

en Operator's Manual HYBRID LT-SERIES™





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Record Important Information

Recording the equipment information will help when placing an order for replacement parts and/or decals.

Company Equipment No:	
Unit Model No:	
Unit VIN:	
Engine Model No:	Serial No:
Generator Model No:	Serial No:
Battery Model No: Serial (1) No:	
Serial (2) No:	
Accessories:	

Manual Contents:

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Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a wellventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65Warnings.ca.gov/diesel.

Introduction

About This Manual TAKE TIME TO READ THIS MANUAL THOROUGHLY

This instruction manual provides necessary instructions for the Allmand® Hybrid LT-Series™.

The information found in this manual is in effect at the time of printing. Briggs & Stratton, LLC. may change contents without notice and without incurring obligation.

The images throughout this manual are representative, and may differ from your model.

Any reference in this manual to left or right shall be determined by looking at the trailer from the rear.

If uncertain about any of the information in the manual, contact the Allmand service department at

1-800-562-1373, or contact us through the Allmand website, www.allmand.com.

Save these original instructions for future reference.

Component Manuals

In addition to this Operator's Manual, be sure to read any component manuals that are included with the machine.

Products Covered by This Manual

The following products are covered by this manual: Hybrid LT-Series™

Safety Safety Definitions

For your safety, the safety of others, and to protect the performance of equipment, follow the precautions listed throughout the manual before operation, during operation and during periodic maintenance procedures.



Indicates a potential personal injury hazard.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Information considered important but not hazard related.

Safety Symbols

The following table contains saftey symbols that may be found on the unit or in this manual, along with the meaning of each symbol.

Symbol	Meaning	Symbol	Meaning
Â	Electrical/ Electrocution Hazard		Carbon Monoxide Hazard
	Light Tower Rollover Hazard		Battery Explosion Hazard
	Fire Hazard		Explosion Hazard
	(Battery) Acid Burn Hazard		Engtanglement (Moving Parts) Hazard
	Sever (Moving Parts) Hazard		Sever (Moving Parts) Hazard
	Radiator Burn Hazard		Burn/Hot Object Hazard
	Engine Auto Start Hazard		Tower Mast Operation Hazard
	Optical Hazard	\bigwedge	General Safety Hazard
	Read Operator's Manual		Wear Protective Gloves
- <u>\</u> -\ -\ -\ -\ -\ -\ -\ -\ -\ -\	Keep Clear of Light Fixtures when Illuminated		Do Not Look Directly at Light Fixtures when Illuminated
	Keep Clear of Cap of Hot Radiator	ک بی	Keep Clear of Moving/Rotating Parts
	Stand Clear of Light Tower during Tower Mast Operation	88←>⊄‡ ¶, ,	Keep Light Tower Far Away From Power Lines
	Set Outriggers before Light Tower Mast Operation		Lower Light Tower Mast before Towing
f.	Maximum Light Tower Towing Speed		Emergency Stop
	No Open Flames		No Smoking
	No Flammables		Do Not Operate Unit Indoors

Safety Precautions

The following section contains general safety precautions and guidelines that must be obeyed to reduce risk to personal safety. Special safety precautions are listed in specific procedures. Read and understand all of the safety precautions before operating or performing repairs or maintenance.

Electrocution Hazard

- Always check overhead wires and obstructions before raising or lowering the light tower.
- Always obey the rules or instructions for your work site and state, province and national electric code for maintaining a safe distance from overhead wires.
- High voltage is present when unit is running. Never attempt to service electrical components while unit is running.
- Do not operate the light tower if the insulation on the electrical cord or other electrical wiring is cut or worn or if bare wires are exposed. Repair or replace damaged wiring before starting the unit.

Unsafe Operation Hazard

- Never permit anyone to install or operate the equipment without proper training.
- Read and understand this Operator's Manual, the Engine Operator's Manual, Battery Operator's Manual, and any other component manuals before operating or servicing the light tower to make sure that safe operating practices and maintenance procedures are followed.
- Safety signs and decals are additional reminders for safe operating and maintenance techniques.

Carbon Monoxide Hazard

Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings. Stop Hybrid Mode before transport and storage.

Fall Hazard

• Never carry riders on the equipment.



Modification Hazard

 Never modify the equipment without written consent of the manufacturer. Any modification could affect the safe operation of the equipment.

Exposure Hazard

 Always wear personal protective equipment, including appropriate clothing, gloves, work shoes, and eye and hearing protection, as required by the task at hand.

Rollover Hazard

- Do not raise, lower or use light tower unless all outriggers and jacks are positioned on firm ground.
- Never move or reposition the light tower while the light tower is extended in the vertical position.

Explosion Hazard (Lithium Ion Battery)

Charge only Vanguard[™] approved lithium ion batteries of the same type, voltage, cell number, and amp-hour capacities as shown on the label. Battery types not matching label information or non-rechargeable batteries could burst causing personal injury and damage.



Fire and Explosion Hazard (12V Lead Acid Battery)

12V lead acid batteries give off explosive gases during recharging. Sparks could cause explosions, resulting in death or serious injury.



Burn and Blind Hazard (12V Lead Acid Battery)

12V batteries contain acid or electrolytes, which are extremely caustic. Contact with battery contents could cause severe chemical burns and/or blindness. DO NOT use the battery if there is damage, leakage or burns. DO NOT use the battery if you hear unusual noises, see smoke, or smell odors. DO NOT use the battery if the casing is cracked, gashed, bulging, warped, or damaged.



Shock Hazard (All Batteries)

All batteries present a risk of electric shock and high short circuit current.

- Always disconnect the negative (-) battery cable before servicing equipment.
- Disconnect the charging source before you connect or disconnect the battery terminals.
- DO NOT dispose of battery in a fire. Recycle battery.
- DO NOT allow any open flame, spark, heat, or lit cigarette during and for several minutes after charging a battery.
- DO NOT open or mutilate battery.
- DO NOT charge a frozen battery. Always slowly warm the battery to room temperature before charging.
- Wear protective gloves, rubber apron, rubber boots and rubber gloves.
- Wear safety glasses or approved eye protection when you work near the battery.
- Remove watches, rings, or other metal objects.
- Use tools having insulated handles.
- Do not put tools or metal parts on top of batteries.



Fire and Explosion Hazard

- Diesel fuel is flammable and explosive under certain conditions.
- Never use a shop rag to catch fuel.
- · Wipe up all spills immediately.
- Never refuel with the engine running.
- Store any containers containing fuel in a well ventilated area, away from any combustibles or sources of ignition.

Alcohol and Drug Hazard

• Never operate the light tower while under the influence of alcohol or drugs, or when ill.



Entanglement / Sever Hazard

- Always stop the engine before beginning service.
- If the engine must be serviced while it is operating, remove all jewelry, tie back long hair and keep hands, other body parts and clothing away from moving/ rotating parts.

- Verify that all guards and covers are attached properly to the equipment before starting the engine. Do not start the engine if any guards or covers are not properly installed on the equipment.
- Attach a "Do Not Operate" tag near the key switch while performing maintenance on the equipment.

Flying Object Hazard

 Always wear eye protection when cleaning the equipment with compressed air or high pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.

Coolant Hazard

 Wear eye protection and rubber gloves when handling engine coolant. If contact with the eyes or skin should occur, flush eyes and wash immediately with clean water.



Burn Hazard

 Opening cap on hot radiator could result in death or serious injury. Allow radiator to cool down before opening cap.



Burn Hazard

- Light fixtures and some of the engine surfaces become very hot during operation and shortly after shutdown.
- Keep hands and other body parts away from hot surfaces.
- Handle hot components, such as light fixtures, with heat resistant gloves.

NOTICE

- Any part which is found defective as a result of inspection or any part whose measured value does not satisfy the standard or limit MUST be replaced.
- Always tighten components to the specified torque. Loose parts can cause equipment damage or cause it to operate improperly.
- Follow the guidelines of the Environmental Protection Agency (EPA), Environment Canada (EC) or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant.
- Only use replacement parts specified. Other replacement parts may effect warranty coverage.

- Clean all accumulated dirt and debris away from the body of the equipment and its components before you inspect the equipment or perform preventative maintenance procedures or repairs. Operating equipment with accumulated dirt and debris will cause premature wear of equipment components.
- Never dispose of hazardous materials by dumping them into a sewer, on the ground, or into groundwater or waterways.
- Retrieve any tools or parts that may have dropped inside of the equipment to avoid improper equipment operation.
- If any alert indicator illuminates during equipment operation, stop the engine immediately. Determine the cause and repair the problem before continuing to operate the equipment.

Safety Decals

Before operating your unit, read and understand the following safety decals. The cautions, warnings, and instructions are for your safety. To avoid personal injury or damage to the unit, understand and obey all the decals.

Keep the decals from becoming dirty or torn, and replace them if they are lost or damaged. Also, if a part needs to be replaced that has a decal attached to it, make sure to order the new part and decal at the same time.

If any safety or instructional decals become worn or damaged, and cannot be read, order replacement decals from your dealer.



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All Models		All Models	
WARNING - Failure to follow warnings, instructions and operator's manual could result in death or serious injury. Read and follow operator's manual before operating or servicing this equipment. Part No. 122467-1	Control Control Failure to Shilow warrings, inclusion and operators manual serious hips, warrings, inclusion and the shift operators in manual serious hips, warrings, inclusion and the shift operators in the utilization and the utilization and the shift operators in the utilization and the sh	 WARNING - Standing under light tower mast and fixtures during lowering operation could result in death or serious injury. Keep bystanders away from light tower during lowering and raising operations. WARNING - Handling light fixtures when they are hot could result in death or serious injury. Keep clear of light fixtures when illuminated 	<section-header><section-header><section-header><section-header><section-header><section-header><text><text><text><text></text></text></text></text></section-header></section-header></section-header></section-header></section-header></section-header>
WARNING - Unexpected start of engine could result in death or serious injury. Read and follow electronic controller operator's manual before operating or servicing this equipment. Part No. 122467-2	Loropection and the second secon	or hot. WARNING - Looking at illuminated light fixtures could result in serious injury. Do not look directly at illuminated light fixtures. Part No. 122478	ar Ind. (daudi). Locating at Runnation is motion upon the second result. Image: Constraint of the second result. Do not book directly it itsmenation (grit fibrares. Image: Constraint of the second result.
WARNING - Contact with hot exhaust gases and parts could cause death or serious injury. Avoid hot exhaust gases. Keep hands and combustible materials away from hot parts.	Register out equipment. Register out equipmen	WARNING - Power washing or spraying electronic components or connectors may cause damage and/or erratic operation that could result in death or serious injury. Do not power wash or spray electronic components or connectors. Part No. 125338	<section-header><section-header><text><text><text><text><text></text></text></text></text></text></section-header></section-header>
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Part No. 122467-4	Constant with creating parts and result in clean of a result of a result in the result	DANGER - Contacting power lines when raising light tower will result in death or serious injury. Keep light tower far away from power lines. Part No. 122469-2	Contacting power lines with in deal or serious plays. A series of the se
WARNING - Opening cap on hot radiator could result in death or serious injury. Allow radiator to cool down before opening cap. Part No. 122467-5	Coverning ap on het radiatic could real to death or serious injury Coverning ap on het radiatic could real to death or serious injury cap. Coverning ad socion for an or an	WARNING - Standing under light tower mast and fixtures during lowering operation could result in death or serious injury. Keep bystanders away from light tower during lowering and raising operations. Part No. 122469-3	▲ Constraints ▲ Constands ▲ Constraints ▲ Constra
WARNING - Exposure to corrosive materials could cause result in death or serious injury. Wear protective gloves when handling battery. Part No. 122467-6	Exposure to controls Water protective gloves Exposure to controls Water protective gloves Exposure to services righty Water protective gloves Exposure to services righty Water protective gloves Toole responsion a dest portant causes la mont portant causes la mont greet. Fourt des gins de protective gloves	WARNING - Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements. Part No. 122469-4	EVERTIME
WARNING - Smoking materials, open flames, or other forms of ignition near the battery could cause explosion resulting in death or serious injury. Keep smoking materials, open flames, or other forms of ignition away from the battery. Part No. 122467-7	Eventuality Constraints Stroking readering, energy constraints, explored readering, energy constraints, energy constrants, energy constraints, energy constraints, energy	WARNING - Raising light tower without positioning outriggers and lowering jacks could cause machine rollover resulting in death or serious injury. Position outriggers and lower jacks on a stable surface before raising light tower. Part No. 122469-5	Events Events <thevents< th=""> <thevents< th=""> <thevents< td="" th<=""></thevents<></thevents<></thevents<>

All Models		All Models	
WARNING - Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Run equipment far from windows, doors and vents. Do not run equipment indoors or in partially enclosed spaces.	Characteristic Construction Constrelisting anding and and and and and and anding and and and and an	Electrical Info Part No. 112133	20 kW 60 Hz 120/208 V 56 A 3 Ø
Part No. 122469-6		Tie-Down Point	
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Always start and operate the engine in a well-ventilated area.	olden angement. - On roll die engine eusept as necessang - Ne pan nette kendeur au natenti auf en cas - de deroende kendeur en de deroende kendeur en de deroende kendeur www.PBSwamings.ca.gov/deset www.PBSWamings.ca.gov/deset.	Forklift Pocket Part No. 107254	
 If in an enclosed area, vent the exhaust to the outside. Do not modify or tamper with 			107254
the exhaust system.		 Oil Drain	
Do not idle the engine except as necessary.		Part No. 107973	
www.P65warnings.ca.gov/diesel Part No. 122469-7			
WARNING - Failure to follow			107973
warnings, instructions and operator's manual could result in death or serious injury. Read and follow operator's manual before operating or servicing this equipment. WARNING - Failure to lower tower into a secured position before towing a secured position before	✓ WARNING	Fluid Containment Drain Part No. 107971	
towing could result in death or serious injury. Lower tower to a secured position before towing. WARNING - Excessive towing speed could result in death or serious injury. Do not exceed 65mph (105km/h) when towing trailer.	A warehouse the second	Coolant Drain Part No. 104752	
Part No. 122463	Events the second	Lift Point Part No. 122480	
Tire Information			122480
Emorraneou Stan		Trailer Serial Number (VIN) Part No. 124879	
Part No. 105567		Checklist / Mode Operations Decal WARNING - Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings. Stop Hybrid Mode before transport and storage. Part No. 125335	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><complex-block><image/><image/></complex-block></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>
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Operation Icons

The following table contains operation icons that may be found on the unit, along with the meaning of each icon.

lcon	Meaning	lcon	Meaning
	Electronic Controller System		Work Light
	Power On	↑⁸1 ⁸	Light Tower Raise
Ο	Power Off	↓ 818 □	Light Tower Lower
Ē	Engine - Engine Mode	()	Engine Oil Drain
	(Lithium Ion) Battery - Battery Mode		Coolant Drain
r N	Engine/Battery - Hybrid Mode or Recharge Mode		Fluid Containment Drain
	Hybrid Light Tower System	*	Circuit Breaker
(Status and Diagnostics	*	Disconnecting Circuit Breaker
	(Lithium Ion) Battery Charger Inlet		(GFCI) Power Outlet
1 3 2 4	Light Fixture Indicator	H	Earth Ground
	Location (GPS)	()	Total Runtime/ Hour Meter
70	Glow Plug	$\langle \rangle$	Remaining Runtime
<u>اللہ</u> ک	Coolant Temperature		Oil Pressure
(- -	(12V Lead Acid) Battery		Fuel
	Temperature	Ā	Power Draw
Ë	Date	Ĩ	Scheduler

Features and Controls

The Allmand® Maxi-Lite® Light Tower is intended for use as a stationary lighting device to illuminate large areas.

Identify the features and controls of the machine by comparing Figures 1 through 3 with the tables following. See *Transporting* and *Operation* for detailed information on each feature / control.



Ref	Description
А	Safety Chains (2)
В	Trailer Coupler / Lunette Ring
С	Tongue Jack
D	Hydraulic Light Tower
E	Light Assembly
F	Light Bar
G	Lifting Eye
Н	Engine and Battery Compartment Access Door
I	Ground Lug
J	Rear Outrigger & Stabilizer Jack (each side)
К	Rear Forklift Pocket / Tie Down Point (each side)
L	Front Forklift Pocket (each side)
М	Front Outrigger & Stabilizer Jack (each side)
Ν	Step Plate
0	Front Tie Down Loop



Ref	Description
А	Engine Compartment Access Door
В	Breakaway Kit
С	License Bracket / Marker Light
D	Engine Oil Drain
E	Fluid Containment Drain
F	Engine Coolant Drain
G	Tail Light (2)
Н	Control Panel Access Door
Ι	Emergency Stop
J	Radiator Access Door



Ref	Description
А	Vanguard 7kWh Batteries (2)
В	12VDC Battery Tender
С	Dual 50 Gallon Fuel Tanks (2)
D	Kubota Z482 Engine
Е	Electronic Control System PDM
F	Fuse Box PDM



Ref	Description
А	Vanguard 1425W 48VDC Battery Charger
В	Permanent Magnet Generator
С	DC to AC 2200W Power Inverter
D	12VDC Battery
E	12V Fuse Array
F	Hydraulic Pump for Vertical Tower
G	AC to DC Rectifier



Ref Description А Electronic Control Display Screen В Electronic Control System On/Off Switch С Tower Up/Down Switch D Mode On/Off Push Button Е Primary Operation CAN 8-Button Pad F 20A GFCI Outlet G 15A Inlet (Battery Charger)

Pre-Operation Checklist

Perform the following checks before transporting and operating the unit, when performing general maintenance, and after the light tower has been stored or idle for a period of time.

Unsafe Operation Hazard

Operating or transporting the machine with worn, damaged or missing parts can result in death or serious injury. Always replace worn, damaged or missing parts promptly. Do not transport or operate the machine until all worn, damaged or missing parts have been replaced, and proper operation of the machine has been verified.

NOTICE

We encourage the use of authorized replacement Allmand parts. The warranty does not cover damage or performance problems caused by the use of parts that are not authorized replacement parts.

- 1. Check that all safety and operation decals are present and legible. See *Safety Safety Decals*.
- 2. Check that all operator's manuals (product, engine, generator, etc.) are with the unit.
- 3. Check the following components for wear and damage, and for proper operation:
 - A. Tongue jack
 - Check for rust or damage. Repair or replace as needed.
 - Check for proper operation. See *Transporting Using The Tongue Jack.*
 - B. Hitch Assembly (trailer coupler / lunette ring)
 - Check for rust or damage. Repair or replace as needed.
 - Check for proper operation. See *Transporting - Coupling And Uncoupling The Trailer Hitch*.
 - Check the hardware securing the trailer hitch assembly in place. Tighten as needed.
 - C. Safety chains
 - Check for rust or damage. Repair or replace as needed.
 - Check the hardware securing the safety chains in place. Tighten as needed.
 - D. Trailer lighting cable
 - Check for cut, frayed or bare wires. Repair or replace as needed.
 - Check connector for damage. Repair or replace as needed.
 - E. Breakaway kit
 - Check for broken or frayed wires or breakaway cable.
 - Check battery charge status.

- F. Tires
 - Check for wear, cuts, cracks, etc. Replace as needed.
 - Check and adjust inflation pressure.
 See *Specifications* for proper inflation pressure.
- G. Brakes
 - Check brakes for proper operation and wear. Repair as needed.
- H. Axle and undercarriage
 - Check for rust or damage. Repair as needed.
- I. Outriggers and stabilizer jacks
 - Check for rust or damage. Repair or replace as needed.
 - Check for proper operation. See
 Operation Using The Outriggers & Stabilizer Jacks.
- J. Electrical wiring and components
 - Check for cut, worn or bare electrical wiring. Repair as needed.
 - Check electrical components for damage or loose wiring. Repair as needed.

Electrocution Hazard

Operating the unit with cut, worn or bare electrical wiring and/or damaged components could result in death or serious injury. Repair or replace damaged wiring and components before operating the light tower.

- K. Engine
 - Check for leaks or other signs of wear or damage. Repair as needed.
 - Check the air cleaner to be sure it is firmly attached, and that the air cleaner seals and hose clamps are properly secured. Check the air cleaner element. Replace if necessary.
- L. Batteries
 - Check the battery casing for cracks, gashes, bulges, warping, or other signs of wear or damage.
 - Check to see if the battery terminals are stripped, damaged, bent or missing.
 - If the battery is damaged, contact an Authorized Service Dealer for more information and instructions.
- M. Light tower
 - Check for worn or frayed cables, hydraulic leaks, etc. Repair as needed.
 - Check and adjust the hydraulic fluid level. See *Maintenance Hydraulic Pump*.

- N. Tower lights
 - Check for broken lenses, bulbs, etc. Repair or replace as needed.
- 4. Check and adjust fluid levels.
 - A. Engine oil
 - Refer to the engine operator's manual for oil recommendations, capacity, and procedures.

NOTICE

Operating engine without oil will cause engine damage.

- B. Engine coolant
 - Refer to the engine operator's manual for coolant recommendations, capacity, and procedures.

NOTICE

Operating engine without coolant will cause engine damage.

C. Fuel

 See Operation - Fueling The Unit for fuel tank location, capacity, and fueling procedures.

Transporting

Unsafe Operation Hazard

Operating the equipment without proper training could result in death or serious injury. Never allow anyone to operate the equipment without proper training.

Before transporting, read Safety.

Preparing For Work Site Delivery

Prepare the unit for delivery to the work site, especially if it has been stored or idle for a period of time.

Unsafe Operation Hazard

Operating or transporting a machine with worn, damaged or missing parts can result in death or serious injury. Always replace worn, damaged or missing parts promptly. Do not operate or transport this machine until all worn, damaged or missing parts have been replaced, and proper operation of the machine has been verified.

- 1. Perform all pre-operation checks. See *Pre-Operation Checklist.*
- Raise and lower the light tower to verify operation. See Operation - Raising And Lowering The Light Tower.
- Run the unit through a startup and shutdown cycle of the various modes to verify operation. See *Operation* - *Operating the Unit.*

4. Turn the tower lights on and off to verify operation. See *Operation - Operating the Unit.*

Preparing For Transport

- Stop the mode of operation and turn off the electronic controller system power switch . See *Operation -Operating the Unit.*
- Lower the light tower and adjust the tower lights into the transport position. See Operation - Raising And Lowering The Light Tower and Operation -Adjusting The Tower Lights.

Tip Hazard

Failure to lower the light tower into the transport position before transporting could result in death or serious injury. Always lower the light tower into the transport position before transporting.

Burn Hazard

Handling the tower lights while hot could result in serious injury. Allow lights to cool before handling or use heat-resistant gloves.

- 3. Retract the outriggers and stabilizer jacks. See *Operation Using The Outriggers & Stabilizer Jacks.*
- 4. Close and lock all access doors.

Towing

Maximum highway speed is 65 mph (105 km/h). Maximum off- highway speed is 20 mph (32 km/h). Do not exceed these speed limits.

Unsafe Operation Hazard

Towing the light tower trailer at highway speeds in excess of 65 mph (105 km/h) could result in death or serious injury. Do not tow the light tower trailer at highway speeds in excess of 65 mph (105 km/h).

Tow vehicle / hitch requirements

- 1. Check the Gross Vehicle Weight Rating (GVWR) of the light tower trailer. See *Specifications*.
- 2. Check the rated towing capacity of the tow vehicle and hitch. Both must meet or exceed the GVWR of the light tower trailer.

NOTICE: Check the vehicle owner's manual and hitch owner's manual for rated towing capacities.



Towing Hazard

Using a tow vehicle or hitch with a rated towing capacity less than the GVWR of the light tower trailer could result in death or serious injury. Use only a tow vehicle and hitch with a rated towing capacity that meets or exceeds the GVWR of the light tower trailer.

Check the tow vehicle hitch type

The light tower trailer is designed for the following types of tow vehicle hitches:

- 2" ball hitch
- Pintle hitch
- 2-5/16" ball hitch
- 2" Bulldog hitch

Be sure the tow vehicle is equipped with either of these hitch types. Install if needed.

Unsafe Operation Hazard

Failure to use a tow vehicle hitch that mates with the trailer hitch assembly could result in death or serious injury. Use only a tow vehicle hitch that mates with the trailer hitch assembly.

Reversing the trailer hitch assembly

The trailer hitch assembly is reversible. Use the trailer coupler (A, Figure 6) for ball hitches, or the lunette ring (B, Figure 6) for pintle hitches. To reverse the trailer hitch assembly:

- 1. Remove the mounting hardware (C, Figure 6).
- 2. Reverse the trailer hitch assembly.

NOTICE: Use the set of mounting holes in the trailer tongue that will keep the trailer as level as possible when connected to the tow vehicle.

3. Reinstall the hardware. Tighten securely.

Unsafe Operation Hazard

Failure to properly install the trailer hitch assembly could result in death or serious injury. Install the trailer hitch assembly properly, and tighten the hardware securely.



Connect the light tower trailer to the tow vehicle

1. Position a wheel chock (not supplied) firmly against the front and rear of the wheel (A, Figure 7) on each side of the light tower trailer.



- 2. Use the tongue jack to raise the trailer tongue. See *Transporting Using The Tongue Jack.*
- 3. Position the tow vehicle hitch under the trailer hitch.
- 4. Couple the trailer hitch to the tow vehicle hitch. See *Transporting Coupling And Uncoupling The Trailer Hitch.*
- 5. Connect the safety chains.
 - A. Connect the safety chains (A, Figure 8) to the safety chain pockets on the tow vehicle. Crisscross the chains under the hitch to cradle the hitch in the event of a disconnect.
 - B. Rig the chains as tightly as possible while allowing enough slack to permit free turning.

Unsafe Operation Hazard

Failure to properly install safety chains could result in death or serious injury. Always properly install safety chains.

- 6. Connect the trailer lighting cable.
 - A. Make sure the trailer lighting cable mates with the tow vehicle lighting cable. If needed, install the proper cable and/or connector to the tow vehicle.
 - B. Connect the trailer lighting cable to the tow vehicle lighting cable (B, Figure 8).
 - C. Make sure there is adequate slack to allow for turning without allowing the cable to drag on the ground.
 - D. Check the trailer lights for proper operation.

Unsafe Operation Hazard

Failure of trailer lights to operate properly could result in death or serious injury. Always check for proper operation of trailer lights, and repair or replace as needed.



- 7. Retract the tongue jack. See *Transporting Using The Tongue Jack.*
- 8. Remove the wheel chocks.
- 9. The trailer is now ready for towing.

To disconnect the trailer from the tow vehicle

- 1. Chock the wheels.
- 2. Deploy the tongue jack. See *Transporting Using The Tongue Jack.*
- 3. Disconnect the trailer lighting cable from the tow vehicle lighting cable.
- 4. Remove the safety chains from the safety chain pockets on the tow vehicle.

- 5. Uncouple the trailer hitch from the tow vehicle hitch. See *Transporting - Coupling And Uncoupling The Trailer Hitch.*
- 6. Move the tow vehicle away from the unit.

Using The Tongue Jack

The unit is equipped with a tongue jack to raise and lower the trailer tongue, and to level the trailer front-to-rear.

To deploy the tongue jack

- 1. Remove the jack locking pin (A, Figure 9).
- Rotate the tongue jack 90° into the operating position (B, Figure 9). Install the jack locking pin (C).
- 3. Unfold the jack handle into the operating position (D, Figure 9).

Unsafe Operation Hazard

Failure to install the jack locking pin could result in death or serious injury. Be sure the tongue jack is locked in the operating position with the jack locking pin.

To lower the jack foot (raise the trailer tongue)

• Turn the jack handle counterclockwise (E, Figure 9) to lower the jack foot (F) and raise the trailer tongue.

To raise the jack foot (lower the trailer tongue)

• Turn the jack handle clockwise (G, Figure 9) to raise the jack foot (H) and lower the trailer tongue.

To retract the tongue jack

Unsafe Operation Hazard

Failure to support the trailer tongue before retracting the tongue jack could result in death or serious injury. Be sure the trailer tongue is securely supported before retracting the tongue jack.

- 1. Be sure the trailer is securely supported by the tow vehicle or other approved means.
- 2. Fully raise the jack foot.
- 3. Fold the jack handle into the transport position (I, Figure 9).
- 4. Remove the jack locking pin.
- 5. Rotate the tongue jack 90° into the transport position (J, Figure 9). Install the jack locking pin.



Using the Trailer Coupler / Lunette Eye

Trailer Coupler

To connect the trailer to the tow vehicle

- Lift up and pull back on the locking latch (A, Figure 10) of the trailer coupler.
- 2. Lower the trailer coupler onto the vehicle ball hitch. Make sure that the hitch ball (B, Figure 10) is fully engaged in the coupler socket (C, Figure 10).
- Push the locking latch forward and down. (It is selflocking.) Install a padlock through the latch hole (D, Figure 10) for added security.
- 4. Make sure that the coupler is fully installed on the ball hitch.

To disconnect the trailer from the tow vehicle

- 1. Remove the padlock (if installed) from the trailer coupler latch (D, Figure 10).
- 2. Lift the trailer coupler (A, Figure 10) latch up and back.



Lunette Eye

To connect the trailer to the tow vehicle

- 1. Remove the locking pin (A, Figure 11, if equipped) from the pintle hitch (B, Figure 11).
- 2. Pull up on the latch (C, Figure 11), to open the pintle hitch.
- 3. Lower the lunette eye (D, Figure 11) into the pintle hook (E, Figure 11).
- 4. Close the pintle hitch. Make sure that the latch locks the pintle hitch in place.
- 5. Install the locking pin (if equipped).

To disconnect the trailer from the tow vehicle

- 1. Remove the locking pin (if equipped) from the pintle hitch.
- 2. Pull up on the latch to open the pintle hitch.
- 3. Remove the lunette eye from the pintle hook.



Lifting

Lifting equipment requirements

 Use only approved lifting equipment with a rated lifting capacity that exceeds the GVWR of the unit. See *Specifications.*



Unsafe Operation Hazard

Failure to use approved lifting equipment with a rated lifting capacity that exceeds the GVWR of the unit could result in death or serious injury. Use only approved lifting equipment with a rated lifting capacity that exceeds the GVWR of the unit.

Before lifting

• Be sure the light tower is fully lowered and locked in the transport position. See *Operation - Raising And Lowering The Light Tower.*



Rollover Hazard

Failure to lower the light tower before lifting the unit could result in death or serious injury. Always lower the light tower before lifting the unit.

Lifting points

- Lifting eye (A, Figure 12) Use only shackles or a locking type hook when using the lifting eye.
- Forklift pockets (B, Figure 12) Use forklift blades at least 60" (152 cm) long when lifting the unit. Insert the forklift blades fully into the forklift pockets.

Unsafe Operation Hazard

Failure to use the designated lifting points to lift the unit could result in death or serious injury. Use only the designated lifting points to lift the unit.

Unsafe Operation Hazard

Failure to properly lower and lock the tower could result in death or serious injury. Always be sure to properly lower and lock the tower before attempting to lift the unit.

Crush Hazard

Standing under or near the unit while it is being lifted could result in death or serious injury. Never stand under or near the unit while it is being lifted.



Transporting on a Trailer

Three tie-down points, located on the bottom rear of the trailer (forklift pockets on right and left sides) and the underside of the trailer tongue (A, Figure 13), are used to secure the unit to a transport trailer.

NOTICE: All models have similar tie-down point locations.

Unsafe Operation Hazard

Failure to use the designated tie-down points to secure the unit to the transport trailer could result in death or serious injury. Always use the designated tie-down points to secure the unit to the transport trailer.



1. Secure the unit at the tie-down points with appropriately rated chains or straps.

Unsafe Operation Hazard

Failure to use appropriately rated chains or straps to secure the unit to the transport trailer could result in death or serious injury. Always use appropriately rated chains or straps to secure the unit to the transport trailer.

- 2. Do not apply more than 600 lbs (272 kg) force on the chains or straps.
- 3. The truck operator is responsible for securing the load properly to the transport trailer.



Operation

Before operating, read Safety.

Choosing the Work Site

Obey state, province and federal rules and regulations, as well as rules or instructions for the work site.

Consider the following when choosing a work site:

- 1. Ground surface
 - Set up on smooth, flat, solid ground surfaces only.
 - Do not set up on inclines of more than 2.8° (5% grade) front-to-back and side-to-side.



Rollover Hazard

Setting up the unit on soft or unstable ground, or on inclines of more than 2.8° (5% grade), could result in death or serious injury. Set up the unit only on smooth, flat solid ground surfaces with inclines of no more than 2.8° (5% grade).

- 2. Overhead obstructions
 - Consider the height of the light tower when fully raised. See *Specifications.*
 - Avoid areas with trees and power lines
 - Other overhead obstructions



Electrocution Hazard

Raising the light tower in the presence of electrical power lines will result in death or serious injury. Always check for overhead wires and obstructions before raising the light tower.

3. Wind

The unit is designed to operate in winds up to 55 mph (88 km/h). Do not operate in winds exceeding 55 mph (88 km/h).

<u> warning</u>

Rollover Hazard

Operating in winds over 55 mph (88 km/h) could result in death or serious injury. Never operate in winds exceeding 55 mph (88 km/h).

Setting Up the Unit

- 1. Position the unit at the work site. See **Operation - Choosing The Work Site.**
- 2. Chock the wheels. See *Transporting Towing.*
- 3. If the unit was towed to the work site, disconnect from the tow vehicle. See *Transporting Towing.*
- 4. Level the trailer using the tongue jack. See *Transporting Using The Tongue Jack.*
- 5. Deploy the outriggers and stabilizer jacks. See *Operation - Using The Outriggers & Stabilizer Jacks.*
- 6. Adjust the tower lights. See **Operation Adjusting** *The Tower Lights.*
- 7. Raise the light tower. See **Operation Raising And Lowering The Light Tower.**
- 8. The unit is now set up and ready for operation.

Using the Outriggers and Stabilizer Jacks



Rollover Hazard

Failure to deploy the outriggers and stabilizer jacks could result in death or serious injury. Always deploy the outriggers and stabilizer jacks before raising the light tower.

To deploy

- 1. Raise the outrigger locking pin (A, Figure 14).
- 2. Fully extend the outrigger (B, Figure 14) until the locking pin engages the outrigger in the operating position.



Rollover Hazard

Failure to lock the outrigger in the operating position could result in death or serious injury. Be sure the outrigger is locked in the operating position.

- 3. Remove the stabilizer jack locking pin (C, Figure 14).
- 4. Rotate the stabilizer jack (D, Figure 14) 90° into the operating position, and install the stabilizer jack locking pin. Make sure the pin is inserted fully through the stabilizer jack.



Rollover Hazard

Failure to lock the stabilizer jack in the operating position with the stabilizer jack locking pin could result in death or serious injury. Be sure the stabilizer jack is locked in the operating position with the stabilizer jack locking pin.

- 5. Unfold the jack handle (E, Figure 14) to the operating position.
- Turn the jack handle counterclockwise (F, Figure 14) until the jack foot (G) is firmly planted on the work site surface.
- 7. Repeat for the remaining outriggers and stabilizer jacks.
- 8. Once all outriggers and stabilizer jacks are deployed, use the stabilizer jacks to help level the unit on the work site ground.

To retract

- 1. Turn the jack handle clockwise to fully raise the jack foot.
- 2. Fold the jack handle to the transport position.

- 3. Remove the stabilizer jack locking pin.
- 4. Rotate the jack 90° to the transport position, and install the stabilizer jack locking pin. Make sure the pin is inserted fully through the stabilizer jack.
- 5. Raise the outrigger locking pin.
- 6. Retract the outrigger into the transport position. Be sure the locking pin engages.

Unsafe Operation Hazard

Failure to lock the outrigger in the transport position could result in death or serious injury. Be sure the outrigger is locked in the transport position.

7. Repeat for the remaining outriggers and stabilizer jacks.



Adjusting The Tower Lights



Burn Hazard

Adjusting the tower lights while the lights are hot could result in serious injury. Allow lights to cool before handling, or use heat-resistant gloves.

NOTICE: The tower lights must be adjusted to the preferred work angle before raising the light tower.

To adjust for operation

- 1. Set the light bar to the preferred work angle.
 - A. Pull the park pin (A, Figure 15) and rotate 90° to unlock the light bar.
 - B. Rotate the light bar to the preferred work angle.
 - C. Pull the park pin and rotate back 90° to lock the light bar in place.
- 2. Set the tower arms to the preferred work angle.
 - A. Loosen the adjustment nut (B, Figure 15) on each tower arm.
 - B. Pull the park pin (C, Figure 15) and rotate 90° to unlock each tower arm.
 - C. Rotate each tower arm to the preferred work angle.
 - D. Lock each tower arm with the park pin.
 - E. Tighten the adjustment nuts.
- 3. Set each individual LED light fixture to the preferred work angle.
 - Yoke center pivot (D, Figure 15) adjusts the horizontal angle of each individual light fixture. Grasp the sides of the yoke to adjust.
 - Fixture pivots adjust the vertical angle of each individual light fixture. Open the locking clasp (E, Figure 15), move the light fixture up or down to adjust, then close the locking clasp.



To adjust for transport / storage

- 1. Set the light bar to the transport position.
 - Rotate the light bar front-to-back. See Figure 16.
 - B. Pull the park pin and rotate 90° to lock the light bar.
- 2. Set the tower arms to the transport position.
 - A. Loosen the adjustment nut on each tower arm.
 - B. Rotate each tower arm to set the light fixture yokes to a horizontal position. See Figure 16.
 - C. Tighten the adjustment nuts.

3. Rotate the fixture yokes and light fixtures to be parallel with the light bar. See Figure 16. Lock the light fixtures with the locking clasp.



Raising And Lowering The Light Tower

Crush Hazard

Raising or lowering the light tower with obstructions or people near the light tower could result in death or serious injury. Be sure the area is clear of people and obstructions before raising or lowering the light tower.

NOTICE: The unit does not need to be on in mode operation to raise or lower the light tower.

NOTICE: Raising or lowering the tower during run operaton of any of the modes will stop the mode and will require a restart. See **Operating The Unit** for more information on the operating modes.

To raise the light tower

- 1. Move the tower switch (A, Figure 17) on the control panel to the UP position to raise the tower to the preferred height.
- 2. Tower must be raised prior to operating the unit and turning on the tower lights. See *Operating the Unit.*

To lower the light tower

- Turn off the tower lights and shut down the unit before lowering the light tower. See *Operating The Unit.*
- 2. Move the tower switch (A, Figure 17) on the control panel to the DOWN position until the tower is fully lowered.
- 3. Hold the tower switch in the DOWN position for three additional seconds, to make sure the tower is fully lowered.



Setting The Inverter

The inverter is located inside the engine compartment, mounted on the bottom side of the stringer. The inverter powers auxilary GFCI outlet on the control panel. See *Auxilary AC Outlet*.

- 1. Set voltage on inverter.
- 2. Check that the power cords are securely and correctly connected to the inverter.
- 3. Turn ON/OFF switch on inverter to the ON/I position.

For more information on the operation and functionality of the inverter refer the inverter operator's manual.

Fueling The Unit

Two fuel tanks are located inside the engine compartment, one on each side of the unit, each with a filler cap.

To fuel

- 1. Open the engine compartment access doors to access the fuel tanks.
- 2. Open the filler cap(s).
- Add fuel as needed. Refer to the engine operator's manual for fuel recommendations. See *Specifications* for fuel capacity.

NOTICE

Using engine fuels other that those recommended by the engine manufacturer could cause damage to your engine or its emission control system resulting in voiding the engine manufacturer's warranty. Always read and follow the engine manufacturer's fuel recommendations.

NOTICE

Pressurized fueling is not allowed.

Operating The Unit Before Operating

- 1. Perform pre-operation checks. See *Pre-Operation Checklist.*
- 2. Make sure the unit is set up properly at the work site. See *Operation - Setting Up The Unit.*

Main Control Panel Layout

The light tower is powered on via the electronic controller system power switch located to the left side of the user interface screen, the screen will power up and you will see the user control panel lighting come online, it's also expected to hear a beep and a few clicks which is related to the various sub-systems powering up. The light tower when powered on will always default to Battery Mode. Identify the controls of the control panel in Figure 18 with the following table.



Ref	Description
A	Electronic Display Screen - User feedback, set-up and diagnostics and machine controller (See <i>Electronic Display Screen Layout</i>)
В	Electronic Control System Switch On - Required for all other functionality including mast lift or drop
С	Electronic Control System Switch Off - Nothing happens when off except the shore power from the battery charging port will charge the 48VDC batteries
D	Mode Push Button On/Off - Initiates the start of a mode (See for or the engine once selected by the control pad
E	Tower Up/Down Switch - Only works when Power on, active at all times when power is on regardless of mode or intensity, a mast actuation by a user when in hybrid mode will disable it, requiring that it be re-acknowledged

Ref	Description
F	Primary Operation CAN 8-Button Pad - See <i>Mode and Lighting</i> Control Pad
G	AC 110V 20A GFCI Outlet - Powered by DC to AC 2200W inverter
Н	20A Thermal Breaker - Circuit for AC 120V 20A GFCI outlet
I	AC 120V 15A Inlet (Battery Charger) - Connected to a built in 1425 W charger which will charge the 48VDC batteries when the machine is off or when it is in BATTERY Mode

Mode and Lighting Control Pad

This Pad is used to select operating mode, to manually control lights on/off state and light intensity and to engage Auto light control mode where either Sunset/Sunrise or selected Timed Events . The light intensity level controls all lights and ranges from 100W up to 350W in 50W increments providing a total lighting output window from 100W up to 1400W. Button color and solid vs. blinking varies by Mode and status and will be noted later. Identify the buttons of the control pad in Figure 19 with the following table.



Ref	Description
A	Mode Select Button - Pressing this button moves through the four operational modes starting with "BATTERY" - Green button, "HYBRID" - Blue button, "ENGINE" - Red button & "RECHARGE" - White button, button light flashes until the mode is started via the Mode On/Off button at which time it becomes solid
В	Auto Light Mode Select Button - When active/on automatically turns lights on and off per Auto Light Set-up
С	On/Off Light Control Button - These four buttons turn the lights on and off
D	MAX Light Control Button - Set the light intensity up to 350W
E	MIN Light Control Button - Set the light intensity down to 100W

Electronic Display Home Screen Layout

This touch screen is used to display all of the operating features and functionality of Hybrid LT-Series electronic control operating system. The screen controls user feedback, set-up, and diagnostics of the machine. Identify the features of the home screen in Figure 20 with the following table.



Ref	Description
А	Mode Selected Display (Hybrid, Battery, Engine, or Recharge)
В	GPS Location Display
С	Manual or Auto Lighting Control Display
D	Runtime Estimator
E	Date Display (00/00/00)
F	Clock Display (24:00)
G	Battery System Current +/- (Not used for engine mode)
Н	Fuel Level Remaining
I	Battery Power Remaining (Not used for engine mode)
J	Tower System Set-Up Button
К	Light Hour Display
L	Light Fixture On/Off Indicator
М	Engine Hour Display
Ν	Engine Glow Plug Display
0	Battery Status and Diagnostics Button
Р	Engine Status and Diagnostics Button
Q	Lighting Output (Insensity) Display (Per Light & Lighting Total)

Electronic Control System Setup

Initial setup of the electronic control system is required by the end user to set date, time, and location for operation of the hybrid light tower unit.

NOTICE: Location is preset to Holdrege, Nebraska, and the Date and Time are populated on the display based on the time at which the controller battery was first installed by the manufacturer.

NOTICE: Date, time, location, and day light savings must be set in order for Auto Lighting to operate correctly. See **Auto Lighting Operation.** 1. Press the SETUP button (A, Figure 21) on the home screen display to access the setup screen.



Set the date: Touch the date 00/00/0000 (A, Figure 22) on the setup screen. This will open the date setup pop-up screen. To set the month, touch the up and down arrows on the left (B, Figure 22). To set the day, touch the up and down arrows in the middle (C, Figure 22). To set the year, touch the up and down arrows on the right (D, Figure 22). NOTICE: Date is shown as month/day/year. Touch the SET DATE button (E, Figure 22) to save the setting. Touch the X button (F, Figure 22) at any time to exit the pop-up screen.



 Set the time: Touch the time 00:00 (A, Figure 23) on the setup screen. This will open the time setup popup screen. To set the hour, touch the up and down arrows on the left (B, Figure 23). To set the minutes, touch the up and down arrows on the right (C, Figure 23). NOTICE: Time is shown using a 24 hour clock display. Touch the SET TIME button (D, Figure 23) to save the setting. Touch the X button (E, Figure 23) to at any time exit the pop-up screen.



 Set the temperature scale: Touch the temperature slider (A, Figure 24) on the setup screen. Slide to the right to set temperature scale to Fahrenheit (°F) or slide to the left to set to Celisus (°C).



Set the location: Touch the location SET button (A, 5. Figure 25) on the setup screen. This will open the location setup pop-up screen. First, set the latitude (N+/S-) location (B, Figure 25) by using the touch pad to input the desired negitive or positive decimal coordinates, then press the enter button (C. Figure 25). Next, set the longitude (E+/W-) location (D, Figure 25) by using the touch pad to input the desired negitive or positive decimal coordinates, then press the enter button again. The location is now set, and the latitude and longitude coordinates (E, Figure 25) should now show near the upper left corner of the screen. NOTICE: Location must set in order for the sunset/sunrise setting in Auto Lighting to operate correctly. Touch the X button (F, Figure 25) at any time to exit the pop-up screen.

English (en)



 Set the daylight savings time (DST): Touch the DST slider (A, Figure 26) on the setup screen. Slide to the right to enable DST (-1:00) or slide to the left to disable. NOTICE: Daylight saving time with location must set in order for the sunset/sunrise setting in Auto Lighting to operate correctly.



- 7. For auto lighting settings see *Auto Lighting Operation.*
- 8. For advanced settings see *Electronic Control System Advanced Settings.*

Hybrid Mode Operation

Carbon Monoxide Hazard

Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings. Stop Hybrid Mode before transport and storage.

Hybrid mode run operation powers the light tower with energy from the engine and two lithium ion batteries. Engine charges the lithium ion batteries in this mode.

Hybrid Mode Start

- 1. Raise the tower. See *Raising And Lowering The Light Tower.*
- 2. Set the electronic controller system power switch to the ON/I position (B, Figure 27).

NOTICE: Setting the electronic controller system switch to ON/I position will automatically default the system to battery mode before making a mode selection.

- 3. Press the MODE SELECT button (C, Figure 27) until the button light changes to the color blue and hybrid mode (D, Figure 27) is shown on the control screen.
- 4. Read the acknowledgement pop-up on the screen for hybrid mode.
- 5. Press the MODE ON/OFF button (E, Figure 27) to initiate hybrid mode run operation.

NOTICE: Raising or lowering the tower during the run operation of the hybrid mode will stop the mode and will require a restart.

- Press the on/off light control buttons (F, Figure 27) to set lights 1 through 4 to either ON/I or OFF/O operation. ON/I operation will be indicated with each button lit to the color red along with each fixture number (G, Figure 27) lit up on the control screen. The total number of light watts (H, Figure 27) will also change on the screen with either ON/I or OFF/O operation of each light.
- Press either the MAX (I, Figure 27) or MIN light control button (J, Figure 27) to set the light intensity from 100W up to 350W. The watt number per light (K, Figure 27) on the control screen will change with each intensity see

Hybrid Mode Stop

- 1. Press the MODE ON/OFF button (E, Figure 27) to stop hybrid mode run operation.
- 2. Set the electronic controller system power switch (L, Figure 27) to the OFF/O position.
- 3. Lower the tower. See *Raising And Lowering The Light Tower.*



Battery Mode Operation

Battery mode run operation powers the light tower with energy from only the lithium ion batteries. Plug-in battery recharge ONLY works in this mode or when the unit's system is completely shut down.

Battery Mode Start

- 1. Raise the tower. See *Raising And Lowering The Light Tower.*
- 2. Set the electronic controller system power switch to the ON/I position (B, Figure 28).

NOTICE: Setting the electronic controller system switch to ON/I position will automatically default the system to battery mode before making a mode selection.

- 3. Press the MODE SELECT button (C, Figure 28) until the button light changes to the color green and battery mode (D, Figure 28) is shown on the control screen.
- 4. Read the acknowledgement pop-up on the screen for battery mode.
- 5. Press the MODE ON/OFF button (E, Figure 28) to initiate battery mode run operation.

NOTICE: Raising or lowering the tower during the run operation of the battery mode will stop the mode and will require a restart.

 Press the on/off light control buttons (F, Figure 28) to set lights 1 through 4 to either ON/I or OFF/O operation. ON/I operation will be indicated with each button lit to the color red along with each fixture number (G, Figure 28) lit up on the control screen. The total number of light watts (H, Figure 28) will also change on the screen with either ON/I or OFF/O operation of each light. Press either the MAX (I, Figure 28) or MIN light control button (J, Figure 28) to set the light intensity from 100W up to 350W. The watt number per light (K, Figure 28) on the control screen will change with each intensity see

Battery Mode Stop

- 1. Press the MODE ON/OFF button (E, Figure 28) to stop battery mode run operation.
- 2. Set the electronic controller system power switch (L, Figure 28) to the OFF/O position.
- 3. Lower the tower. See *Raising And Lowering The Light Tower.*



Engine Mode Operation



Carbon Monoxide Hazard

Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings.

Engine mode run operation powers the light tower with energy from only the engine. No lithium ion battery recharge occurs in this mode.

Engine Mode Start

- 1. Raise the tower. See *Raising And Lowering The Light Tower.*
- 2. Set the electronic controller system power switch to the ON/I position (B, Figure 29).



NOTICE: Setting the electronic controller system switch to ON/I position will automatically default the system to battery mode before making a mode selection.

- 3. Press the MODE SELECT button (C, Figure 29) until the button light changes to the color red and engine mode (D, Figure 29) is shown on the control screen.
- 4. Read the acknowledgement pop-up on the screen for engine mode.
- 5. Press the MODE ON/OFF button (E, Figure 29) to initiate engine mode run operation.

NOTICE: Raising or lowering the tower during the run operation of the engine mode will stop the mode and will require a restart.

- Press the on/off light control buttons (F, Figure 29) to set lights 1 through 4 to either ON/I or OFF/O operation. ON/I operation will be indicated with each button lit to the color red along with each fixture number (G, Figure 29) lit up on the control screen. The total number of light watts (H, Figure 29) will also change on the screen with either ON/I or OFF/O operation of each light.
- Press either the MAX (I, Figure 29) or MIN light control button (J, Figure 29) to set the light intensity from 100W up to 350W. The watt number per light (K, Figure 29) on the control screen will change with each intensity see

Engine Mode Stop

- 1. Press the MODE ON/OFF button (E, Figure 29) to stop engine mode run operation.
- 2. Set the electronic controller system power switch (L, Figure 29) to the OFF/O position.
- 3. Lower the tower. See *Raising And Lowering The Light Tower.*

Recharge Mode Operation

Carbon Monoxide Hazard

Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings.

Recharge mode run operation uses the engine to recharge the lithium ion batteries. No light function occurs in this mode. Plug-in battery recharge does not work in this mode.

Recharge Mode Start

1. Set the electronic controller system power switch to the ON/I position (A, Figure 30).

NOTICE: Setting the electronic controller system switch to ON/I position will automatically default the system to battery mode before making a mode selection.

- 2. Press the MODE SELECT button (B, Figure 30) until the button light changes to the color white and recharge mode (C, Figure 30) is shown on the control screen.
- 3. Read the acknowledgement pop-up on the screen for recharge mode.
- 4. Press the MODE ON/OFF button (D, Figure 30) to initiate recharge mode run operation.

Recharge Mode Stop

- 1. Press the MODE ON/OFF button (B, Figure 30) to stop engine mode run operation.
- 2. Set the electronic controller system power switch (E, Figure 30) to the OFF/O position.





Auto Lighting Operation

Carbon Monoxide Hazard

Engine exhaust contains carbon monoxide, a poisonous gas that could cause death or serious injury. Do not use this product indoors or near dwellings. Stop Auto Lighting before transport and storage.

Auto lighting uses Hybrid or Engine mode operation to power the light tower automatically.

Auto Lighting Initial Setup

1. Press the SETUP button (A, Figure 31) on the home screen display to access the setup screen.



- Make sure that the date (A, Figure 32), time (B, Figure 32), location (C, Figure 32), and daylight savings (D, Figure 32) are set correctly. See *Electronic Control System Setup* to adjust these settings.
- Touch the auto lighting SET button (E, Figure 32) on the setup screen. This will open the auto lighting screen to set unit up for either sunset/sunrise or timed events settings.



Sunset/Sunrise Auto Lighting Setup

- Set sunset/sunrise auto lighting:
 - A. Touch the sunset/sunrise-timed events slider (A, Figure 33) on the auto lighting screen. Slide to the left to set sunset/sunrise to on. The time that the light will turn on and off will automatically populate the box (B, Figure 33) on the right hand of the screen and will reflect the sunset and sunrise times box (C, Figure 33) unless sunset/sunrise offset times have been set. The on/off operation of the lights will be based on the location and day light savings settings.
 - B. Set the light intensity by touching the up and down arrows (D, Figure 33) on the lower right of the screen. Set the desired light intensity from 100W up to 350W.



C. Touch either the sunset offset time (A, Figure 34) or the sunrise offset time (B, Figure 34) to open the offset time setup pop-up screen. To ajdust the sunset offset, touch the up and down arrows (C, Figure 34) to set the time. To ajdust the sunrise offset, touch the up and down arrows (D, Figure 34) to set the time. NOTICE: Sunset/sunrise offset time can be set to either +/- 4:00 in 15 minute increments. Touch the UPDATE button (E, Figure 34) to save the setting.

English (en



D. Touch the scheduler SET/VIEW button (A, Figure 35) on the auto lighting screen. This will open the sunset/sunrise week set screen. Select the on/off operation for each desired day by touching the day of the week (SU-MO-TU-WE-TH-FR-SA) buttons (B, Figure 35). On operation will be indicated with the day of the week button being highlighted with the work light shown with a green number 1. Off operation will be indicated by the day of week button being darkened with the work light shown with a red number 0. Touch the return button (C, Figure 35) to set the days and exit the sunset/sunrise week set screen.



Timed Events Auto Lighting Setup

- Set timed events auto lighting:
 - A. Touch the sunset/sunrise-timed events slider (A, Figure 36) on the auto lighting screen. Slide to the right to set timed events to on.
 - B. Set the light intensity by touching the up and down arrows (B, Figure 36) on the lower right of the screen. Set the desired light intensity from 100W up to 350W.

NOTICE: All four lights will turn on in Auto Lighting operation.



- C. Touch the scheduler SET/VIEW button (A, Figure 37a) on the auto lighting screen. This will open the timed events week set screen. Select the on/off operation for each desired day by touching the day of the week (SU-MO-TU-WE-TH-FR-SA) buttons (B, Figure 37a). ON/I operation will be indicated with the day of the week button being highlighted with the work light shown with a green number 1. OFF/O operation will be indicated by the day of week button being darkened with the work light shown with a red number 0.
- D. Touch the ON/I work light time (C, Figure 37a) to set the time the light will turn on. This will open the time setup pop-up screen. To set the hour, touch the up and down arrows on the left (D, Figure 37b). To set the minutes, touch the up and down arrows on the right (E, Figure 37b). NOTICE: Time is shown using a 24 hour clock display. Touch the SET TIME button (F, Figure 37b) to save the setting. Touch the X button (G, Figure 37b) to at any time exit the pop-up screen.
- E. Repeat step, for OFF/O work light time (H, Figure 37a) to set the time the will turn off. NOTICE: The work light on and off operating time will set for each day that selected for ON operation.
- F. Touch the return button (I, Figure 37a) to set the days and exit the timed events week set screen.



Auto Lighting Start

 Press the tower raise/lower switch in the UP position (A, Figure 38) to raise the tower for operation.
 NOTICE: Raising or lowering the tower during the run operation of the mode will stop the mode and will require a restart.

🗔 1012:28 🖳 1798:33

5

- 2. Set the electronic controller system power switch to the ON/I position (B, Figure 38).
- 3. Set auto lighting for Sunset/Sunrise or Timed Events. See *Sunset/Sunrise Auto Lighting Setup* or *Timed Events Auto Lighting Setup.*
- 4. Set unit for either Hybrid or Engine Mode Operation. See *Hybrid Mode Operation* or *Engine Mode Operation*.
- 5. Press the AUTO button (C, Figure 38) on the control pad. The button light will change to the color red and auto lighting on (D, Figure 38) is shown on the control screen. The unit is now set for auto lighting operation.

Auto Lighting Stop

- 1. Press the AUTO button (C, Figure 38) on the control pad. The button light shut off and manual light control will now be shown on the control screen.
- 2. Press the MODE ON/OFF button (E, Figure 38) to stop hybrid mode run operation.
- 3. Set the electronic controller system power switch (F, Figure 38) to the OFF/O position.
- 4. Press the tower raise/lower switch in the DOWN position (G, Figure 38) to lower the tower.



Auxiliary AC Outlet

The light tower unit comes equipped with an auxiliary 20A 110V AC GFCI outlet (A, Figure 39). Power is supplied to the outlet via the on-board inverter when the unit is running in Hybrid or Engine mode.

The GFCI outlet is protected by a dedicated circuit breaker (B, Figure 39). If a breaker trips:

- 1. Disconnect the load from the outlet.
- 2. Shut down the unit.
- 3. Wait 10 minutes for the unit to cool down.
- 4. Correct the load problem.
- 5. Restart the unit in Hybrid or Engine mode.
- Reset the breaker. NOTICE: Be sure to also check the GFCI breaker on the GFCI outlet and reset if necessary.
- 7. Reconnect the load.
- 8. If the problem persists, see *Troubleshooting.*



Battery Charger AC Inlet

The light tower unit comes equipped with an 15A 120V AC inlet (A, Figure 40) that is connected to a built-in 1425W battery charger. The battery charger will charge the two 7kWh 48VDC batteries when the light tower unit is shut off or when it is in battery mode.



Emergency Stop

The unit has an emergency stop that will immediately shut the entire unit down in case of an emergency.

To Engage:

• Push the emergency stop (A, Figure 41).

To Disengage:

• Pull the emergency stop.

Make sure that the issue that required an emergency stop is addressed before beginning unit run operation again.

Do not use the emergency stop to shut down the unit during normal operation. See *Shutting Down The Unit*.



Electronic Control System Advanced Settings

Press Advanced Settings SET button (A, Figure 42a) on the Setup screen to access Advanced Settings screen. This will open the password pop-up screen. The end user will have to use the factory set preprogrammed passcode 5555 to gain access. Use the touch number pad (B, Figure 42a) to enter the four digit passcode, then press the enter button (C, Figure 42a). Touch the X button (D, Figure 42a) to at any time exit the pop-up screen.

There are two main functions for the end user on this screen, one is to change the default passcode to a new user defined passcode and the second is to disable the usage of engine based operating modes (Hybrid, Engine and Recharge). For all other functions of the Advanced Settings screen contact Allmand Parts & Service for more information.

- Set passcode: Touch the Set Password SET button (E, Figure 42b) on the advanced settings screen. This will open the passcode setup pop-up screen. Follow on screen instructions for setting new passcode.
- To enable/disable the engine, Touch the engine lockout slider (F, Figure 42b) on the advancing settings screen. Slide to the right to enable engine lockout or slide to the left to disable engine lockout.

NOTICE: Recovery of a forgotten new password entered by an end user requires that the software be re-installed to return it back to the preprogrammed default code. The engine and light hours tracking will transfer over but other parts of the set-up will need to be redone.



42b

02/20/25 9:33 44.4379 ADVANCED SETTINGS HYBRID SET SE1 SET PASSWORD TEST ENGINE MANUAL ENGINE CONTROL LOCKOUT Έ F PDM DIAGNOSTICS 5 **C** 1012:28 **C** 1798:33

Shutting Down The Unit

- 1. Shut down the hybrid tower unit. See *Operation Operating The Unit.*
- 2. Lower the light tower. See **Operation Raising And Lowering The Light Tower.**
- 3. Adjust the lights to the transport position. See *Operation Adjusting The Tower Lights.*

Burn Hazard

Handling hot light fixtures could result in serious injury. Allow lights to cool before handling, or use heat- resistant gloves.

- 4. Retract the stabilizer jacks and outriggers. See *Operation - Using The Outriggers & Stabilizer Jacks.*
- 5. The unit is now ready for transport. See *Transporting.*

Maintenance

Before performing any maintenance, read Safety.

Scheduled maintenance is necessary for safe and effective operation of the unit. Under extreme conditions (dusty conditions, extreme heat or cold, etc.), more frequent maintenance may be required.

Unsafe Operation Hazard

Operating or transporting a machine with worn, damaged or missing parts could result in death or serious injury. Replace worn, damaged or missing parts promptly. Do not operate or transport the machine until all worn, damaged or missing parts have been replaced, and proper operation of the machine has been verified.

General

Use the pre-operation checklist as a general maintenance guideline. See *Pre-Operation Checklist.*

Engine

For engine service intervals and other recommendations specific to this light tower unit refer to **Specifications**. Refer to the Engine Operator's Manual for all other scheduled engine maintenance procedures.

Engine Oil Drain

The unit is equipped with a remote engine oil drain (A, Figure 43).

To drain the engine oil:

- 1. Place an approved container beneath the oil drain.
- 2. Remove the oil drain plug or open the oil drain valve, depending on model.
- 3. Allow the engine oil to drain completely into the approved container. Make sure to dispose of used engine oil according to local, state, province and/or federal rules.
- 4. Replace the oil drain plug or close the oil drain valve.
- 5. Add oil to the engine. Refer to *Specifications* or the engine operator's manual for oil recommendations and capacity.

NOTICE

Failure to add engine oil will result in engine damage.

Engine Coolant Drain

NOTICE

Failure to use the required coolant type (as stated in the *Specifications* section) in the radiator may result in damage to the engine and radiator, thus voiding the warranty.

English (en

NOTICE

The mixing of different coolant types in the radiator may result in damage to the engine and radiator, thus voiding the warranty.

The unit is equipped with a remote engine coolant drain (B, Figure 43).

To drain the engine coolant:

- 1. Place an approved container beneath the coolant drain.
- 2. Remove the coolant drain plug or open the coolant drain valve, depending on model.
- Allow the engine coolant to drain completely into the approved container. Make sure to dispose of used engine coolant according to local, state, province and/or federal rules.
- 4. Replace the coolant drain plug or close the coolant drain valve.
- 5. Open the coolant fill access door (C, Figure 43), and add coolant to the engine. Refer to *Specifications.*

NOTICE

Failure to add engine coolant will result in engine damage.



Electrical System Generator

Refer to the Generator Operator's Manual for all scheduled generator maintenance procedures.

Lithium Ion Batteries

Refer to the Vanguard Battery Operator's Manual for all battery maintenance procedures.

Hydraulic Pump

Hydraulic Oil Specifications

Refer to Figure 44 and the table following for recommended hydraulic oils.



Ref	Description
А	Use ISO Viscosity Grade 10 or 15 Hydraulic Fluid
В	Use Automatic Transmission Fluid

Adding Hydraulic Oil

Fill the reservoir with automatic transmission fluid or any clean hydraulic fluid having a viscosity index that is suitable for the climate conditions in which the unit will be operated. Refer to the preceding table.

NOTICE: Standard units are supplied with automatic transmission fluid (ATF), and arctic units are supplied with long life synthetic hydraulic fluid.

Priming the Hydraulic Pump

Pumps that have been disassembled for repair, or pumps that have been replaced, require proper priming to avoid possible pump failure. A pump is primed when the internal portions of the pump are filled with oil and all air has been expelled. To prime the pump:

- 1. Make sure that the oil reservoir (A, Figure 45) is filled with oil to the full mark.
- 2. Place a catch pan under the pump to catch excess oil.
- 3. Turn on the ignition switch and move the tower switch to the UP position. Do so intermittently, to "jog" the pump. This will expel air and oil through the loosened fitting. Repeat until oil flow is free of air.
- 4. Turn off the ignition switch.
- 5. Remove the catch pan and dispose of the oil. Make sure to obey the guidelines of governmental agencies.
- 6. Replenish the oil in the reservoir to the full mark.



Once the pump has been primed, the cylinder should be purged of air. To purge the cylinder of air:

- 1. Make sure that the oil reservoir is filled with oil to the full mark.
- Move the tower switch to the DOWN position. Make sure that the tower is fully lowered. Turn off the ignition switch.
- 3. Replenish the oil in the reservoir to the full mark.

Trailer

Frame

- 1. Check the trailer coupler for proper operation, and for corrosion or damage. Replace as needed.
- 2. Inspect the trailer frame and body panels for rust, nicks and chips. Use the proper touch-up paint to touch up nicks or scratches. Contact your dealer for additional information.
- 3. Inspect the axle, springs and undercarriage for wear and damage. Replace as needed.
- 4. Inspect the outrigger bars, front and rear stabilizer jacks and locking mechanisms for proper operation, wear and damage. Replace as needed.
- 5. Inspect the safety chains for wear and corrosion damage. Replace as needed.
- 6. Check the breakaway kit for damage. Check that the battery is properly charged. Check the wiring for wear or fraying. Inspect the breakaway cable for wear or damage. Repair or replace as needed.

Grease Points

1. Use NGLI consistency #2 high-temperature antifriction bearing lubricating grease for all trailer mechanical pivot points.

Trailer Wheels and Tires



Towing Hazard

Towing a trailer with damaged tires, rims or lug nuts could result in death or serious injury. Never tow the trailer with damaged tires, rims or lug nuts.

- 1. Check the tires for any cracks, cuts or damage. Repair or replace the damaged tires before towing.
- 2. Check the air pressure of the trailer tires when cold. See Specifications.
- 3. Check the wheel rims for any cracks or damage.
- 4. Check the brakes to make sure that they work properly.
- 5. Make sure all the lug nuts are in place. Never tow the trailer with missing or improperly tightened lug nuts.
- 6. Check that the lug nuts are tightened properly. The correct torque for the lug nuts is 90 lb-ft (122 Nm).
- 7. When torquing lug nuts, always use a criss-cross pattern.

Wheel Bearings

Refer to the axle manual for information regarding maintenance of wheel bearings and other axle components.

Trailer Lighting



Towing Hazard

Never tow the trailer with inoperable trailer lights. Lights are a vital safety feature of your trailer and are also required by state law. Keep the lights in proper working order.

- 1. Check the trailer lights and harness for damage or wear. Repair or replace as needed.
- 2. Make sure the harness is secured to the trailer and does not hang down onto the ground.
- 3. Check the taillight housing assemblies for damage or leaks. Use silicone or rubber sealant to seal the lens or harness, as required, or replace the housing assembly. Electrical grease will help protect the sockets and prevent corrosion.
- 4. When replacing bulbs, make sure the proper bulb is used and use a small amount of electrical grease in the sockets to prevent corrosion.
- 5. For trailer wiring schematic information, refer to the separate Wire Schematic Manual.

Maintaining the 12V Lead Acid Battery



Explosion, Burn, and Shock Hazard

Batteries give off explosive gases during recharging. Sparks could cause explosions, resulting in death or serious injury.

Batteries contain acid, which is extremely caustic. Contact with battery contents could cause severe chemical burns.

English (en

Batteries present a risk of electric shock and high short circuit current.

- Always disconnect the negative (-) battery cable before servicing equipment.
- DO NOT dispose of battery in a fire. Recycle battery.
- DO NOT allow any open flame, spark, heat, or lit cigarette during and for several minutes after charging a battery.
- DO NOT open or mutilate battery.
- DO NOT charge a frozen battery. Always slowly warm the battery to room temperature before charging.
- Wear protective gloves, rubber apron, rubber boots and rubber gloves.
- Remove watches, rings, or other metal objects.
- Use tools having insulated handles.

Removing and Installing the 12V Lead Acid Battery

To remove the battery



Explosion Hazard

Failure to remove the black negative (-) battery cable(s) first could cause sparks and/or an explosion resulting in death or serious injury. Always remove the black negative (-) battery cable(s) first.

- 1. Unlatch and open the engine compartment cover.
- Disconnect the black negative (-) cable (A, Figure 46) from the negative (-) battery terminal, and secure away from the battery.
- Disconnect the red positive (+) battery cable (B, Figure 46) from the postive (+) battery terminal, and secure away from the battery.
- 4. Loosen the hardware securing the battery hold-down (C, Figure 46), and remove the hold-down.
- 5. Carefully remove the battery, and place in a wellventilated area on a level surface.

To install the battery



Explosion Hazard

Failure to install the black negative (-) battery cable(s) last could cause sparks and/or an explosion resulting in death or serious injury. Always install the black negative (-) battery cable(s) last.

- 1. Carefully place the battery in the engine compartment with the battery terminals toward the front of the unit.
- 2. Install the battery hold-down on top of the battery. Tighten the hardware securely.

- 3. Connect the red positive (+) battery cable(s) to the positive (+) battery terminal.
- 4. Connect the black negative (-) battery cable(s) to the negative (-) battery terminal.
- 5. Replace the terminal covers over the battery terminals.
- 6. Close and latch the engine compartment cover.



Lithium Ion Battery Service



Hazard - No User Serviceable Parts - Do Not Open Battery - Contact a Briggs & Stratton Authorized Service Dealer

Contact an Authorized Service Dealer for all service instructions. Do not disassemble the battery for inspection, maintenance, or repair. All service must be done by an Authorized Battery Service Dealer. For an Authorized Battery Service Dealer near you, go to vanguardpower.com.

Lithium Ion Battery Disposal and Recycling



Lithium-ion batteries must be collected and recycled separately from other waste. Do not discard lithium-ion batteries as municipal waste. Contact an Authorized Battery Service Dealer for disposal and recycling instructions.

Cleaning



Entanglement / Sever Hazard

Failure to shut down the engine before cleaning the unit could result in death or serious injury. Always shut down the engine before cleaning the unit.



Burn Hazard

Shut down the engine and let components cool before cleaning the unit. Failure to do so could result in serious burns.

NOTICE

Use caution when using compressed air or water / steam pressure washers. Do not pressure–clean electrical components, as this may cause damage.

Keeping the light tower clean is important to ensure proper operation. Dirt and dust buildup acts as an insulator and may cause the engine, generator and light assemblies to operate at excessively high temperatures.

Use the following as cleaning guidelines:

- 1. Clean the light tower trailer to remove all dust, dirt or other foreign material.
- 2. Clean the light tower and light fixture assemblies with a damp cloth or sponge.
- 3. Clean all electrical wiring and components by hand using non-corrosive cleaner.
- 4. Clean the inside of the engine compartment.
- 5. Clean any oil or liquid spills inside the engine compartment.
- 6. Empty the fluid containment tray. See *Fluid Containment System (FCS).*

Fluid Containment System (FCS)

The unit contains a fluid containment system designed to catch fuel, oil or coolant spills. To drain:

- 1. Position a suitable container beneath the fluid containment drain (A, Figure 47)
- 2. Remove the drain plug.
- 3. Allow the fluid to drain completely into the container.
- 4. Reinstall the drain plug.
- 5. Dispose of the fluid properly in accordance with governmental guidelines.



Long-Term Storage

Proper maintenance is required when the light tower trailer will be stored or removed from operation for long periods of time.

Refer to the Engine Operator's Manual, the Battery Operator's Manual, and the Generator Operator's Manual for all engine and generator long-term storage procedures.

- 1. Lower the light tower to the full DOWN position.
- 2. Make any repairs necessary to make sure the equipment is fully functional upon recommissioning.
- 3. Clean and wash the frame and body panels. Apply an anti-corrosion coating to all surfaces where applicable.
- 4. Clean any oil or liquid spills inside the engine compartment.
- 5. Drain the fluid containment system.
- 6. Clean all electrical wiring and components by hand using non-corrosive cleaner.
- 7. Clean the light tower and light fixture assemblies.
- 8. Disconnect and remove the battery.
- 9. Use a suitable cover to protect the light tower and trailer.
- 10. Properly support the trailer axle on jack stands or other suitable supports to allow the tires to remain off the ground during storage.

Models and Serial Numbers

Model and serial number information is required for product support and repair parts. Following are the model and serial number locations of the primary components.

Trailer

The serial number plate for the light tower trailer is located on the left front side of the unit (A, Figure 48).

English (en



Generator

The generator has a serial number plate (A, Figure 49) attached to the side of the housing.



Kubota Engine

The engine has a serial number plate (A, Figure 50) attached to the upper side of the engine near the fan and a serial number engraved on the left door side of engine (B, Figure 50).



Vanguard Lithium Battery

The battery has a serial number (A, Figure 51) located on the side of the battery casing.



Specifications

NOTICE: Refer to the Engine or Generator Operator's Manual for specific engine or generator specifications.

Overall Dimensions			
Dimension	Imperial	Metric	
Length - Towing Transport	10 ft - 6 in	3,20 m	
Length - Outriggers Deployed	14 ft - 2 in	4,32 m	
Width - Towing Transport	6 ft - 5 in	1,96 m	
Width - Outriggers Deployed	12 ft - 7 in	3,84 m	
Height - Towing Transport	8 ft - 5 in	2,57 m	
Height - Tower Fully Elevated (4 Lights)	25 ft - 4 in	7,71 m	
Bottom Clearance	8.5 in	216 mm	
Shipping Weight	3250lbs	1474 kg	
Gross Vehicle Weight Rating (GVWR)	5000 lbs	2268 kg	

Trailer			
Specification	Imperial	Metric	
Gross Axle Weight Rating (GAWR)	5000 lbs	2268 kg	
Tire Size and Rating	ST225/75R15D Lo	ad Range 'D'	
Rims	15 x 6 JJ		
Cold Tire Inflation Pressure	65 psi	448 kPa	
Max On-Road Speed	65 mph	105 km/h	
Max Off-Road Speed	20 mph	32 km/h	
Fuel Tank	100 US Gallons	378 L	
Frame Structure	Formed welded ste	eel design	
Axle	Tubular design		
Hubs	(6) 1/2-20 UNF studs on a 5.5 inch (139,7 mm) bolt circle		
Brakes	Electrically actuated brakes with trailer breakaway kit.		
Springs	Elliptical springs - 4 leaf		
Trailer Road Lighting	Stop, turn, tail, side markers, illuminated license plate bracket		
Trailer Road Lighting Connector	7-Way RV Connector		
Lifting Eye - Rated Capacity	5000 lbs	2268 kg	
Tie-Down Points	Rear forklift pocket tube, and tie- down loop on bottom of tongue		
Forklift Pockets	2 each side		
Outrigger and Stabilization System	Front left and right side outriggers with adjustable screw type jacks, 2 rear side outriggers with adjustable screw type jacks, 1 adjustable screw type tongue jack		
Maximum Wind Speed - Tower Elevated and Outriggers and Stabilizers Deployed	55 MPH	88,5 km/h	
Light Tower			
Structure	Six-section tubular steel design		
Actuation	Standard - Hydraulic		

Polyethylene self-lubricating

Guide Pads

Light Fixtures - Variable 350W SMD LED

Color Temperature	5000K
Power Consumption - per Fixture	100 W - 350 W (Adj. 50 W increments)
Lumens - per Fixture	57,140 max

Electrical - Generator	
Generator	PMG
Generator Output	100A MAX
Rectifier Output	48 Vdc

Electrical - AC Power via Inverter		
Input	48 Vdc	
Output	110 Vac	
Wattage	2,200W	
Outlet	20A GFCI	

Engine - Kubota Z482

Specification	Imperial	Metric
Manufactuer	Kubota	
Model	Z482 (Variable Speed)	
Туре	Liquid-Cooled Two	Cylinder Diesel
Displacement	29 cu in	0.479 L
Aspiration	Naturally aspirated	
Emissions	EPA Tier 4 Final	
Rated Power Output	13.3 HP @ 3600 rpm	9,9 kWm @ 3600 rpm
Fuel System	Indirect Injection	
Starting Aid	Glow Plugs	
Engine Alternator	40 A	
Automatic Low Oil Pressure Shutdown	7 PSI	48 kPa
Automatic High Water Temperature Shutdown	230°F	110°C
Fuel North America - diesel fuels that ASTM D975 for Ultra Low Sulfu Diesel (ULSD) are required. UL has a maximum sulfur content of parts per million (PPM) or 15 m kg. Diesel fuel may be No. 1-D No. 2-D. Refer to Engine Opera Manual for detailed information		seel fuels that meet ra Low Sulfur required. ULSD lfur content of 15 PM) or 15 mg/ v be No. 1-D or Engine Operator's l information.
Required Engine Oil Type	10W-30 API CK-4 (CJ-4, CI-4, CI-4 Plus) or its equivalents	
Engine Oil Capacity - with Filter	4.0 US qts	3,8 L
Required Engine Coolant Type	Nitrite Free Extended Life Coolant, Organic Acid Technology (OAT), 2-EHA Free	
Coolant System Capacity	2.7 US qts	2,6 L
Coolant Overflow Reservoir Capacity	1.1 US qts	1,0 L
Service Interval - Oil Change & Filter	First Oil & Oil Filter Change - 50 hr All Other Oil & Oil Filter Changes - 250 hr*	
Service Interval - Fuel Filter	400 hrs	
Service Interval - Air Filter Refer to Engine Op Manual		Manual
Note*	Engine oil must be checked prior to operation and refilled if necessary	

Electrical - 12V DC Power		
Engine Electrical System	12V	
Number of Batteries	1	
Battery Size	Group 24	
Battery Type	Standard - Absorbed Glass Mat (AGM)	
Battery Rating	775 CCA @ 0°F (-18°C)	
Onboard 12V Battery Charger Input	120 Vac (via AC Inverter)	
Onboard 12V Battery Charger Output	12V, 3A	

Electrical - 48V DC Power		
Number of Batteries	2	
Battery Chemistry	Lithium Ion	
Nominal Energy	7 kWh (per battery)	
Nominal Voltage	51.6 VDC	
Nominal Capacity	135.9 Ah (per battery)	
Discharge Cell Temperature	-4°F to 140°F	
Charge Cell Temperature	33°F to 113°F	
Onboard 48V Battery Charger Input	120 Vac, <15A MAX	
Onboard 48V Battery Charger Output	48 Vdc, 1425 W MAX	

Status and Diagnostics Engine Status and Diagnositcs

- Locate the ENGINE STATUS & DIAG button (A, Figure 52) on the home screen display. The engine status will be indicated with a different color of the engine status & diag button. See color indicators below. To access the engine status & diagnostics screen touch the button.
 - Gray color button the engine is not active.
 - Green color button the engine is active and operating with no faults.
 - Yellow color button the engine is active and operating with faults.
 - Red color button the engine is not active and faults are preventing operation.

NOTICE: The diagnostics screen will automatically be displayed when faults occur and will require the end user to clear the screen. See **Troubleshooting** for more information on the diagnostics screen.



- The engine status & diagnostics screen displays the operating status of the engine that includes the following Engine RPM (A, Figure 53), Coolant Temperature (B, Figure 53), 12VDC (Starter) Battery Voltage (C, Figure 53), Oil Pressure Status (D, Figure 53), Glow Plug Status (E, Figure 53) and Fuel Level (F, Figure 53).
- 3. The engine status & diagnostics screen also has two buttons, a return button (G, Figure 53) that when touched will return to the previous screen, and a diagnostics button (H, Figure 53) that when touched will access the diagnostics screen. For more information on the diagnostics screen and faults, see *Troubleshooting*.



Battery Status and Diagnositcs

- Locate the BATTERY STATUS & DIAG button (A, Figure 54) on the home screen display. The battery status will be indicated with a different color of the battery status & diag button. See color indicators below. To access the battery status & diagnostics screen touch the button.
 - Gray color button the battery is not active.
 - Green color button the battery is active and operating with no faults.
 - Yellow color button the battery is active and operating with faults.

• Red color button - the battery is not active and faults are preventing operation.

NOTICE: The diagnostics screen will automatically be displayed when faults occur and will require the end user to clear the screen. See **Troubleshooting** for more information on the diagnostics screen.



- The battery status & diagnostics screen displays the operating status of batteries #1 and #2 that includes the following Battery (Charge) Level (A, Figure 55), Power Draw (B, Figure 55), Min Cell Temperature (C, Figure 55), and Max Cell Temperature (D, Figure 55).
- 3. The battery status & diagnostics screen also has two buttons, a return button (E, Figure 55) that when touched will return to the previous screen, and a diagnostics button (F, Figure 55) that when touched will access the diagnostics screen. For more information on the diagnostics screen and faults, see *Troubleshooting*.



Troubleshooting



<u>/</u>}

Electrocution Hazard

- Batteries are capable of discharging high voltage.
- High voltage is present when unit is running. Never attempt to service electrical components while unit is running.
- Contact with wires made bare by damaged, cut or worn insulation could result in death or serious injury. Replace damaged wiring before operating unit.



Burn Hazard

- The light fixtures become extremely hot during use.
- Always use caution and heat-resistant glove when handling the lights or allow the lights to sufficiency cool down before handling.

Before performing any troubleshooting procedures, read *Safety* as well as the following safety messages.

For engine, battery, and generator troubleshooting, refer to the Engine Operator's Manual, Battery Operator's Manual, and Generator Operator's Manual, or contact your dealer.

Always follow the electrical component manufacturer specifications for voltage and test procedures.

Tower Lights Troubleshooting Chart

Problem	Possible Cause	Remedy
Light(s) not operating	Connection between light bar and fixture(s) not secure.	Check and secure connections.
	Operating in Battery Mode with insufficent battery charge level.	Switch to Hybrid or Engine Mode or stop lighting operation to recharge the batteries.
	Light fixture(s) burned out or broken.	Replace light fixture(s).

Diagnostics Screen

In the case that the ECU detects a fault of the engine or battery, the ECU will transmit details of the fault via the CAN signal to the electronic control system, and the diagnostics screen will automatically display error codes and descriptions when faults occur (A, Figure 56). Depending on the severity of the fault, the unit may or may not stop operating.

 To scroll through the active faults on the diagnostics screen touch the up and down arrow buttons (B, Figure 56) on the left and right side of the screen. • To clear an active fault, fix the engine or battery error, and touch the check fault button (C, Figure 56). Touching the all fault button (D, Figure 56) will reset all active faults.

NOTICE: The fault will reappear when check fault button has been touched and if the unit error has not been addresed.

• Touch the return button (E, Figure 56) to return to the previous screen.

Refer to the *Engine Diagnostic Trouble Codes (DTC) Chart* for identification of fault error codes and engine troubleshooting. For any other engine or battery troubleshooting refer to the Engine Operator's Manual, Battery Operator's Manual, or contact your dealer.



DTC (J1939-73 Codes)	Detection Item	DTC Set Parameter
Oil Pressure Error (SPN-100 / FMI-1)	Oil pressure switch	Despite rpm, oil pressure switch is ON
Engine Overheat (SPN-110 / FMI-0)	Overheat of engine water temperature	Engine water temperature ≥ 120 °C (248 °F)
Water Temperature Sensor: High <i>(SPN-110 / FMI-3)</i>	Open circuit of sensor / harness, + B short circuit	Voltage of coolant temperature sensor is 4.9V or above
Water Temperature Sensor: Low <i>(SPN-110 / FMI-4)</i>	Ground short circuit of sensor / harness	Voltage of coolant temperature sensor is 0.1V or less
Battery Voltage: High <i>(SPN-158 / FMI-3)</i>	Open circuit, short circuit, or damage of harness. Failure of battery	ECU recognition of battery voltage is above 18 V
Engine Overrun (SPN-190 / FMI-0)	Engine speed exceeds threshold speed	Engine speed > 2070 min-1 (rpm)
Sensor Supply Voltage: Low (SPN-3509 / FMI-4)	Sensor supply voltage	Voltage to sensor is below 4.00 V
Actuator Abnormal (SPN-523771 / FMI-2)	Open circuit, short circuit, or damage of harness	Actuator current > 3.0A or < 80mA
Engine Speed Sensor Abnormal (<i>SPN-</i> 523772 / <i>FMI-2</i>)	Open circuit, short circuit, or damage of harness	Engine speed = 0 min- 1 (rpm) after Starter signal into ECU

Engine Diagnostic Trouble Codes (DTC) Chart

DTC (J1939-73 Codes)	Detection Item	DTC Set Parameter
Starter Error (SPN-523736 / FMI-2)	Starter running time exceed threshold time	Starter running time is above 12 sec
Alternator L Terminal Abnormal (SPN-523737 / FMI-2)	Open circuit, short circuit, or damage of harness	Alternator L terminal has voltage while 0 rpm (After Key On)
Charging Failure (<i>SPN-</i> 523738 / <i>FMI-2</i>)	Open circuit, short circuit, or damage of harness	Alternator L terminal is 0 V while engine is running

For all other issues, contact your authorized dealer.

Compliance

FCC Compliant

Pursuant to part 15.105(a) of the FCC Rules, you are cautioned that changes or modifications to the product not expressly approved by Briggs & Stratton could void your authority to operate the product.

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ICES Compliant

IC Information to User

This device complies with Industry Canada's licenseexempt RSSs. Operation is subject to the following two conditions:

- 1. This device may not cause interference; and
- 2. This device must accept any interference, including interference that may cause undesired operation of the device.

Reporting Safety Defects

Reporting Safety Defects to the United States Government

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Allmand.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Allmand.

To contact NHTSA, you may call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to http:// www.safercar.gov; or write to: Administrator, NHTSA, 400 Seventh Street, SW., Washington, DC 20590.

You can also obtain other information about motor vehicle safety from http://www.safercar.gov.

Reporting Safety Defects to the Canadian Government

If you live in Canada, and you believe that the vehicle has a safety defect, notify Transport Canada immediately, and notify Allmand. Call Transport Canada at 1-800-333-0510; go to: www.tc.gc.ca/recalls (English) www.tc.gc. ca/rappels (French); or write to: Transport Canada Motor Vehicle Safety Directorate Defect Investigations and Recalls Division, 80 Noel Street, Gatineau, QC J8Z 0A1

Reporting Safety Defects to Allmand

In addition to notifying NHTSA (or Transport Canada) in a situation like this, notify Allmand. Contact the Allmand service department at 1-800-562-1373, go to www. allmand.com, or write to: Allmand Bros., Inc.P.O. Box 888 Holdrege, NE 68949.

Tire Safety Information

The following section contains tire safety information as required by 49 CFR 575.6. It will cover the following:

(i) Tire labeling, including a description and explanation of each marking on the tires provided with the vehicle, and information about the location of the Tire Identification Number (TIN);

(ii) Recommended tire inflation pressure, including a description and explanation of:

(A) Recommended cold tire inflation pressure,

(B) The vehicle placard and tire inflation pressure label and their location in the vehicle

(C) Adverse safety consequences of underinflation (including tire failure), and

(D) Measuring and adjusting air pressure to achieve proper inflation;

(iii) Glossary of tire terminology, including "cold tire pressure," "maximum inflation pressure," and "recommended inflation pressure," and other non-technical terms;

(iv) Tire care, including maintenance and safety practices;

(v) Vehicle load limits, including a description and explanation of:

(A) Locating and understanding load limit information, total load capacity, seating capacity, towing capacity, and cargo capacity,

(B) Calculating total and cargo load capacities with varying seating configurations including quantitative examples showing/illustrating how the vehicle's cargo and luggage capacity decreases as the combined number and size of occupants increases,

(C) Determining compatibility of tire and vehicle load capabilities,

(D) Adverse safety consequences of overloading on handling and stopping and on tires.

1. Steps for Determining Correct Load Limit—Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification / VIN label that is located on the forward half of the left (road) side of the unit. This certification / VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

English (en

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and / or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification / VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

1.1 Trailers 10,000 Pounds (4536 kg) GVWR or less

(1) Locate the statement "The weight of cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.

(2) This figure equals the available amount of cargo and luggage load capacity.

(3) Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

1.2 Trailers over 10,000 Pounds (4536 kg) GVWR (NOTICE: These trailers are not required to have a tire information placard on the vehicle.)

(1) Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.

(2) Locate the GWVR of the trailer on your trailer's VIN (Certification) label.

(3) Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safety exceeded.

2. Steps for Determining Correct Load Limit—Tow Vehicle

(1) Locate the statement "The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.

(2) Determine the combined weight of the driver and passengers that will be riding in your vehicle.

(3) Subtract the combined weight of the driver and passengers from XXX kg or XXX lbs.

(4) The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb passengers in your vehicle, the amount of available cargo and luggage load capacity is 650 lbs. (1400–750 (5 × 150) = 650 lbs.)

(5) Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in Step 4.

(6) If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this reduces the available cargo and luggage load capacity of your vehicle.

3. Glossary of Tire Terminology

Accessory weight means the combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio, and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead means the part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation means a breakdown of the bond between components in the bead.

Bias ply tire means a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass means the tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking means the breaking away of pieces of the tread or sidewall.

Cord means the strands forming the plies in the tire.

Cord separation means the parting of cords from adjacent rubber compounds.

Cracking means any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

Curb weight means the weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Cold inflation pressure means the tire pressure when the vehicle hasn't been driven for at least three hours.

Extra load tire means a tire designed to operate at higher loads and higher inflation pressure than the corresponding standard tire.

Groove means the space between two adjacent tread ribs.

Gross Axle Weight Rating or GAWR means the value specified by the vehicle manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interfaces.

Gross vehicle weight rating or GVWR means the value specified by the manufacturer as the loaded weight of a single vehicle.

Hitch Weight means the downward force exerted on the hitch ball by the trailer coupler.

Innerliner means the layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation means the parting of the innerliner from cord material in the carcass.

Light truck (LT) tire means a tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating means the maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating means the load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure means the maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight means the sum of — (a) Curb weight; (b) Accessory weight; (c) Vehicle capacity weight; and (d) Production options weight.

Measuring rim means the rim on which a tire is fitted for physical dimension requirements.

Non-pneumatic rim means a mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly means a nonpneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire means a mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly means a non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution means distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice means any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter means the overall diameter of an inflated new tire.

Overall width means the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Passenger car tire means a tire intended for use on passenger cars, multipurpose passenger vehicles, and trucks, that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less.

Pin weight means the downward force applied to the 5th wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

Ply means a layer of rubber-coated parallel cords.

Ply separation means a parting of rubber compound between adjacent plies.

Pneumatic tire means a mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight means the combined weight of those installed regular production options weighing over 2.3 kilograms in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire means a pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure means the proper Cold Inflation Pressure as shown on the Tire Information label.

Reinforced tire means a tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim means a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter means nominal diameter of the bead seat.

Rim size designation means rim diameter and width.

Rim type designation means the industry of manufacturer's designation for a rim by style or code.

Rim width means nominal distance between rim flanges.

Section width means the linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall means that portion of a tire between the tread and bead.

Sidewall separation means the parting of the rubber compound from the cord material in the sidewall.

ST tire means a tire designed for use only on trailers drawn on a road.

Test rim means the rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread means that portion of a tire that comes into contact with the road.

Tread rib means a tread section running circumferentially around a tire.

Tread separation means pulling away of the tread from the tire carcass.

Treadwear indicators (TWI) means the projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight means the rated cargo and luggage load plus 68 kilograms times the vehicle's designated seating capacity.

Vehicle maximum load on the tire means that load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire means that load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of 49 CFR 571.110) and dividing by 2.

Wheel center member means, in the case of a nonpneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or in the case of a nonpneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the nonpneumatic tire and provides the connection between the tire and the vehicle.

Wheel-holding fixture means the fixture used to hold the wheel and tire assembly securely during testing.

4. Tire Safety - Everything Rides On It

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by 49 CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/ tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- · Increase the life of your tires

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips. Use this information to make tire safety a regular part of your vehicle maintenance routine.

Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

Safety First-Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

Finding Your Vehicle's Recommended Tire Pressure And Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

Understanding Tire Pressure And Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure– measured in pounds per square inch (psi)–a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Checking Tire Pressure

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours.

When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

Steps For Maintaining Proper Tire Pressure

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

Tire Balance And Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

Information on Passenger Vehicle Tires

Please refer to Figure 57 and the information following.



A- 'P' indicates the tire is for passenger vehicles.

B- This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

C- This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

D- "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

E- This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

F-

(Number) This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. *NOTICE: You may not find this information on all tires because it is not required by law.*

(Letter) The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. *NOTICE: You may not find this information on all tires because it is not required by law.*

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
Т	118 mph
U	124 mph
н	130 mph
V	168 mph*
Y	186 mph*

I

*NOTICE: For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

G- U.S. DOT Tire Identification Number. This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

H- The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

I- Tire Ply Composition and Materials Used. The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

J- Maximum Load Rating. This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

K- Maximum Permissible Inflation Pressure. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Uniform Tire Quality Grading (UTQGS)

Quality grades can be found where applicable on the tire sidewall between tread shoulder and maximum section width. For example:

TREADWEAR 200 TRACTION AA

Temperature A

All Passenger Car Tires Must Conform to Federal Safety Requirements in Addition to These Grades

Treadwear

The treadwear grade is a comparative rating based on the wear rate of the tire when tested under controlled conditions on a specified government test course. For example, a tire graded 150 would wear one and one-half (11/2) times as well on the government course as a tire graded 100. The relative performance of tires depends upon the actual conditions of their use, however, and may depart significantly from the norm due to variations in driving habits, service practices and differences in road characteristics and climate.

Traction

The traction grades, from highest to lowest, are AA, A, B, and C. Those grades represent the tire's ability to stop on wet pavement as measured under controlled conditions

on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance.

Warning: The traction grade assigned to this tire is based on straight-ahead braking traction tests, and does not include acceleration, cornering, hydroplaning, or peak traction characteristics.

Temperature

The temperature grades are A (the highest), B, and C, representing the tire's resistance to the generation of heat and its ability to dissipate heat when tested under controlled conditions on a specified indoor laboratory test wheel. Sustained high temperature can cause the material of the tire to degenerate and reduce tire life, and excessive temperature can lead to sudden tire failure. The grade C corresponds to a level of performance which all passenger car tires must meet under the Federal Motor Safety Standard No. 109. Grades B and A represent higher levels of performance on the laboratory test wheel than the minimum required by law. Warning: The temperature grade for this tire is established for a tire that is properly inflated and not overloaded. Excessive speed, underinflation, or excessive loading, either separately or in combination, can cause heat buildup and possible tire failure.

Additional Information on Light Truck Tires

Tires for light trucks have other markings besides those found on the sidewalls of passenger tires. See Figure 58 and the information following.



A- The "LT" indicates the tire is for light trucks. An "ST" is an indication the tire is for trailer use only.

B- Load Range. This information identifies the tire's load-carrying capabilities and its inflation limits.

C- Maximum Load Dual. This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).*

D- The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

E- This information indicates the maximum load and tire pressure when the tire is used as a single.*

*NOTICE: Maximum load is presented in kilograms and pounds (kg/ lbs). Maximum tire pressure is presented in kilopascals and pounds per square inch (kPa/psi) for when the tire is cold.

Tire Safety Tips

Preventing Tire Damage

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs of foreign objects in the roadway, and try not to strike the curb when parking.

Tire Safety Checklist

• Check tire pressure regularly (at least once a month), including the spare.

- Inspect tires for cracks, foreign objects, uneven wear patterns on the tread, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the tire information placard or owner's manual for the maximum recommended load for the vehicle.