. Mid-Latitude (e.g., California/Mid-Atlantic): ~30°–40°. High Latitude (e.g., Canada/Northern US): ~40°–50°+.	 Adjust the angle of the solar array to the recommended angle for your location. For the best year-round performance, 30° to 45° is standard.
Install Tele-struts to stabilize the Solar Wings These expandable struts maintain rigidity in the panels and prevent damage in high wind scenarios.	(Option available on certain models)
To set lighting parameters See instructions in the Control Pannel section	

POWER GENERATION

- Solar arrays are housed on the solar wings. Each solar wing is made up of one or more solar modules.

- The solar wings use actuators to raise, lower and stabilize on each side of the unit at customizable angles. When deployed, these angles allow the operator to optimize solar wing angle to any geographic area latitude; and for travel, to stow solar wings properly out of harm's way.

- **Optimizing Power Generation**

  - ***Positioning solar arrays at optimal latitude and eliminating shade over the unit are critical for optimal "set it and forget it" performance.***

  - The unit should be placed so that the tongue of the trailer is facing East or West. This allows the sun to travel the full length of the unit throughout the course of the day.

  - The general optimal angle for fixed solar panels is typically equal to your location's latitude. For the best year-round performance, 30° to 45° is standard.

    General Reference Examples:
    - Optimal Angle by Latitude (Approximate):
    - Low Latitude (e.g., Florida/Texas): ~25°–30°.
    - Mid-Latitude (e.g., California/Mid-Atlantic): ~30°–40°.
    - High Latitude (e.g., Canada/Northern US): ~40°–50°+.

  - The Solar Light Tower should be positioned in a manner that there is no shade on the solar panels throughout the day. If there is shade from nearby tall obstructions that is unavoidable, this will have a negative impact on solar intake. **HOWEVER, this impact can be mitigated by using the dimmer switch on the control panel to reduce the intensity of the lights.**
    - Simple way to think about it…. If we bring in less power, we need to reduce the power output to keep the system balanced.

    - The high lumen flood lights are very bright. Using the dimmer to reduce their power consumption should have a little impact on the efficacy of the area be illuminated, but does effectively conserve battery power.

- **Power Storage & Shore Power AC Charger**
  - For Backup AC Charging Power – U.S. 110-120VAC/20amp (ex U.S. 220-240VAC/20amp) plug.

	US models: This shore charger plug can be used to plug a standard 3 prong drop cord into the control box. This allows the unit to charge directly from the grid if necessary. ⚠ Keep plug cover fully closed when not in use and in good, clean condition to ensure it functions as intended. International models will have similar plug or on-board drop cord for shore charging.

  - Lights can be operated while batteries are being charged.

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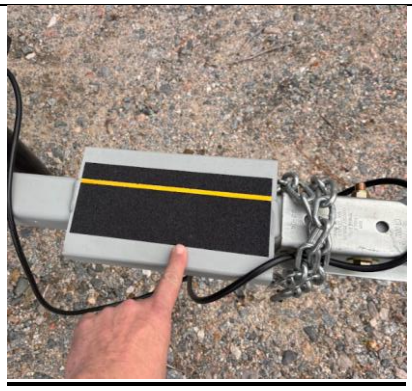
TRAILER

North American DOT compliant trailer.

Outriggers/Jack Stands Outriggers and jack stands are used to level unit and support the raised light tower mast. ⚠ Deploy outriggers/jacks for stability. ⚠ Located at the front tongue and all 4 corners of the trailer provide stability while light tower is deployed. ⚠ Do not attempt to move the unit if outriggers/jack stands are deployed.	
Tongue - Jack stand is used to level and support the tongue and enable attachment / detachment of the light tower to a vehicle for towing. Most models include removable tongue Some models include tongue step Coupler fits is 2” ball Includes safety chains	
Electrical Connection - 4 pin plug attach wiring of trailer lights and brakes to towing vehicle	
⚠ **Towing Weight**	2000 – 2,600 lbs. depending on the model User is responsible for safe towing

TOWER

⚠ Outrigger jacks should always be Deployed prior to extending the tower.

Each light lower is equipped with Solid-State LED Flood Lights. These advanced lights are > 200 lumens per watt.

Each light can rotate 360 Degrees and tilt up or down for easy user defined direction. Tighten thumb screws once desired orientation is achieved.

The tower can rotate to approximately 180 degrees using tower pivot ring to provide optimum angle for your lights.

This tower extends the mast to the desired height, up to ~23' for most models.

⚠ A spring activated safety pin is present to prevent the tower from being extended too far. If tower does not move up or down freely, this safety

mechanism may be engaged.

DANGER: ALWAYS MAKE SURE THE AREA ABOVE THE UNIT IS CLEAR OF TREE BRANCHES, BUILDING

DANGER: OVERHANGS, POWER LINES OR ANY OTHER OBSTRUCTIONS. CONTACT WITH SUCH OBSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

WARNING: PRIOR TO RAISING THE LIGHT TOWER, MAKE SURE THE WIRING IS NOT TANGLED. INJURY AND PROPERTY DAMAGE COULD OCCUR.

DANGER: THE SOLAR LIGHT TOWER SHOULD NEVER BE MOVED WHEN THE SOLAR WINGS ARE DEPLOYED

DANGER: THE SOLAR LIGHT TOWER SHOULD NEVER BE MOVED WHEN THE TOWER IS EXTENDED.

SOLAR ARRAY

	Each solar array consists of one or more N-Type mono-crystalline solar panels. N-Type cells are engineered to offer longer-lasting, more efficient solar performance compared to traditional P-Type cells. By using N-Type mono-crystalline silicon, this module reduces susceptibility to light-induced degradation (LID) and maintains high efficiency throughout its lifetime. This cutting-edge cell technology ensures stable power output and long-term reliability, making it ideal for users seeking consistent solar production.
Solar panels are mounted on 2 separate adjustable wings. Each solar array is connected to an Ultra-Fast Maximum Power Point Tracking (MPPT) Smart Solar	Each solar wing is individually controlled from the control panel with electric actuators, giving you total control for maximum solar harvesting and compact trailering ability. The number of solar panels may be different depending on your model #.
Solar panels may be bi-facial	The back of the solar panels also absorb energy. They work on the premise of indirect sunlight that reflects off of the ground and other surfaces. This advanced feature can add up to 30% more capacity for solar intake.
Optimizing solar intake	Panels should be maintained to be clean or near clean. Site conditions can vary significantly. In very dirty/dusty environments, it is recommended to clean the solar panels every other week. If visual inspection shows little to no build up, solar panels may require no cleaning. Rule of thumb to remember: The dirtier the solar panels, the less effective they will be at harvesting energy from the sun.
Cleaning the solar array	There are many ways to accomplish this. Progress has found the following to be very effective: Use a back pack sprayer or hand held garden sprayer that can project fluid 3-5'. Water only is fine, or for more buildup, mix 1 part white vinegar to 4 parts water. Rinse down the panels, allow to air dry or dry with a blower if desired. If panels are particularly dirty, use of a long handled soft brush is recommended. Such brushes are typically widely available and are often used for washing of autos, boats, rvs, etc. Panels are made of glass, clean accordingly.
Useful life	These solar panels have a useful life of 20-30 years

Tele-Struts

Used to stabilize solar wings during high winds, with use of Tele-tabs and pins. Included in units that have the high-wind package.

Connect long telestruts to highest wing.

Connect short telestruts to lowest wing.

Connection points can be found on the side of the unit and the underside of the solar array.

Connect with provided pins

Adjust wing angle until telestrut is aligned. Secure position with provided pins.

⚠ Do not operate wings with telestruts install. Damage will occur.

CONTROL PANEL

BLUETOOTH SCREENS CAN BE ACCESSED WITH THE VICTRON CONNECT APP

The Victron Connect app is available for the following platforms:

1. Android.
2. Apple iOS (Note that USB is not supported, it is only possible to connect via Bluetooth).
3. Mac Os.
4. Windows (Note that Bluetooth is not supported, it is only possible to connect via USB).

The **Victron Connect app** can be downloaded from app stores for free or from the Victron Connect product page or **scan the QR code shown here**

Get it on Google Play
Download on the App Store
Available on the Mac App Store
Download from Victronenergy.com

BATTERY MONITOR

HELIOS is equipped with a BMV-712 Smart battery monitor. It measures battery voltage and current. Based on these measurements, it calculates the battery's state of charge and the hours remaining. It also keeps track of historical data, such as deepest discharge, average discharge and the number of charge and discharge cycles. All monitored battery parameters can be read out, and settings can be changed via the display and the four buttons. A connection with the Victron Connect app is possible via Bluetooth. The Victron Connect app can be used to read out all monitored battery parameters or to change settings.

CLICK HERE FOR THE FULL BATTERY MONITOR MANUAL

DO NOT CHANGE FACTORY PROGRAMMING PARAMETERS

SOLAR MONITOR	This display can be used to monitor the **Solar Charge Controller** and to view both live and historic data. This display can also be used to configure solar charger settings. ⚠ DO NOT CHANGE FACTORY PROGRAMMING PARAMETERS Examples of live and historic monitoring: 1. PV power, yield, voltage and current. 2. Battery voltage, current and charge stage. 3. Load output state and current (only available if the solar charger is equipped with a load output). 4. 30-day historical values. 5. Cumulative historic values over the life of the solar charger. **CLICK HERE FOR THE FULL SOLAR MONITOR MANUAL**

STATUS MENU: The Smart Solar Control display always starts up in this menu.

1. Press the - and + button to cycle through all menu items.
2. Press the - button to see the live data of the solar charger. Each time the - button is pressed, the next parameter will be displayed.

If the + and - button is pressed at the same time for 4 seconds, the auto scroll mode will be activated. The display will continuously cycle through each menu item every 5 seconds. To stop the auto scroll mode, briefly press the "-" or the "+" button.

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SOLAR MONITOR – STATUS MENU

These menu items will be displayed in order of appearance as indicated in below table:

LCD display	Menu item	Description and notes
	Battery voltage and charge current when no PV is present	The first number indicates the battery voltage (V), the second number indicates the battery charge current (A).
	Battery voltage and charge current when PV is present	
	Battery charge current	Charge stage: Bulk, Absorption, Float or off.
	Battery voltage	Charge stage: Bulk, Absorption, Float or off.
	Battery charge power	Charge stage: Bulk, Absorption, Float or off.
	Battery temperature	The temperature is shown or A special message is shown: • "---" = No sensor information • "Err" = Invalid sensor data
	Solar charger temperature	The temperature is shown or A special message is shown: • "---" = No sensor information • "Err" = Invalid sensor data
	PV current	Solar array output current

LCD display	Menu item	Description and notes
	PV voltage	Solar array output voltage
	PV power	Solar array output power

In addition to above menu items, the following menu items will appear when special conditions occur:

LCD display	Menu item	Description and notes
	Warning message	"Inf" together with a number is displayed. This number refers to an error code, see solar charger manual for the meaning of this code.
	Error message	"Err" together with a number is displayed. This number refers to an error code, see solar charger manual for the meaning of this code.
	Remote operation	"remote" is displayed.
	BMS operation	"bms" is displayed.

The charge stage and if PV is active is indicated by the bottom line of the display:

LCD display	Description	Notes
	Bulk charge stage	The first charge stage, the battery is between 0 and 80% state of charge.
	Absorption charge stage	The middle charge stage, the battery is between 80% and 100% state of charge.
	Float charge stage	The last charge stage, the battery 100% state of charge.

	**SOLAR WING CONTROL** Use rocker switches to automatically raise and lower solar wings using actuators
	**HOUR METER** Records the actual time of light usage
	**3 WAY LIGHT CONTROL** Set switch to the bottom to use the programmable timer for light control **OR** Set switch to the top position for the dusk to dawn feature **OR** Set switch to the center position for lights off.
 Reduce power using dimmer to maintain system balance if needed.	**ROTARY LIGHT DIMMER** Rotate switch from left to right/OFF to MAX to increase light intensity. The impact of poor solar conditions can be mitigated , by **using the dimmer switch to reduce the intensity of the lights.**

PROGRAMMABLE TIMER

The Light Timer allows the user to set specific clock times for the lights to turn on/off automatically (unattended by operator). Multiple on/off times can be set per night and they can vary by day of the week if desired. Naturally any times can be used and can change as needed. This will automatically turn lights on when you need it but conserve energy by turning the lights off when they are not needed. This is helpful year round for user convenience, but this is also especially helpful during the winter months when the days are short (less solar energy is available) and the nights are the longest.

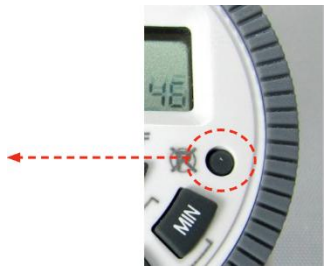
Examples:

- In a parking lot, you can set the Light Timers to turn on at 7pm and go off at 11pm and then turn back on at 5am and off again at 7am.
- For a job site, you can set the Light Timers to come on at 8pm and go off at 4am Mon through Friday if that is the work shift. Saturdays and Sundays can be set differently to remain off if there is no work activity.
- For entertainment or sporting events, you can set the Light Timers to turn on the lights from 6pm until 11pm or for whatever times fit your purpose.

If you want to start earlier than the automated timer setting, you can always manually turn the Lights on with the Timer by pushing the manual key until the red light comes on, and then push the key a second time to return it to automatic. The lights will turn on instantly and the lights will turn off at the designated off time automatically.

Programming the Timer

Before programming, clear all existing settings by pressing the reset button, located just above the dark gray "MIN" button, using a small pointed object.



Setting the Clock

1. Press and hold the "CLOCK" button.
2. Press the "DAY" key repeatedly until the correct day of the week is displayed.
3. Repeat the process using the "HOUR" and "MIN" buttons to set the current time.

Setting the Timer Programs

The TM 619 offers 15 pre-defined daily program settings. Use the "DAY" key to scroll through these options:

1. Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday (All days)

2. Monday
3. Tuesday
4. Wednesday
5. Thursday
6. Friday
7. Saturday
8. Sunday
9. Monday, Tuesday, Wednesday, Thursday, Friday (Weekdays)
10. Saturday, Sunday (Weekend)
11. Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
12. Monday, Tuesday, Wednesday
13. Thursday, Friday, Saturday
14. Monday, Wednesday, Friday
15. Tuesday, Thursday, Saturday

These presets simplify programming. All on/off times within a chosen program must be the same for the selected days. For example, to set an event for Monday through Friday, select program #9.

Setting On/Off Times

After selecting a program (e.g., program #9 for weekdays):

1. Press the "TIMER" key. The display will show "1 ON".
2. Set the desired turn-on time using the "HOUR" and "MIN" buttons.
3. Press the "TIMER" key again. The display will show "1 OFF".
4. Set the desired turn-off time using the "HOUR" and "MIN" buttons.
5. If more than one on/off cycle is needed per day, press the "TIMER" key again to set "2 ON", "2 OFF", and so on, up to a maximum of 8 on/off cycles per day.

Once all desired on/off times are programmed, press the "CLOCK" key to finalize. Ensure the timer is set to "AUTO" mode by pressing the "MANUAL" button until the "AUTO" indicator is active.

Checking Programmed Settings

To review your programmed settings, press the "TIMER" button. The display will cycle through the programmed on/off times.

Changing Settings - If any on/off times need to be changed, the entire timer must be reset using the reset button. Individual settings cannot be modified without a full reset.

<table>
<tr>
<td> 

Note: Breakers may be labeled for different options depending on model.</td>
<td>BREAKERS are used to engage or disengage electrical circuits (up is ON, down is OFF)

Breakers will be labeled for the electrical circuit it controls.

◦ SOLAR CUTOFF - double pole breaker that disconnects the positive and negative supply from the solar panels

◦ LIGHTS & SOLAR WINGS CUTOFF - single pole breaker that disconnects power from the lights and solar wing actuators</td>
</tr>
<tr>
<td> 
</td>
<td>BATTERY DISCONNECT

Will disconnect all circuitry from the battery bank.</td>
</tr>
</table>

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The knob of the BATTERY DISCONNECT is removable for isolation or safety purposes.

1. Twist the knob clockwise to turn the switch on.
2. Turn the knob counter clockwise to turn switch off.
3. Turn the knob a further 30° counter clockwise to turn switch off and to remove the knob.

The three switch positions: ON, OFF and Remove

3.1. Battery Switch knob removal

The knob of the Battery Switch can be removed. Use this feature to prevent unwanted operation of the switch. When the knob is removed, the switch is off.

Removal of the knob will prevent accidental switching, for example when system maintenance is carried out (safety), or when the system is left unattended for a certain time (battery discharge prevention).

To remove the knob

1. Ensure that engines and equipment connected to the same DC circuit as the Battery Switch are turned off.
2. Turn the Battery Switch knob counter clockwise to the "OFF" position has been reached.
3. Turn the knob a further 30° counter clockwise until the "Remove" position has been reached
4. Pull the knob away from the Battery Switch.

BATTERY BANK

Each light tower is equipped with a 24V DC Battery Bank..

- The size and chemical make-up will vary depending on your model #.
- Batteries must be recharged routinely either by solar and wind power or by the back-up electric AC battery charger.
- Batteries should not be charged with an AC battery charger when the batteries are frozen.
- Batteries are typically more efficient (charge faster) but provide less battery capacity during low temperatures.

AGM BATTERY BANK

An AGM (Absorbent Glass Mat) battery is a type of VRLA (Valve-Regulated Lead-Acid) battery that uses a highly porous fiberglass separator to absorb and immobilize the electrolyte. The sealed design eliminates free liquid acid, allows safe gas recombination, and requires no maintenance, giving AGM batteries their “maintenance-free” reputation.

Advantages of AGM Batteries

- **High cycle life:** It can withstand frequent charge and discharge cycles and is suitable for start-stop systems and deep cycle applications.
- **Fast charging:** It has strong charging acceptance and can quickly restore power after deep discharge.
- **Good low-temperature performance:** It can still maintain good starting performance and discharge capability in low-temperature environments.
- **Safety and leak-proof:** The electrolyte is completely sealed, eliminating the risk of acid leakage, making it suitable for scenarios with high safety requirements.
- **High vibration resistance:** Fiberglass partitions and reinforced shell enable it to withstand vibrations and bumps, making it suitable for mobile devices

Limitations of AGM Batteries

- **Lower energy density:** Compared with LiFePO4 batteries, AGM batteries have a lower energy density, requiring a larger volume and weight for the same amount of power.
- **Limited deep discharge performance:** If the discharge level is below 50%, their performance will degrade rapidly, and they are not suitable for prolonged partial charge states.

LiFePO4 BATTERY BANK

LiFePo4 batteries use lithium iron phosphate as the cathode material and graphite as the anode. It offers exceptional safety, long cycle life, and environmental friendliness, making it a popular choice in EVs, energy storage systems, and mobile power solutions.

Advantages of LiFePO4 Batteries

- **High safety:** Lithium iron phosphate cathode material has stable chemical properties and is not easy to decompose to produce oxygen or cause thermal runaway. Even under extreme conditions such as overcharging, short circuit, and needle penetration, combustion or explosion is very rare.
- **Long cycle life:** It can be charged and discharged more than 2,000 times, and some products can reach 3,500 times or even more. It can still maintain a high capacity after long-term use, making it suitable for application scenarios with high lifespan requirements.
- **Moderate energy density:** The energy density of a single cell is generally 160-180Wh/kg, which is lower than that of ternary lithium batteries, but can meet the needs of most electric vehicles and energy storage.
- **Environmentally friendly and pollution-free:** It does not contain heavy metals such as cobalt and nickel, and its production, use and recycling processes are environmentally friendly and in line with the trend of green energy development.
- **Low self-discharge rate:** Minimal power loss during long-term storage, eliminating the need for frequent power replenishment, making it suitable for long-term storage and backup.
- **No memory effect:** It can be charged at any time without needing to be fully discharged before recharging, making it convenient to use.
- **Supports fast charging:** Can be fully charged in a short time.
- **Stable voltage platform:** It maintains a stable voltage over 90% of the capacity range.

Limitations of LiFePO4 Batteries (nonheated)

- **low-temperature performance:** The capacity decays significantly in low-temperature environments, and the capacity may drop to 40%-60% at -20℃,
    - Progress Solar Solutions offers models with self-heated battery options for low temperature environments.

MAINTENANCE

- THE UNIT HAS NO PRESCRIBED MAINTENANCE PROGRAM EXCEPT FOR TRAILER MAINTENANCE. A TRAILER MAINTENANCE CHECKLIST IS PROVIDED HEREIN.

- OPERATING CONDITIONS WILL LEAD TO VARIANCES, BUT TYPICALLY AGM BATTERIES WILL HAVE A USEFUL LIFE OF APPROXIMATELY 4 YEARS. LiFePo4 BATTERIES WILL HAVE A USEFUL LIFE OF 5-10 YEARS. SEE IMPORTANT BATTERY SAFETY INFORMATION CONTAINED HEREIN.

- ALL BREAKERS SHOULD BE TURNED OFF BEFORE REMOVING THE CONTROL BOX LID FOR MAINTENANCE OR INSPECTION.

- BATTERY SWITCH SHOULD BE TURNED OFF BEFORE REMOVING THE CONTROL BOX LID FOR MAINTENANCE OR INSPECTION.

- SOLAR PANELS MUST BE DISCONNECTED FROM THE CONTROLLER FIRST, BEFORE ANY WORK CAN BE DONE ON THE MPPT OR BATTERIES. THIS CAN BE ACCOMPLISHED BY SIMPLY UNPLUGGING SOLAR INPUTS USING PLUGS ON EXTERIOR OF CONTROL BOX.

- INSPECT PLUGS AND INTERNAL PIN CONFIGURATION TO ENSURE A WORKING KNOWLEDGE FOR RECONNECTION.

- IF ANY CORROSION IS DETECTED, THE PLUG SHOULD BE CONSIDERED FOR REPLACEMENT TO ENSURE PROPER OPERATION OF THE UNIT.

- DO NOT LEAVE THE UNIT IN A UNSAFE MANNER FOR OTHERS TO BE INJURED. ENSURE CONTROL BOX LID IS REPLACED PROPERLY WHEN SERVICE IS COMPLETE.

- DO NOT LEAVE THE UNIT IN A PARTIALLY CONNECTED/MAINTENANCE STATE FOR AN EXTENDED PERIOD. DURING THIS TIME, NO ENERGY CAN REACH THE BATTERIES. IF THIS OCCURS OVER AN EXTENDED PERIOD OF TIME (WEEKS OR MONTHS), IT WILL RESULT IN A DIMINSHED USEFUL LIFE OF THE BATTERIES.

TRAILER MAINTENANCE & SAFETY CHECKLIST

Before Each Use

- Check tire pressure and condition (cracks, bulges, low tread)
- Verify lug nuts are tight
- Test lights and turn signals
- Inspect coupler and latch for secure connection
- Check safety chains and hooks
- Inspect trailer jack for proper operation
- Confirm load is balanced and secured

Monthly / Every Few Uses

- Inspect wheel bearings for noise or play
- Check leaf springs and suspension hardware
- Inspect frame and welds for cracks or rust
- Check deck boards or metal floor for damage
- Inspect wiring for wear or loose connections

Every 6–12 Months

- Grease wheel bearings (or repack if needed)
- Check and tighten all bolts and hardware
- Inspect and lubricate coupler and jack
- Touch up paint or rust protection
- Check tire age and tread wear

Every 5–6 Years

- Replace trailer tires (even if tread looks good, rubber loses structural integrity over time)
- Repack or replace wheel bearings if worn

TRANSPORT & TOWING

WARNING: MAKE SURE TRAILER HITCH AND BALL ARE CORRECT SIZES. SECURE THE TRAILER CORRECTLY TO TOWING VEHICLE.

WARNING: FOLLOW ALL LOCAL AND STATE SPEED LIMITS AND D.O.T LAWS WHEN TOWING A TRAILER.

SLOW DOWN AND BE ESPECIALLY CAREFUL DURING WHEN MAKING SHARP OR SUDDEN TURNS

- Close solar wings completely into down position tightly against the sides of the unit before transit. Secure all latches and connectors prior to transit.
- Lower light tower down to its lowest position. Turn flood lights so they are pointing down and turn light bar to parallel with hitch direction to reduce drag during towing.
- Retract all jack stands and outriggers accept the tongue jack and make sure they are properly stowed and outrigger pins locked for transit.
- Position vehicle ball under trailer connector. Crank down (counter-clockwise) tongue jack to lower trailer.
- Place coupler over ball and secure the unit to towing vehicle.
- Stow tongue jack to raised/locked position for transit. Lower jack by turning (counter clock-wise) the side mounted crank. Pull lock pin out and rotate jack to the horizontal position, parallel to trailer tongue and release lock pin. Make sure spring lock pin is completely inserted in correct hole.
- Attach safety chains and allow adequate slack (chains should not drag ground).
- Attach 4 pin trailer wire for brake lights to towing vehicle.
- Check for loose debris hanging from the trailer.
- Check tire air pressure and tire condition. Tighten any lug nuts that may be loose.
- Make sure all lock pins (especially outriggers and jacks) are correctly inserted.
- Make sure license plate is attached and current (where required).

VIN/SERIAL NUMBER & MODEL TYPE

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vehicle Identification Number (VIN) and Model numbers are attached on the lower front of the unit. The tag will look like this. The Model number may also be shown in large decals on the side of the control box If you are unclear which model you have, Progress Solar can assist you once we know the VIN number. email at help@ProgressSolarSolutions.com with your unit VIN number and a detailed request.	

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MANUFACTURER'S WARRANTY

Progress Solar Solutions™, LLC (PSS) warrants that all Progress Solar (SLT) & Solar/Wind Light Towers (SLTW) that are manufactured by PSS will be free from defects in material and workmanship for a period of **2 years** after date of delivery to first purchaser.

The warranty covers parts (tires excluded) where correct installation, setup, maintenance and operation have been applied. Normal wear and tear excluded. Operation must be kept within the limit of normal usage and any intentional or neglectful actions or inactions will void this warranty. The warranty specifically covers parts manufactured directly by PSS (no- labor). PSS warrants any replacement parts supplied to be free from defects in material and workmanship for a period of 90 days after documented purchase. Delivery will be considered, for this warranty, to take place five days after original purchase date if not stated otherwise in purchase agreement. This warranty covers the first purchaser. Any retail or wholesale entities will not be considered the first purchaser. The first purchaser is, for this warranty, to be the entity who puts the product into use. The warranty period will start when product is in use by the first purchaser.

Throughout the warranty period, any defective or malfunctioning parts will be replaced at the discretion of PSS. For any products that may need to be returned, transportation must be prepaid to PSS. PSS will not be liable for any losses incurred such as labor costs, loss of profit, down time, third party repairs or personal injury or travel. The sole duty of this manufacturer is to repair or replace defective equipment manufactured by PSS. The remedies here are exclusive to product service and replacement of damaged equipment due to manufacturing defects in workmanship. Any indirect damages are no obligation of PSS. Remedies paid will not exceed the price of the product or parts under liability of warranty. PSS makes no warranty to cover parts, lights, batteries, tires or other components that have been altered, changed or improperly installed, operated or maintained. Any component repaired under the direct supervision of PSS or by PSS is covered under warranty. To keep products maintained correctly, read the Operator Manual for proper instruction. No person is authorized to make changes or exceptions to this warranty unless authorized in writing by the manufacturer. Buyer must send written notice of defect within **30 days** in order to make a warranty claim.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED
(INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS OF ANY PRODUCT OR GOOD FOR
A PARTICULAR PURPOSE) AND ANY EXCEPTIONS ARE STATED BY MANUFACTURER. PARTS, SUBASSEMBLIES OR ADDITIONAL COMPONENTS THAT ARE MANUFACTURED BY OTHER MANUFACTURERS ARE NOT COVERED UNDER THIS WARRANTY. SUCH WARRANTIES WILL ACCOMPANY OR COME WITH THE PRODUCT.