SOLAR OWL

No diesel. No noise.

QUICK START GUIDE

Solar Owl

ZECO ENERGY

Zero Cost Zero Carbon

Solar and Battery Storage solutions

ZECO ENERGY
Zero Cost Zero Carbon

Contents

1.0 General

The purpose of this document is to provide a quick start up and pack down of the Solar Owl unit.

2.0 Setup of the Solar Owl.

1. Park the Solar Owl on flat stable ground. (For optimal operations, park it in a direction where the panels face East and West.)
2. Undo the Stabiliser pins and pull out the stabilizers on the side of the Solar Owl and lock in place.
3. Swing the legs on the stabilizers jacks down and using the stabilizer jack tool, jack the stabilizer to keep a firm ground.
4. Enter the trailer from the back, using the rod provided, jack up the panels on each side till the pin holes are in line on the telescope stabilizers.
5. Place pins in the holes.
6. Unclip the 2 clamps on the side of the panels and using 2 hands, pull down the panel. Repeat for the other 3.
7. Enable all the fuses.
8. Use the control box.

3.0 Packing down the unit.

1. Disable all the fuses.
2. Pull up the panel with 2 hands and Clip the Clamps down to secure the panels. Repeat for the other 3.
3. Remove pins in the holes in the telescopes supports.
4. Release the pressure from the jack by twisting the valve on the side of the jack. REMEMBER to tighten the valve before transport.
5. Untighten the stabilizer jacks and swing the legs sidewards.
6. Pull up the locking mechanism for the stabilizers and push the stabilizers in and lock in place.
7. Cover the unit with protective gear where possible.

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SETTING UP LIGHT SCHEDULE (AUTOMATIC MODE)

Solar Owl

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OPTION 1

1.0 Auto LED Light settings - Custom Week Mode

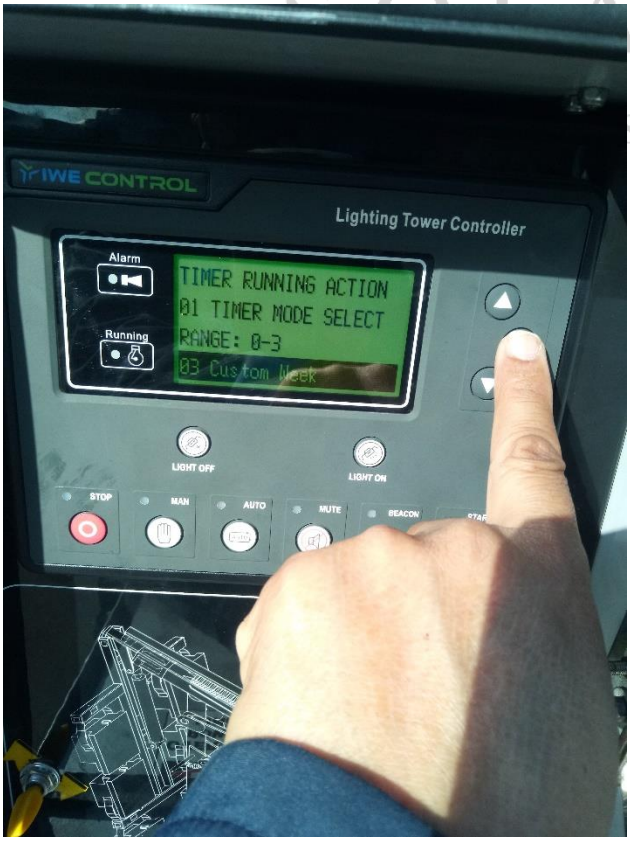
Step 1 “wake up the screen” using MANUAL button (long press..10 sec)

Step 2 Press AUTO

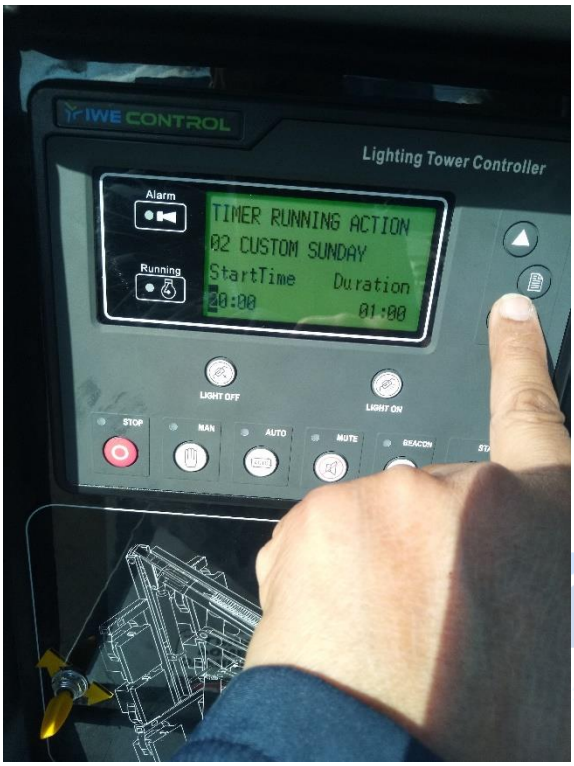
Step 3 Scroll to AUTO TIMER mode and ENTER

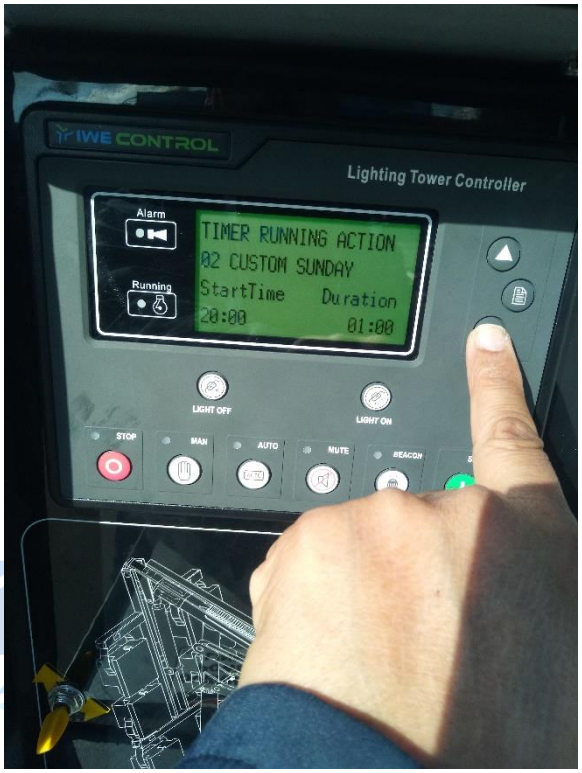
Step 4 Scroll to TIMER set and ENTER

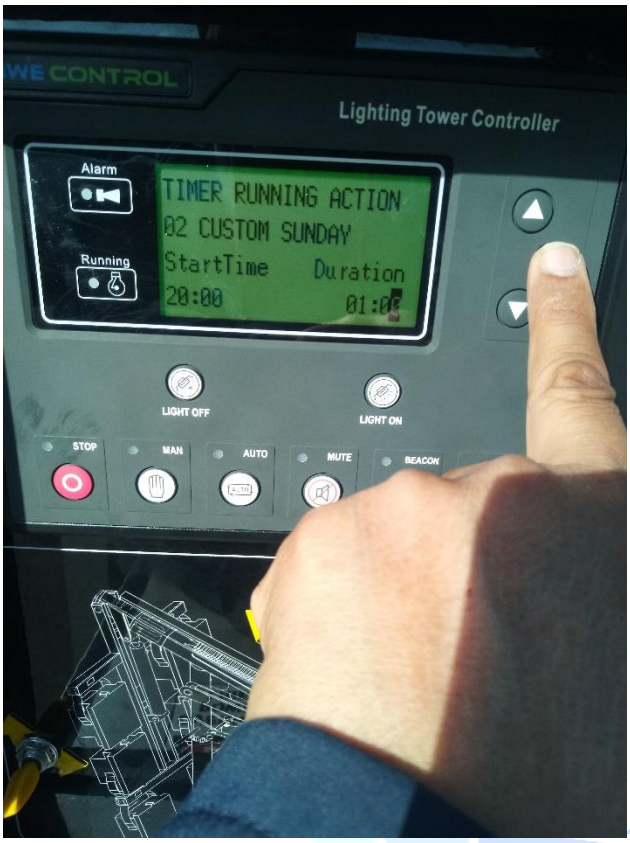
Step 5 In the TIMER RUNNING action screen, Scroll down to CUSTOM WEEK and ENTER



Step 6 In CUSTOM WEEK first day displayed is SUNDAY. Change the START TIME and DURATION by using SCROLL buttons and ENTER for each digit







Step 7 After changing the START TIME and DURATION for Custom Sunday, scroll down to open the TIMER RUNNING ACTION screen to CUSTOM MONDAY and so on…

Step 8 After changing the START TIME and DURATION for all days of the week, press STOP button to get out of TIMER RUNNING ACTION screen

Step 9 Press AUTO button to return the screen to AUTO mode. Now light operation will be controlled based on the settings as entered above

IMPORTANT the system / screen should be finally left in AUTO mode.

To re-confirm that the screen is in AUTO mode, press the AUTO button again as shown in the picture below. The display should show the screen as shown in the picture below….

AUTO TIMER MODE

After a few minutes of no activity the screen will go to sleep.

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SETTING UP LIGHT SCHEDULE USING MANUAL MODE

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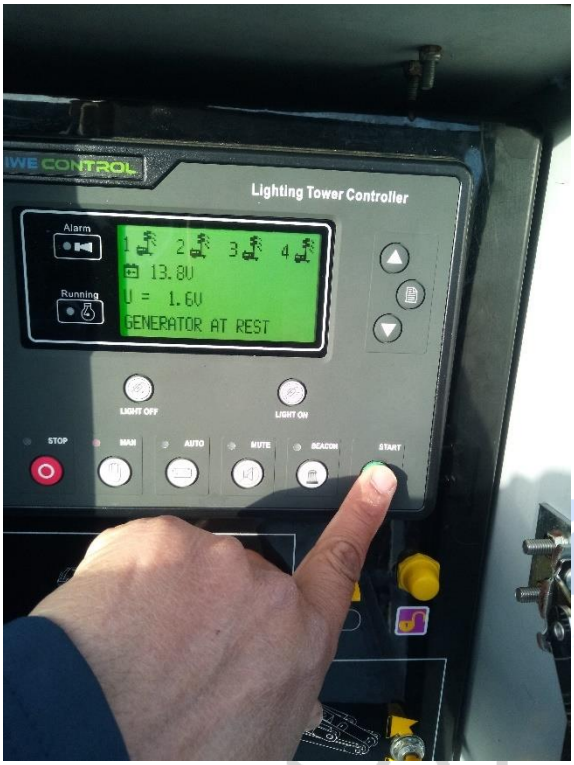
1.0 MANUAL Mode operation process (using CONTROL panel)

Step 1 Wake up the screen by pressing the MANUAL MODE button (long press…10 sec)

Step 2 Press MANUAL button again

Step 3 Press START button and wait for a few seconds (roughly 15 sec). This will allow the system to run through internal checks. Message will display “Genset Normal Running” message.



Step 4 Press the LIGHT ON button once, to turn the first LED light ON. Repeat the sequence to turn all lights

Step 5 Press LIGHT OFF button to turn off all lights one after another.

2.0 MANUAL Mode operation process (using Mobile SMS feature)

Send an SMS to Mobile no. 0491 608 871 (this is the SIM CARD mobile number for Solar Owl 2)

1. SMS message should be exactly this… Status1
   This will send back SMS message with cell voltage, State of Charge and other essential parameters.

2. SMS message should be exactly this… Manuallightson
   This will turn on all the LED lights ON the Solar Owl at once

3. SMS message should be exactly this… Manuallightsoff
   This will turn OFF all the LED lights on the Solar Owl at once

When in MANUAL mode the LED lights will automatically switch off one after another based on “thresholds” settings for battery State of Charge.
Currently these are as follows:

First LED light off	when Battery State of Charge reduces to 25%
Second LED light off	when Battery State of Charge reduces to 20%
Third LED light off	when Battery State of Charge reduces to 15%
Fourth LED light off	when Battery State of Charge reduces to 10%

IMPORTANT NOTE

Please use either MANUAL mode operation process

1.0 using CONTROL panel (JLG)

Or

2.0 using Mobile SMS feature

This will allow the LED lights to turn off automatically based on Battery of STATE OF CHARGE.

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MAINTAINCE MANUAL

Solar Owl

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Contents

1.0 Introduction.

This manual provides the information necessary for maintenance and servicing of the Solar Owl Lighting Towers.

A separate Operation and Safety Manual is also available to enable safe practice of the Solar Owl.

Take time to read and understand this book thoroughly. If you are uncertain about any of the information presented, contact ZECO Energy before operations commence.

All instructions in this manual are based on the machine being used under the operating conditions for which it was designed. In reading this manual, attention should be given to safety related Cautions and Warnings. Proper use and care will see this machine providing years of reliable operation.

2.0 General.

This section prescribes the proper and safe practices for machine operation. A maintenance program has been established and should be followed to ensure that the machine is safe to operate.

The user/operator of the machine shall not accept operating responsibility until this manual has been read and operation of the machine under the supervision of an experienced and qualified operator has been completed. If there is a question on application and/or operation, ZECO Energy Customer Support should be consulted on 1300-009-326 (Australia).

⚠ WARNING

MODIFICATION OF THE MACHINE WITHOUT THE PRIOR WRITTEN APPROVAL OF ZECO Energy (AUSTRALIA) IS PROHIBITED.

3.0 Safety Precautions.

This section outlines the safety precautions applicable to the general use of this product.

Throughout the Operator and Safety section of this manual, cautions and warnings are shown in **BOLD TYPE**. These outline where special care is required when undertaking the various procedures outlined.

NOTE: Safety precautions applicable to machine service and maintenance are in the SAFETY PRECAUTIONS section of the Service and Maintenance Manual.

The user of this machine should read and study this manual thoroughly to ensure that all operating procedures are clearly understood prior to accepting responsibility.

- Modifications or alterations to the lighting tower are not permitted without the prior written permission of the manufacturer.
- Failure to comply with the safety precautions listed here and elsewhere in the manual may result in injury or death.
- When handling the lighting tower other than towing for the purposes of lifting or manoeuvring. Ensure that the crane is of suitable capacity prior to attempting the lift. Refer to the diagrams shown elsewhere in this manual for correct handling procedures using a crane.
- Prior to erecting the mast, the operator should ensure that no overhead obstructions are within a 10 metre radius of the base of the machine.

3.1 Safety Alert Symbols and Safety Signal Words.

This is the Safety Alert Symbol. It is used to alert you to the potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

INDICATES AN IMMINENTLY HAZARDOUS SITUATION. IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH. THIS DECAL WILL HAVE A RED BACKGROUND.

INDICATES A POTENTIALLY HAZARDOUS SITUATION. IF NOT AVOIDED, COULD RESULT IN SERIOUS INJURY OR DEATH. THIS DECAL WILL HAVE AN ORANGE BACKGROUND.

INDICATES A POTENTIALLY HAZARDOUS SITUATION. IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY. IT MAY ALSO ALERT AGAINST UNSAFE PRACTICES. THIS DECAL WILL HAVE A YELLOW BACKGROUND.

3.2 Safety Warnings.

⚠ WARNING

THERE IS ELECTROCUTION HAZARD TO THE OPERATORS IF THE MACHINE IS OPERATED NEAR OVERHEAD POWERLINES.

The following chart is a guide to the applicable safe operating distances from overhead power lines.
Contact local authorities for the relevant minimum safe approach distances (MSAD's) in your area. Local statutory requirements may take precedence over MSAD's listed here.

Voltage Range (Phase to Phase)	MINIMUM SAFE DISTANCE in Metres (Feet)
0-300 V	AVOID CONTACT
Over 300 V to 50 kV	3 (10)
Over 50 kV to 200 kV	5 (15)
Over 200 kV to 350 kV	6 (20)
Over 350 kV to 500 kV	8 (25)
Over 500 kV to 750 kV	11 (35)
Over 750 kV to 1000 kV	14 (45)

Be aware of the radius of the mast when telescoped out and lowered. Be aware of swaying power lines and swaying tree branches in strong winds.

- Be familiar with all controls on the machine prior to operation. The machine incorporates powerful hydraulic mechanisms that can cause serious mechanical damage if the machine can strike external structures such as buildings etc.
- Ensure that the ground is suitable to support the machine, particularly under each of the outrigger pads. A suitable packing material such as a timber block may be required on soft surfaces to ensure that the outriggers do not sink under the weight.

⚠ WARNING

FAILURE OF THE OUTRIGGERS TO SUPPORT THE MACHINE ON SOFT SURFACES COULD CAUSE THE MACHINE TO OVERTURN IN WINDY CONDITIONS.

- Do **NOT** erect the mast of the Solar Owl Lighting Tower in winds exceeding 100 km/hr.

⚠ WARNING

NEVER RAISE THE MAST WITHOUT FIRST SETTING ALL OUTRIGGERS ARMS AND LEGS TO LEVEL THE MACHINE.

- The lighting tower is **NOT** a mobile battery storage. It should only be used for its intended design purpose.
- The hydraulically operated mast has hazardous crushing/pinch points. Do **NOT** put arms, hands etc. near the mast structure while it is in operation.
- The mast is **NOT** a lifting device. Do not attempt to lift any objects using the lighting tower mast and/or hydraulic system.

⚠ DANGER

DO NOT TOUCH LAMP TERMINALS OR SOCKETS. DANGEROUS VOLTAGES MAY BE PRESENT EVEN WHEN POWER IS OFF.

- LED lighting towers use a D.C. battery system supplying potentially dangerous electrical energy. Do **NOT** operate the machine with any safety cover removed. All wiring and electrical devices are to remain covered.
- Do **NOT** modify/alter the machine's electrical system components or wiring in any way.
- Solar Owl lighting towers are designed specifically to carry the LED lights supplied. Alternative lights should not be fitted unless specifically authorised by the manufacturer.
- Do **NOT** operate the lights within easy reach of people's hands. Even after lights have been switched-off, the lamp housings can remain hot for up to five minutes.

4.0 Machine Specifications.

4.1 Solar Owl Dimensions

4.1.1 Envelope: towed/stowed

Length	6.68 m
Width	1.80 m
Height	2.00 m
Ground Clearance (min.)	0.30 m

4.1.2 Envelope: outriggers deployed

Length	4.0 m
Width Rear	3.1 m
Articulated/Telescopic Mast Maximum Height Raised	10 m Mast
Horizontal Outreach	3.0 m
Mast Rotation	270°
Light head Tilt Angle	115°

4.2 Trailer Mass.

Aggregate (ATM) LED-6	1700 kg
Aggregate (ATM) LED-8	1750 kg
Towball "weight" (nominal)	200 kg

Towing Speed (maximum)	80 km/hr

4.3 Solar Owls performance

Solar panels	12 x 350W
Battery Capacity	24 kWh
Days of storage	2 days
No. of LED	4
Luminous output LED	104 000 lm (continuous rating - raw)
Wind Speed Rating	100 km/hr
Mast total extension time	90 s
Mast total retraction time	75 s

4.4 Stored Fluid Volumes

Hydraulic Oil Tank	2.425 L

4.5 Mast Hydraulic System Relief Valve Setting

Setting Pressure	192.5 bar (2800 psi)

4.6 Component Specifications:

4.6.1 Solar Panels

Model	
Number of Panels	12

4.6.2 Battery

Brand	BTS
Voltage	48V
Capacity	480Ah

4.6.3 Electric Over Hydraulic System

Pump Motor	12V
Operating Pressure (max)	240 bar (3500psi)
Pump Displacement	0.78 cm^3/rev

4.6.4 Light Headlamps

Type	Light Emitting Diode (LED) 48V
Fixed Beam Width Angle	35°
Colour	White 5700 K
Rating (electrical input)	200 W
Luminous Flux per Lamp	26 000 lm

4.6.5 Electrical Controls

Battery Circuit Breakers	1 x 100A
Lamp Circuit Breakers	2 x 80 A
12 V Circuit Breaker	1 x 160A
Enclosure Protection Rating	IP54

4.6.6 Trailer Axle & Brakes

Independent Rubber Suspension (IRS) Drum brakes with Hydraulic Override.

4.6.7 Tyres and Wheels

Tyre Dimensions:	205/80 x 16”

Wheel Dimensions:	16” x 6J
Tyre pressure (gauge)	450 kPa
Wheel Nut Torque	120 Nm

5.0 Solar Owl Description

The Solar Owl lighting towers illuminate night-time work sites quietly and efficiently. Illumination is provided by 4 200 W LED floodlights, mounted on the arms of a tilting light-head.

The LED lights draw their power from a LiPO4 battery bank of 24 kWh capacity and capable of storing 48 hours of energy.

At maximum height the lighting tower’s unique mast design can “over-reach” the worksite.

5.1 Mast Operations

The mast will extend to a maximum working height of 10 meters. Mast vertical movement and positioning is adjusted using three independently controlled hydraulic cylinders. The mast is raised and lowered by the lift cylinder. An encased hydraulic cylinder telescopes the mast’s upper-section.

Each hydraulic cylinder is connected to an electro-hydraulic directional control valve that is wired to a control-panel mounted center-off toggle-switch.

Mast rotational movements are manually performed. The mast can be rotated through 270^{o} and its angular position locked by a locking screw.

5.2 Light Heads

The light-head pivots on the end of the mast upper-section. Light-bar tilting angle is adjusted by hydraulic cylinder. Tilting allows directional control of the light array and final adjustment when raised and compact storage when mast is lowered.

5.3 Trailer Frame

The light tower mast assembly rotates within a tubular upright welded to the front of the trailer frame.

Two gas-strut assisted side-doors swing up and allow access to the operator’s control panel, electrical and mechanical systems for service and maintenance. A small door is provided on the left side door to access the lighting tower’s electrical and hydraulic controls

Hydraulic override brakes ensure good trailer stopping performance. The parking-brake secures stowage of the machine.

LED lighting tower stability is provided by four manually deployed outriggers, stowed within the trailer underframe. Each outrigger is levelled using a wind-down jack. A fifth levelling jack is attached to trailer drawbar

5.4 Electrical System

Power to the four LED lights is supplied by a 100 A/48 V DC Battery. Each LED electrical circuit is protected by an 80-amp circuit breaker.

5.5 JLG Control Panel

The lighting tower is operated by a compact programmable control module. This control module can be utilized to raise/lower the mast, adjust the tilt, and to control the illumination

The machine control module features a programmable timer that controls and monitors all machine functions.

5.6 Hydraulic System

The lighting tower's hydraulic system is powered by a 12 V DC electric motor coupled to a hydraulic pump. Three control panel mounted toggle-switches operate electro-hydraulic valves that control the mast lift, mast telescope and light-head tilt cylinders.

A pressure relief valve protects the hydraulic system from excessive system pressures and, the mast mechanism from mechanical overload. It is set for system operating pressure of 19.25 MPa. (2800 psi)

The pump's motor is powered by the energy stored in the rechargeable batteries. The mast can be lowered or raised several times as long as there is enough energy stored in the battery.

6.0 Maintenance Procedures

IMPORTANT

WHEN UNDERTAKING ANY MAINTENANCE OR REPAIR PROCEDURES ON THE LIGHTING TOWER, PARTICULAR ATTENTION SHOULD BE TAKEN ON ALL PROCEDURES THAT INVOLVE WORKING IN, UNDER OR OVER THE MACHINE.
THE FOLLOWING GENERAL GUIDE- LINES SHOULD BE READ AND UNDERSTOOD PRIOR TO UNDERTAKING ANY MAINTENANCE OR REPAIR WORK.

6.1 General

The following information is provided to assist you in the use of maintenance procedures contained in this section.

6.2 Safety and workmanship

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of an object's mass. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

6.3 Cleanliness

The most important single measure that ensures long service life of any electro- mechanical systems is to keep dirt and foreign matter out of the vital components. Precautions have been taken to safeguard against this. Shields, covers, seals, and filters are provided as necessary; however, these items must be maintained on a scheduled basis in order to function properly.

At any time when oil lines are disconnected, clean adjacent areas as well as the openings of fittings themselves. As soon as a line or component is disconnected, cap or cover all openings to prevent contaminant entry.

Clean and inspect all parts during servicing or maintenance and ensure that all passages and openings are unobstructed. Cover all parts to keep them clean. Be sure all parts are clean before they are installed. New parts should remain in their containers until they are ready to be used.

6.4 Components Removal and Installation

Use adjustable lifting devices, whenever possible, if mechanical assistance is required. All slings (chains, cables, etc.) should be parallel to each other and as near perpendicular as possible to top of part being lifted.

If a part resists removal, check to see whether all nuts, bolts, cables, brackets, wiring etc., have been removed and that no adjacent parts are interfering.

6.5 Hydraulic Lines and Electrical Wiring

Clearly label hydraulic lines and electrical wiring as well as associated terminal points and ports when disconnecting or removing them from the unit. This will ensure that they are correctly reinstalled. Refer to electrical schematics when re- assembling to ensure correct wiring at terminal connections.

6.6 Hydraulic System

Keep the system clean. If metal or rubber particles are found in the hydraulic system, then the system must be drained and flushed.

Disassemble and reassemble parts on clean work surfaces. Clean all metal parts with a non-flammable cleaning solvent. Lubricate components as required to aid assembly.

6.7 Lubrication & Servicing

Components and assemblies requiring lubrication and servicing are listed in the machine's regular maintenance schedule.

Always use the recommended lubricants listed in the schedule, at the specified intervals. If the specified lubricants are unavailable, consult your local supplier for an equivalent lubricant that meets or exceeds the specifications listed.

6.8 BESS Cabinet and Batteries

The BESS cabinet and the Li-ion batteries are not to be opened or modified without the authorization from ZECO Energy. Under normal operations these systems won't require any maintenance, if need be please contact ZECO Customer Service.

6.9 Light Droop - LED Luminaires

A. Before performing any maintenance,
   1. Isolate and de-energise the machine's electrical system.
   2. Allow luminaire to cool-down.

B. After the luminaire has cooled,
   1. Unclip and open the luminaire cover.
   2. Check for water ingress or condensation within the enclosure.
   3. Check tightness of all cable glands.
   4. Check toggle clips for tightness.

C. Wipe-clean the inside and outside of the luminaire glass-cover.

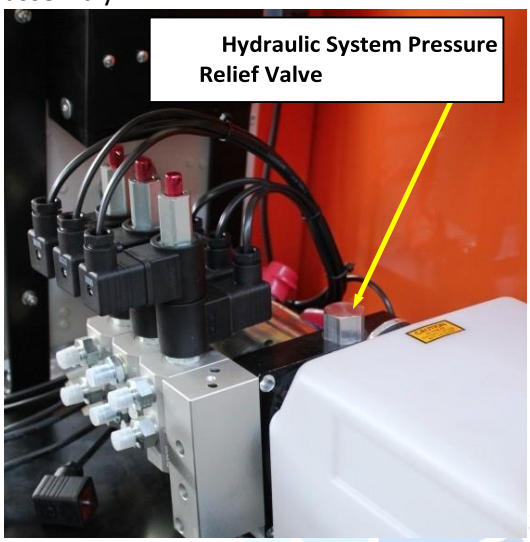
D. If the luminaire's LED modules are replaced,

1. ensure modules replacing faulty modules have same specification.
2. ensure the cover gasket has not become excessively deformed.

If in doubt, contact ZECO Energy.

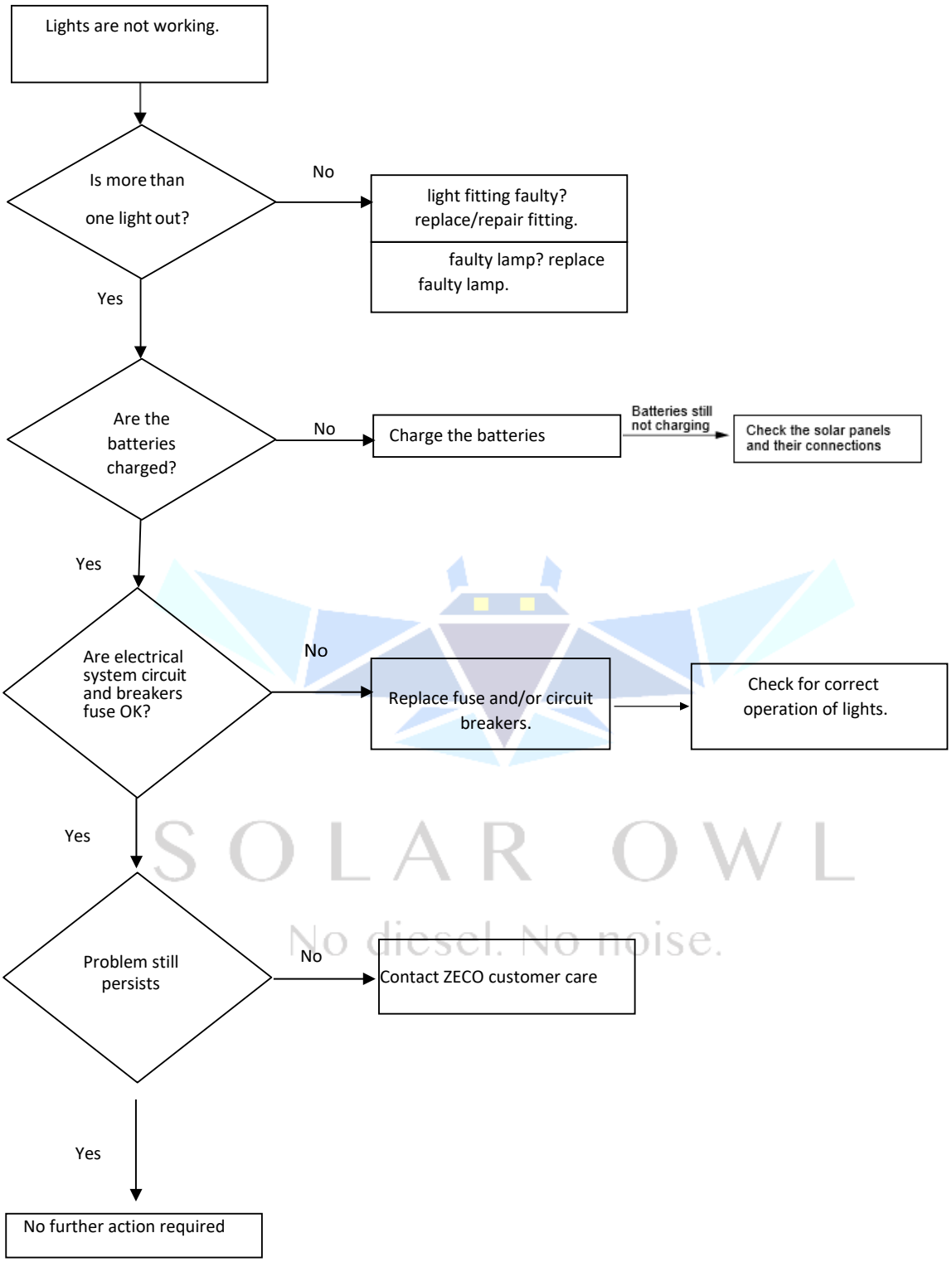
6.10 Setting Hydraulic Oil Pressure

The hydraulic system operating pressure is set to 19.25 MPa (2800 psi).
The hydraulic system pressure is set by adjusting the pump relief valve located on the pump/motor assembly.



1. Unscrew and remove the hex-cap cover from the valve.
2. Connect a suitable pressure-gauge into the “lift-up” side of mast lift- cylinder hydraulic circuit.
3. Operate and bottom-out the mast lift-cylinder “up” function.
4. Monitor and note the gauge-pressure readings whilst operating the lift- cylinder “up” function.
5. Using an “Allen” key, set the pressure relief valve to the pressure specified above.
6. Disconnect and remove the pressure- gauge from the lift-cylinder hydraulic circuit.
7. Re-fit protective hex-cap cover to pressure relief valve.
8. Check all mast hydraulic cylinders function correctly.

7.0 Fault Diagnostic Chart: Lights and Batteries



7.0 Maintenance Schedule

Item	Daily	50hrs	100hrs	200hrs	400hrs	500hrs	Yearly	1500hrs	2000hrs
Check Machine for damage/leaks			•						
Check Decals Legible			•						
Check all controls function as per manual			•						
Check Tyre pressure			•						
Grease mast rotation sliding surfaces. Grease lift/tilt cylinder bushes					•				
Outrigger leg locking pins. Check legs operate freely. Lubricate pins penetrating oil 700010208 or equivalent.				•					
Check mast pins and bushings for wear.						•			
Check tow hitch and safety chains for secure operation				•					
Check chassis frame for cracks and damage.						•			
Clean solar panels					•				
Check tyres for wear, splits, damage.				•					
Visual check of all electrical wires and connections for damage.			•						
DC Voltage Readings (Control Module Display)			•						

9.0 Hydraulic Schematic: LED Lighting Tower (Mast Hydraulics)