# POWER PUSHER

Nu-Star Material Handling Ltd. Tel: +44(0)115 880 0070 www.nu-starmhl.com

# Operators Manual

Please read the operator's manual carefully and make sure you understand the instructions before operating the machine.

# CONTENTS

# INTRODUCTION

**Dear Customer,**

Thank you for choosing a Nu-Star Power Pusher Electric Tug. Nu-Star products are designed and manufactured in the United Kingdom for maximum efficiency & durability. We hope you will gain many hours of reliable use from this product.

This Operator's Manual is a valuable document. We suggest you read it entirely before using your Power Pusher Electric Tug.

By following the instructions regarding operation, service, maintenance & warnings, you will significantly extend the life of the machine and ensure its second-hand value in the future.

**Operating this machine on public roads**

Please check the relevant road traffic regulations before using this machine on a public road. If transporting the machine on another vehicle, always use approved securing devices and make sure the machine is securely held in place & cannot move around whilst in transit.

**Towing**

This machine is equipped with a direct-drive electric transmission and is **not** designed to be towed under any circumstances.

**Usage and Disclaimer**

-This machine is designed to move differing loads across a variety of different ground conditions. Its use may be broadened by the addition of other accessories/attachments available as recommended by the manufacturer. Please contact your dealer about which accessories/attachments are available. The machine may only be used with the equipment and spare parts recommended by the manufacturer. Compliance with and strict adherence to the conditions of operation, service and repair as specified by the manufacturer also constitute essential elements of the intended use and Warranty.

-This machine should only be operated, serviced and repaired by persons who are familiar its specific characteristics and who are acquainted with the relevant safety procedures.

-Accident prevention regulations, all other recognised regulations on safety and the concurrent use of occupational medicines and all road traffic/construction site regulations, must be observed at all times.

-Arbitrary modifications carried out to this machine will relieve the manufacturer of its Warranty liability.

-Whilst we have taken every care to ensure the accuracy of the information presented and to describe generally accepted safe practices we, as the manufacturer, cannot be held responsible for errors of omission or, for any consequences from application of the information given. Application of the information in this manual in a professional manner remains the responsibility of the owner/user.

# INTRODUCTION

**Service & spare parts**

-Nu-Star products are sold all over the world and we are keen to ensure that you, as the customer, get the best support and service. Before this machine left the factory, it was inspected, tested and adjusted by us.

-When you need spare parts, servicing or advice on service issues or Warranty claims etc, Please contact:

Distributor Name
Address
Address
Address
Telephone number
Email address

-The machine itself is fitted with a Serial Number Plate. On here, you will find the following information:

**Model No.**

**Serial No.**

**Year of manufacture**

-Please ensure you state this information when ordering spare parts.

# GUIDE TO SYMBOLS USED

## Symbols

The following symbols are on the machine and used in this manual. Please ensure you are familiar with their meaning

WARNING! Careless or incorrect use can result in serious or fatal injury to the operator or others nearby.

Please ensure you read the operator's manual

This product is in accordance with applicable EC Directives

Always wear:

- Approved safety gloves

- Approved Hard Hat

- Approved safety footwear

-Approved safety goggles

Risk of high voltage

Risk of hand or finger becoming trapped

# SAFETY INSTRUCTIONS

## Safety Instructions

**These instructions are for your safety. Please ensure you read them carefully.**

### Insure your machine

-Check you have the necessary insurances in place. You should have fully comprehensive insurance including: third party, fire, damage, theft and liability.

### General use

-Read all the instructions in this operator's manual and on the machine before you start to use it. Ensure you both understand them and observe them at all times.

-Learn how to use the machine and its controls safely and learn how to stop quickly. Also learn to recognize the safety decals.

-Only allow the machine to be used by adults who are familiar with its use.

-Make sure nobody else is in the vicinity of the machine when you drive off.

-Remember that the operator is responsible for dangers or accidents.

-Never carry passengers. This machine is only intended to be used by one person and is not intended to carry any other person.

-Always check behind you before and during reversing. Keep watch for obstacles and for sudden changes in terrain.

-Slow down before cornering, particularly when the machine is loaded.

-Only use the machine in daylight or in other well lit conditions. Keep the machine at a safe distance from holes or other irregularities in the ground. Pay close attention to other possible risks.

-Never use the machine if you are tired, if you have consumed alcohol or, if you are taking other drugs or medication that can affect your vision, judgement or coordination.

-Keep an eye out for traffic and other powered vehicles when working close to a road or when crossing a road.

-Never leave the machine unsupervised with the ignition switched ON. Always switch the machine OFF and remove the keys before leaving it unattended for any length of time.

-Never allow children or other untrained persons to use the machine or to service it.

**WARNING! You must wear approved personal protective equipment whenever you use the machine. Personal protective equipment cannot eliminate the risk of injury but, it will reduce the degree of injury if an accident does happen.**

-Never wear loose-fitting clothing, jewellery or similar that can get caught in moving parts.

-Never use the machine when barefoot. Always wear protective shoes or protective boots, preferably with steel toe-caps.

## SAFETY INSTRUCTIONS

### Driving on slopes

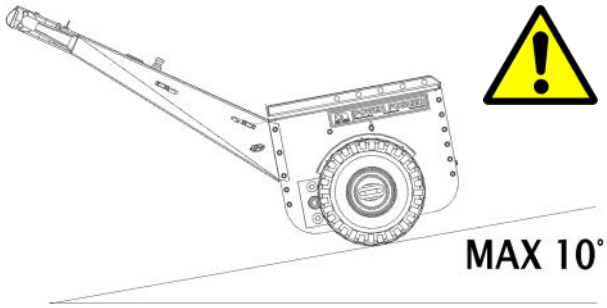
-Driving on slopes is one of the operations where the risk of the operator losing control of the machine or, of it overturning is the greatest. This can result in serious injury or death. All slopes demand extra care. If you feel unsure do not attempt to drive on the slope.

-Remove as many obstacles from the slope beforehand.

-Drive upwards and downwards, not sideways across the slope.

-Do not use the machine on a surface that slopes more than 10°

-Avoid starting or stopping on a slope. If the drive wheels start to slip, drive slowly back down the slope.




-Always drive smoothly and slowly on slopes.

-Do not make any sudden changes in speed or direction.

-Avoid unnecessary turns on slopes. If necessary, turn slowly and gradually if possible.

-Do not operate the machine close to edges, ditches or banks. The machine can suddenly overturn if one wheel goes over the edge of a steep slope or a ditch or, if an edge gives way under the weight.

-When cleaning the machine, do not position the machine close to an edge or ditch.

### Children

-Serious accidents may occur if you fail to be aware of children in the vicinity of the machine. Children are often attracted to the machine when it is in operation. Never assume that children will remain where you last saw them.

-Keep children away from the area where the machine is in use and under close supervision by another adult.

-Be prepared to immediately stop and switch off the machine if children enter the work area.

-Before and during reversing, look behind you and down for small children.

-NEVER allow children to ride either on or in the machine. They can fall off and seriously injure themselves or be in the way for safe manoeuvring of the machine.

**Remember, the machine weighs over 160Kg!**

## SAFETY INSTRUCTIONS

### Maintenance

-Stop the machine on level ground away from the work area

-Switch off at the key-switch and remove the key.

-Do not work on the machine while the battery charger is connected to the mains supply.

-Take care when checking the batteries. Never perform maintenance on the batteries while smoking or in the vicinity of open flames or sparks.

-Make sure all nuts and bolts are tightened correctly (using a torque wrench to achieve the stated torque where necessary).

-Do not modify safety equipment. Check regularly to be sure it works correctly. The machine must not be driven if protective plates, protective covers, safety switches or other protective devices are not fitted or are defective.

-Observe the risk of injury caused by moving parts or electrical components if the machine is activated with any of the covers or protective cowlings open or removed.

-Never make adjustments when the machine is being driven.

-The machine is tested and approved only with the equipment originally provided or recommended by the manufacturer.

### Transport

**IMPORTANT INFORMATION**

**The Regenerative Braking function on the machine is not sufficient to lock the machine during transport. Ensure you secure the machine firmly before transporting the machine**

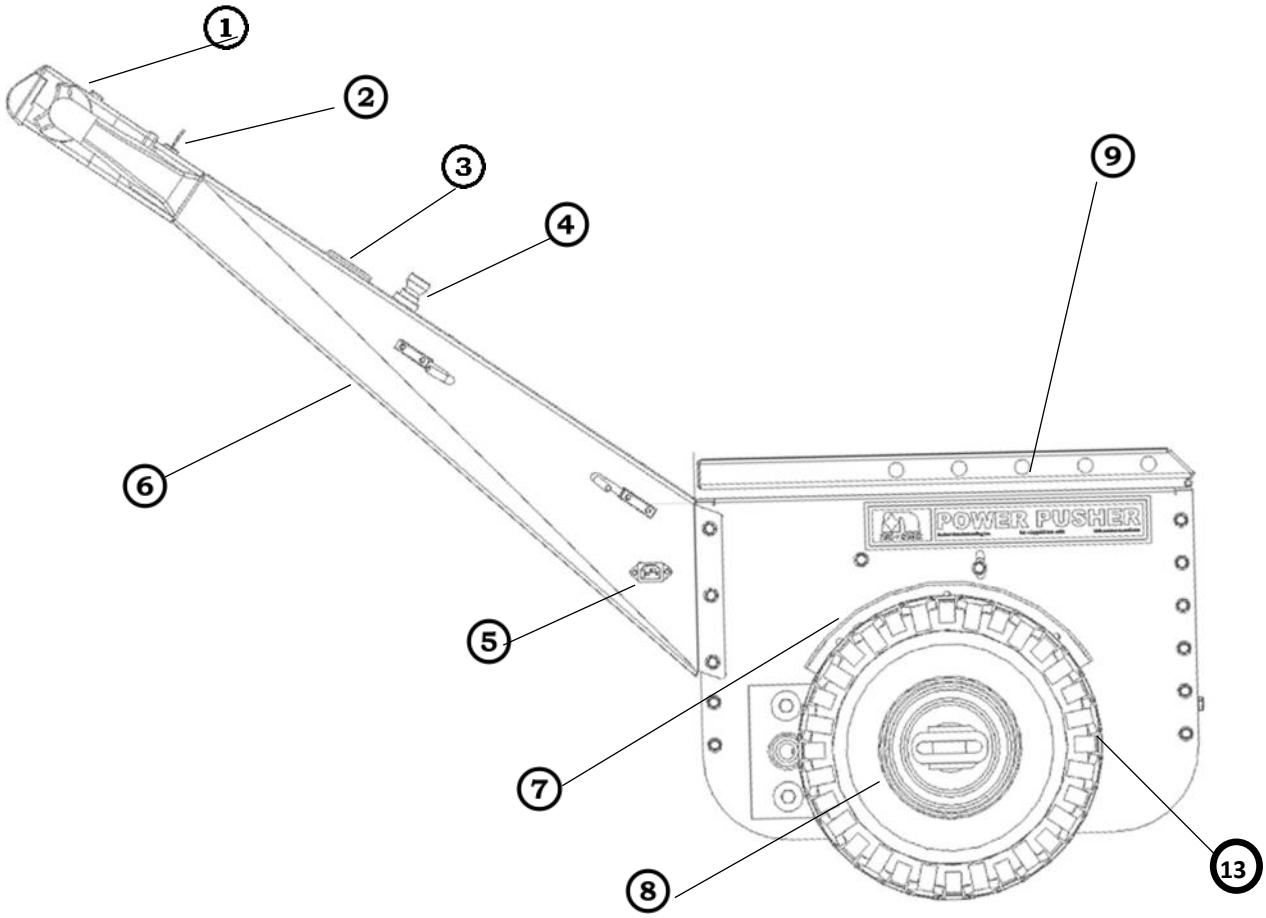
-The machine is heavy and can cause a crush injury. Take care when loading it onto or off a vehicle or trailer.

-Use an approved trailer to transport the machine.

-To secure the machine onto the trailer, switch off at the key-switch then securely lash/strap the machine in conjunction with wheel chocks. Place the wheel chocks in front of and behind the drive wheels.

-Check and observe local road traffic regulations before transporting the machine.

## PRESENTATION & OPERATION




### Presentation of the controls

1 Headset

2 Main Key Switch Power ON/OFF

3 Battery Indicator Clock

4 Emergency Stop

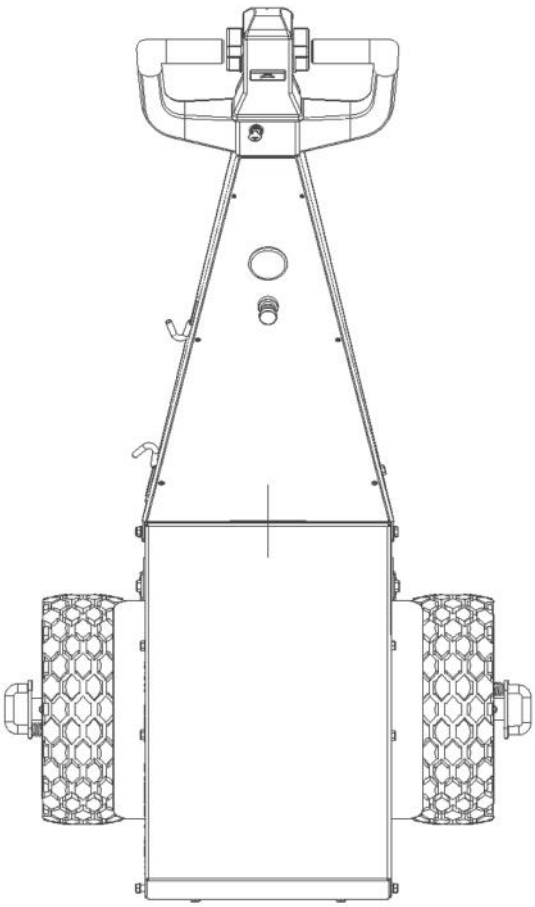
5 Battery Charging IEC socket

6 Main Isolator Fuse

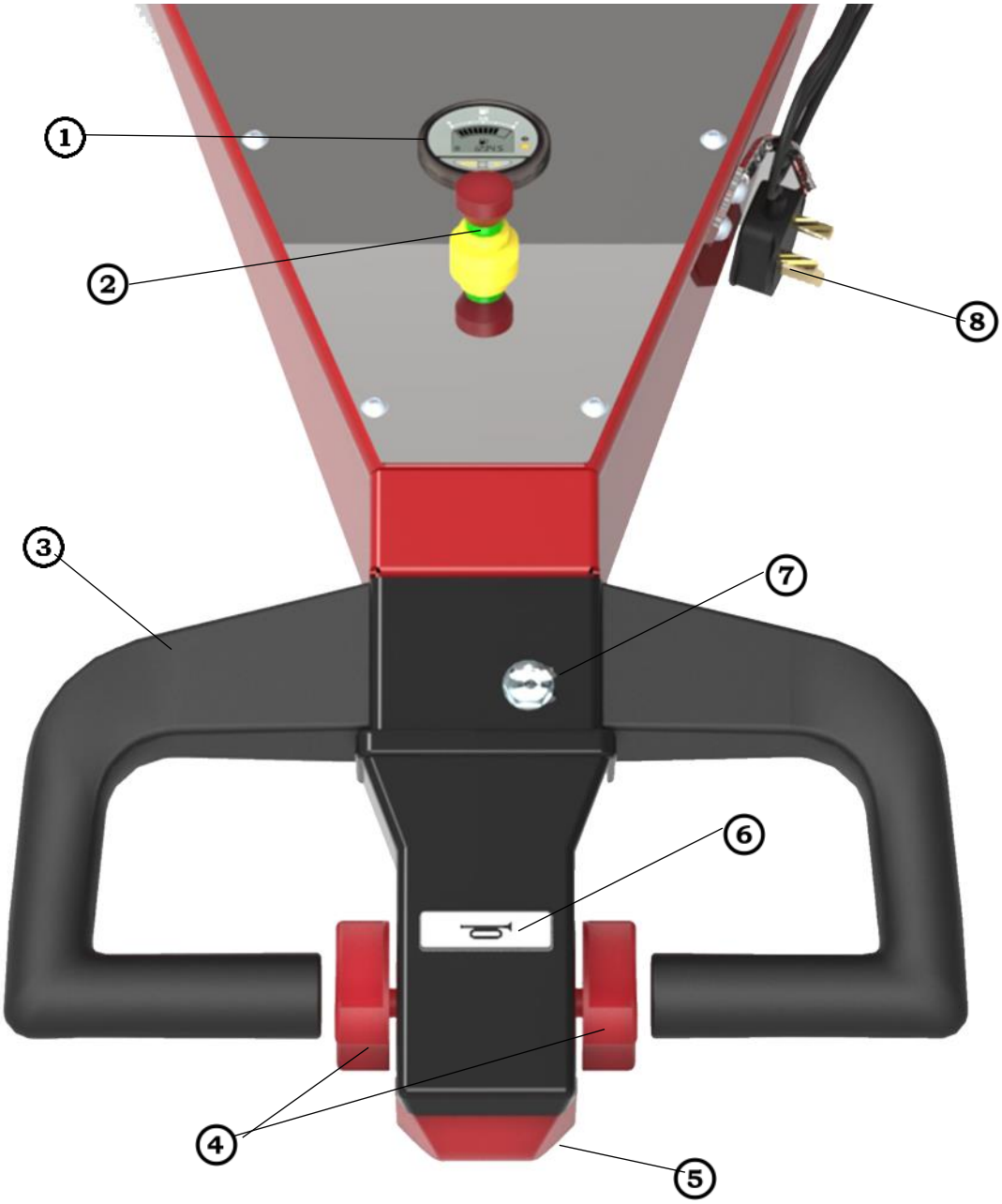
7 Wheel Guard

8 Free Wheel Hub /Tyre Assembly

9 Lid



## PRESENTATION & OPERATION




### Presentation of the controls

1 Battery Indicator Gauge

2 E-Stop

3 Handle

4 Rotary Direction/Speed Control

5 Belly Switch/ Emergency Reverse

6 Warning Horn Button

7 Key switch Off/On

8 Charging Electrical Input

# PRESENTATION & OPERATION

## Presentation & Operation of controls

Congratulations on your choice of an excellent quality product that will give you great benefit and pleasure for many years. This Operator's manual describes the Dual Motor Super Power Pusher.

-The machine is fitted with a DC electric drive motor equipped with primary gear-reduction gearboxes and differentials. Power is then transmitted to the drive shafts via the secondary gear reduction chain & sprockets.

-The machine is fitted with an attachment, or attachments, for the purpose of Pushing and/or Pulling an industrial load.

### Key-Switch Off/On

The key-switch has two positions, OFF & ON.

-The key-switch must first be switched to ON before any of the controls will operate.

-When in the ON position, the Key is locked into the key-switch and may not be removed.

-The key-switch should be switched of OFF when the machine is not in use.

-When in the OFF position, the key may be removed from the key-switch.

### Machine Direction

### Rotary Controls, Speed & Direction of Movement.

Forward and reverse movement of the machine is controlled by the rotary thumbwheels positioned inboard of the handles. These are spring loaded to automatically return to the stop position. The thumbwheels are connected internally – movement of either wheel will initiate movement.

Machine Speed is dependant on the amount of rotation.

Rotate the thumbwheel in a forward motion (away from the operator) to make the machine move forward (away from the operator). Reverse rotation (towards operator) will make the machine move backwards (towards the operator).

### Battery Indicator Gauge

AN LCD battery state indicator is fitted in the top handle plate. All illuminated segments indicate full charge. A reduced number illuminated segments indicate progressive discharge.

This indicator should illuminate once the power is turned on.

Note: The electronic control unit fitted to the machine contains a power saving timer. If the power switch has been turned on, but the machine has not been used for 25 minutes or more the circuit will shut down. (The parameters on the board can be altered to suit the customers machine requirements.) To use the machine again the key-switch must be turned OFF then ON again.

The key-switch should be turned to the "off" position if machine is "in use" but with no demand.

### Emergency Reverse (Anti-Crush) Safety Feature

### ('Belly-Switch')

The operation of this switch MUST be checked on a daily basis.

The purpose of the switch is to protect the operator form any possibility of a crush injury, in the event of the operator becoming trapped between the machine and an object behind the operator. Gentle depression of this switch will immediately cause the machine to stop and switch to a forward motion all the time the throttle is activated and the Belly Switch is depressed.

## PRESENTATION & OPERATION

### Audible Alert

The machine is fitted with an electric horn for warning of approach. The horn switch is placed at the centre/top of the handlebar assembly. Press to activate safety horn.

### Regenerative Breaking Functionality

The controller fitted to the machine is able to detect movement due to the "Back EMF" created by the DC motor. Should the voltage increase to a certain level the controller will apply an opposite voltage to stop the movement.

This occurs even when the power switch is OFF (or no batteries are fitted).

### Emergency Stop

The stop button located on the front control panel of the machine. It is used to stop the machine in case of an emergency stop. It is operated by pressing down of the red button. To reset pull out the red button, this will then allow the operator to use the machine.


### LED Strobe & Audible Motion Bleeper (Sound & Light)

The optional aspect of a LED strobe and sounder is controlled by the key switch on the back panel, controlled by key on/off.


## PRESENTATION & OPERATION

### Free-Wheel Hub

**Engaged**

Free-Wheel Hub in the engaged position.

Machine can only be moved by drive motor.

**Dis-engaged**

Free-Wheel Hub in the dis-engaged position.
Machine can be moved by hand in the event of a fault or, the batteries becoming completely discharged.

## PRESENTATION & OPERATION

**Battery Indicator Gauge**

The battery indicator gauge shows the current state of charge of the batteries.

-The battery indicator gauge consists of a 10-bar LED display which displays the state of charge successively, bar by bar, from full to empty.

-When the batteries are fully charged, the gauge will all 10 black LED's.


-As the machine is used and the batteries discharge, the LED's progressively go out.

-At 70% depth of discharge, a flashing red LED signals an 'energy reserve' alert.


-At 80% depth of discharge, the last two black LED's flash alternately & the RED warning LED also flashes.


**Repeatedly running down the batteries to the 80% depth of discharge state (as shown on the Battery Indicator Gauge) and continuing to use the machine, will certainly cause the batteries to prematurely fail.**

**When red warning light flashes, place machine on charge immediately for a minimum of 8 hours.**

## PRESENTATION & OPERATION

**Battery charger**

The machine is fitted with a Nu-Star Charge Master waterproof (IP68) battery charger. The battery charger is located inside the main body of the machine.

-The battery charger may be connected to either 110V or 240V electrical supplies (AC, 50/60Hz).

-The battery charger input socket is located on the exterior of the machine:

-The battery charger has a 2x 12V 10A outputs which charges the 2xEM60 batteries individually.

-The battery charger will not 'over charge' the batteries if left switched-on for extended periods of time.

'Opportunity' charging of the batteries may be safely carried out in-between periods of work ie. it is not necessary to wait for the batteries to be-come fully depleted before re-charging.

-The battery charger is a waterproof & sealed unit. No maintenance is possible.



LED indicators are provided for the two 12V batteries, which are connected in series to supply the machine.

When the RED Led is illuminated the battery is discharged. The charger is recharging at the "Bulk" charging rate of 10A Voltage is between 11.8 and 14 volts

When both blue and red LEDs are illuminated the charger is recharging at an absorption rate between 3 and 6 amperes. Voltage will be approximately 14V.

**In either case if the LEDs remains ON for more than 48Hrs refer to the troubleshooting section.**

With only the green LED illuminated the battery has reached full charge and the charger is delivering "top-up" at less than 3 Amperes.

The charger circuitry is designed to prevent overcharging.

## PRESENTATION & OPERATION

### Charger Troubleshooting

| Symptom / possible cause | **Solution** |
|---|---|
| 1. LEDs do not illuminate<br>No mains supply<br>Charger fault | Check supply and mains fuse<br>return charger to supplier |
| 2. LEDs illuminate but batteries do not charge<br>Batteries may be defective<br>Loose connections<br>Charger shutdown due to overload / short circuit or Fuse blown | Replace if necessary<br>Check and tighten<br>Eradicate cause & replace blown fuses with same type & rating |
| 3.Charging time excessive in hot weather<br>Charger has shut down due to overheating | Move machine to a cooler environment with better ventilation |
| 4.Red LED permanently ON (48+ hours)<br>Dead short or overload<br>Green LED should illuminate when mains is re-stored<br>If not, the charger may be defective<br>Defective battery or excessive demand | Remove mains and then isolate the batteries from the charger<br>Return charger to supplier<br>Change battery-do not attempt to charge additional or larger batteries |
| 5.Green LED permanently ON (48+ hours)<br>Fuse(s) blown<br>Faulty connection | If fuses and connections are sound, return charger to supplier |
| 6.Red & Green LEDs permanently ON (48+ Hours)<br>Battery damaged or unable to reach full charge<br>Poor electrolyte or cell damage | Check and replace battery |

## PRESENTATION & OPERATION

### BATTERY CHARGING

**IMPORTANT INFORMATION**

**Failure to regularly re-charge the batteries on the machine, when shown on the battery indicator gauge, may lead to permanent damage to the batteries and reduced performance of the machine.**

**Repeatedly running down the batteries to the 80% depth of discharge state (as shown on the Battery Indicator Gauge) and continuing to use the machine, will certainly cause the batteries to prematurely fail.**

**The batteries and battery charger fitted to the machine are specifically 'matched' to each other i.e. The Nu-Star waterproof (IP68) battery charger fitted to the machine has been optimised to specifically re-charge the Nu-Star EM60 batteries fitted to the machine & should not be used to re-charge other types of battery.**

**Using another battery charger or fitting other types of battery to the machine is not recommended and will result in reduced machine performance and/or frequent replacement of the batteries.**

**Replacement of the batteries is a costly item!!**

**Battery charging guidelines**

-The batteries on the machine will need to be regularly recharged, according to usage.

-It is not necessary to wait for the 70% or 80% discharge LED's to appear on the battery indicator gauge before re-charging the batteries.

-Recharging may occur at any stage in the battery discharge cycle & is encouraged to ensure optimum battery life and performance.

**Battery charging procedure**

-Position the machine in a dry and sheltered position close to the electrical supply point and away from interference or disruption.

-Switch off the machine at the key-switch.

Connect the battery charger to the electrical supply, using the correct electrical lead & plug type provided:

UK Square-Pin type

CEE 7/7 type

Yellow Industrial type 110VAC

-Leave the machine 'on charge' according to the depth of battery discharge shown on the battery indicator gauge.

**Do not attempt to use the machine while the battery charger is connected to the electrical supply.**

## PRESENTATION & OPERATION

**How long do I recharge the batteries for?**

As a general rule, one hour recharge for every one hour the machine is used and at least once per week a full uninterrupted twelve hour recharge.

The exception being where the battery indicator gauge has shown the batteries have discharged to either the 70% or 80% depth of discharge state and the gauge has flashed the Warning state.

On these occasions, as previously advised, the batteries **must then receive an immediate uninterrupted minimum eight hour period of recharging** before the machine is used again or, battery damage may be caused.

-It is not possible to 'over-charge' the batteries. The battery charger may be left switched on for extended periods without any risk to the batteries. Once the batteries are fully charged, the charger will fluctuate off & on to maintain this state.

-'Opportunity charging' may be performed during the working day e.g. During breaks or shift changes. This will not cause any damage to the batteries but helps ensure the machine is always ready for use.

# MAINTENANCE

## Maintenance Schedule

**The following is a list of the maintenance which should be carried out on the machine. For those points not described in this manual, please contact an authorised service agent or, approved distributor.**

| Maintenance | Daily | | Weekly | Monthly | Annually |
|---|---|---|---|---|---|
| | Before work | After work | | | |
| Check Key-switch Off/ON | x | | | | |
| Check battery indicator gauge and recharge batteries | x | x | x | x | |
| Check the control assembly, including movement of the throttle control, and horn alert. | x | | | | |
| Check operation of emergency stop on machine | x | | | | |
| Check operation of the 'Belly Switch' anti trap function. This should be tested with good clearance behind the operator. | x | | x | | |
| | | | | | |
| Re-charge batteries for at least twelve un-interrupted hours | | | x | | |
| Clean the machine | | x | | | x |
| Check tread on drive wheels | | | | | x |
| Service at an authorised service representative or distributor | | | | | x |
| Check drive chain tension & lubricate chain | | | | | x |
| Check the sprocket keyways of the drive train. | | | | | x |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# MAINTENANCE

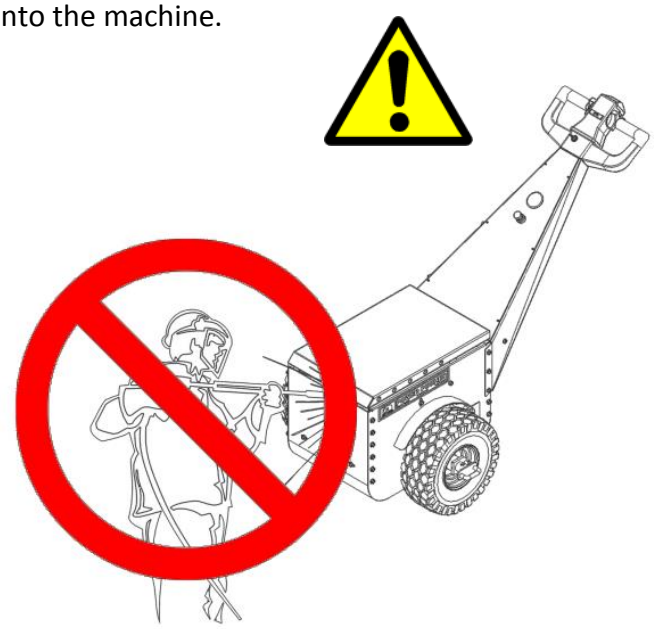
## Cleaning the machine

Clean the machine directly after use, particularly if it has become coated with any substance that will adhere to any part of the machine and set hard.

-**DO NOT** use a hosepipe or pressure washer on any part of the machine. There is a major risk of water penetrating into bearings and electrical connections. Corrosion attacks will result, which will lead to running problems. Cleaning additives and solvents generally aggravate the damage.

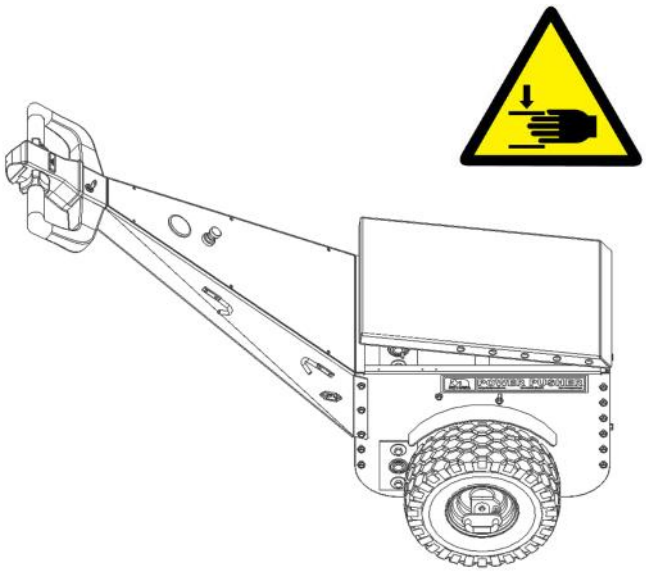
- The exterior of the rest of the machine should be cleaned with a coarse brush and cleaning cloths.

-A penetrating oil and water displacement spray, such as WD-40, may be used to remove oil based dirt and also to help prevent the ingress of water into the machine.



### Opening the lid

When cleaning the inside of the machine be careful when opening closing the lid as it is a risk of hand or finger becoming trapped



# MAINTENANCE

## Chain tensioning

The chains within the machine should be maintained to the correct chain tension.

**Disconnect the batteries before commencing.**

Chain adjustment is provided at the motor/gearbox; slacken the 7/16 inch (vertical) bolts retaining the motor/ gearbox and move the assembly until the maximum chain displacement is ½ inch (12.7mm) at the centre of the chain run.

Re-tighten the bolts to **8.3 Kg-M (60 Ft -Lb)**

(Chain tension adjustment should be checked every six months.)

**ILLUSTRATION ONLY**

**DO NOT INVERT MACHINE!**

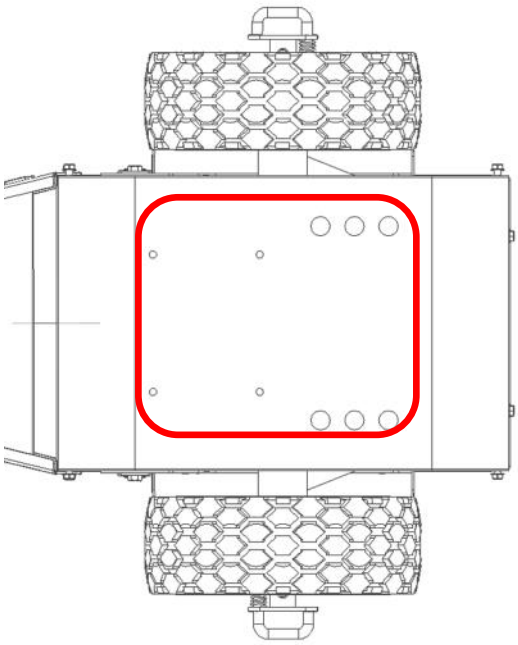


**ILLUSTRATION ONLY**

**DO NOT INVERT MACHINE!**

## Check tyre treads

The drive wheels are filled with an industrial urethane gel that effectively replaces all of the air (that is normally present in a pneumatic tyre) and makes them impervious to puncturing. At the same time, this process chemically bonds the tyre to the wheel rim.

-Periodically check the tyre tread depths. Replace as necessary.

**N.B.** When the tyre tread is exhausted the entire rim/tyre assembly will need to be replaced.

## Storage when not in use

If the machine is going to stand idle for more than 30 days, it should immediately be made ready for storage. To prepare the machine for storage, follow these guidelines:

-Carefully clean the machine.

-Inspect the machine for worn or damaged parts and tighten any loose screws and bolts.

-Ensure the batteries continue to receive a weekly charge throughout the period of storage.

-Store the machine in a clean and dry place and cover for extra protection.

## Annual service

Your machine will benefit from an annual service or overhaul.

-When ordering spare parts, always state your machine's Model No. Serial No. and Year of Manufacture

-Always use genuine parts

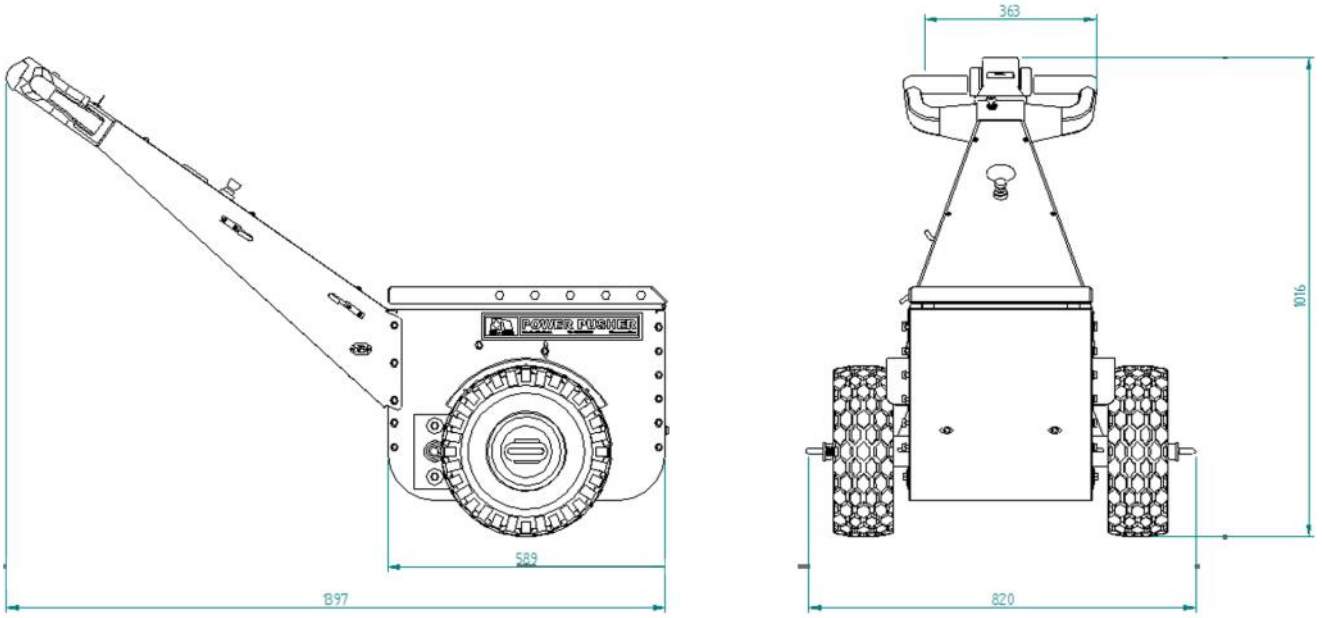
-An annual service / check-up by an authorised servicing distributor is a good way to ensure your machine performs at its best when next needed.

## FAULT FINDING SCHEDULE

| PROBLEM | PROCEDURE |
|---|---|
| No power when key-switch turned on | Check control fuse (refer to exploded diagram)<br>Check batteries are fully charged |
| Machine does not drive when toggle switches are activated<br>(battery indicator gauge shows power in batteries) | Check function of motor controller<br>Motor failure<br>Check emergency button on machine. |
| Machine lacks power | Ensure batteries fully re-charged<br>Check battery charger working correctly<br>Check each battery voltage with multi-meter<br>Check motor controller function<br>Check motor brushes |
| Machine will only drive to the left or to the right. Not drive straight. | Check all free wheel hubs are engaged.<br>Check motor controller function.<br>Check free movement of drivetrain within the machine. (Consult with manufacturer). |

# TECHNICAL DATA

| | |
|---|---|
| **Dimensions** | |
| Length | 1397mm |
| Width | 820mm |
| Height | 1016mm |
| | |
| Gross Weight - No Attachment | 160Kg |
| Tyre Dimensions - Drive wheels | 14x5.5-6 |
| | |
| Air Pressures | N/A Foam Filled |
| **Motor / Gearbox Assembly** | |
| Volts | 24 |
| Watts | 400W |
| RPM | 130 |
| Reduction Ratio | 16.4/1 |
| Braking | Regenerative |
| **Electrical system** | |
| Battery | 2xEM60AH, sealed VRLA, Gel, IATA approved |
| Motor controller | 125A programmable controller |
| | |
| **Main isolator fuse** | 3Amp |
| | |
| **Battery charger** | Nu-Star Chargemaster 502, Input: 230V AC or 110 AC; 50/60Hz |
| Fuse | 25Amp (x3) |
| | |
| **Drive** | |
| Forward Speed | 0 - 3.27km/h |
| Reverse Speed | 0 - 3.27km/h |
| | |



# EC DECLERATION OF CONFORMITY

In accordance with EN ISO 17050-1:2010

Object of the declaration:

Product: Nu-Star Electric Tug

Model/Type: Power Pusher

Serial No: **DDMM 1032 -**

Manufacturer: Nu-Star Material Handling Ltd.

Address: Lakeside, Ednaston Business Centre, Ednaston, Derbyshire DE6 3AE

This declaration is issued under the sole responsibility of the manufacturer

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

2006/42/EC The Machinery Directive

2014/30/EU The Electromagnetic Compatibility Directive

2011/65/EU The Restriction of Hazardous Substances Directive

| Ref. No. & Edition/Date | Title |
|---|---|
| EN ISO 12100 : 2010 | Safety of machinery — General principles for design — Risk assessment and risk reduction |
| BS EN 1175-1 : 1998+A1:2010 | Safety of industrial trucks. Electrical requirements. General requirements for battery powered trucks |
| BS EN ISO 3691-1 : 2015 | Industrial trucks. Safety requirements and verification. Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks |
| BS EN 16307-1 : 2013+A1:2015 | Industrial trucks. Safety requirements and verification. Supplementary requirements for self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks |
| BS EN 12895 : 2000 | Industrial trucks. Electromagnetic compatibility |

Signed for and on behalf of: Nu-Star Material Handling Ltd.

Place of issue: Lakeside, Ednaston Business Centre, Ednaston, Derbyshire DE6 3AE

Date of issue: 13th April 2016

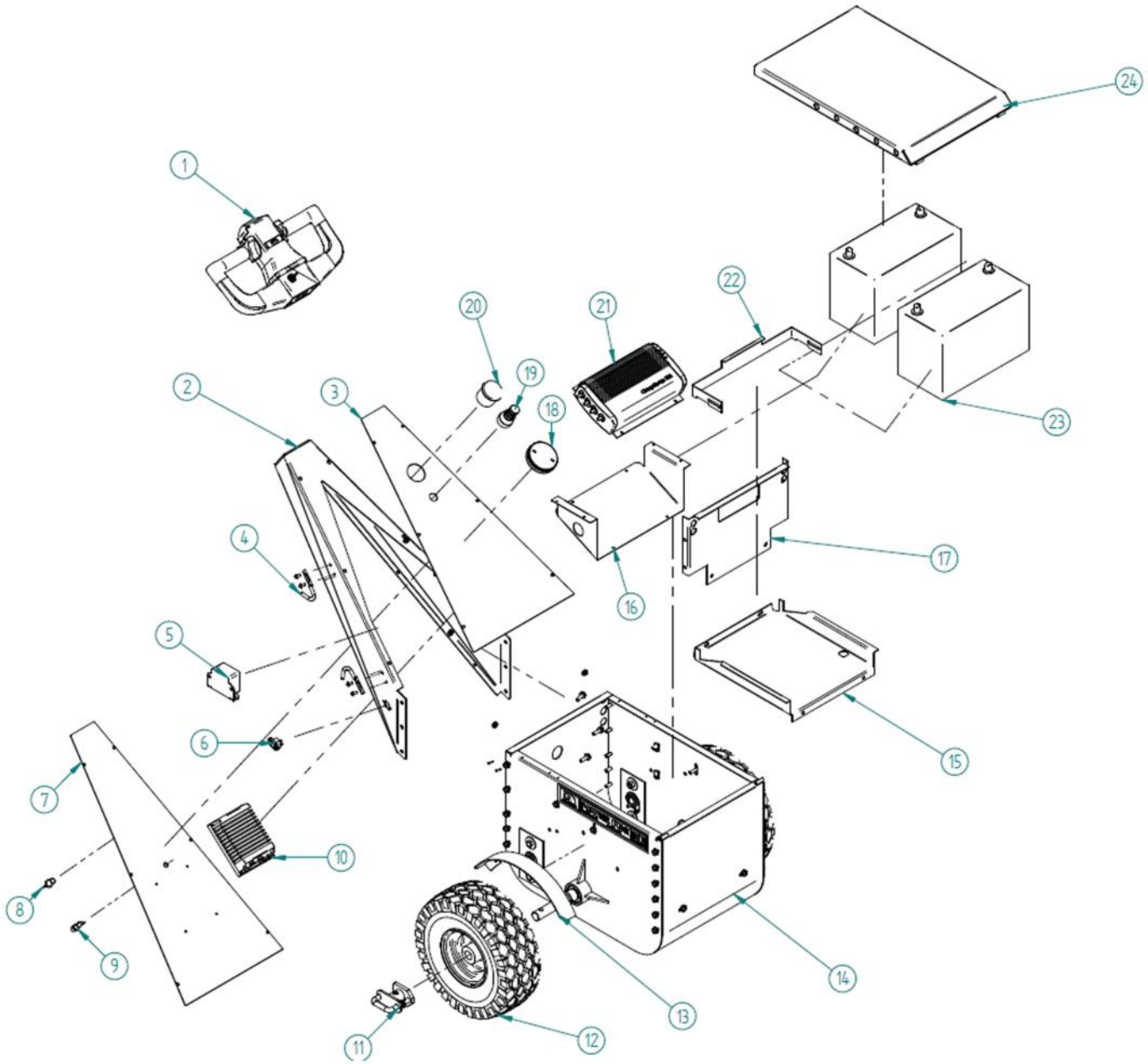
Name: Matt Smith

Position: Technical Director

CE

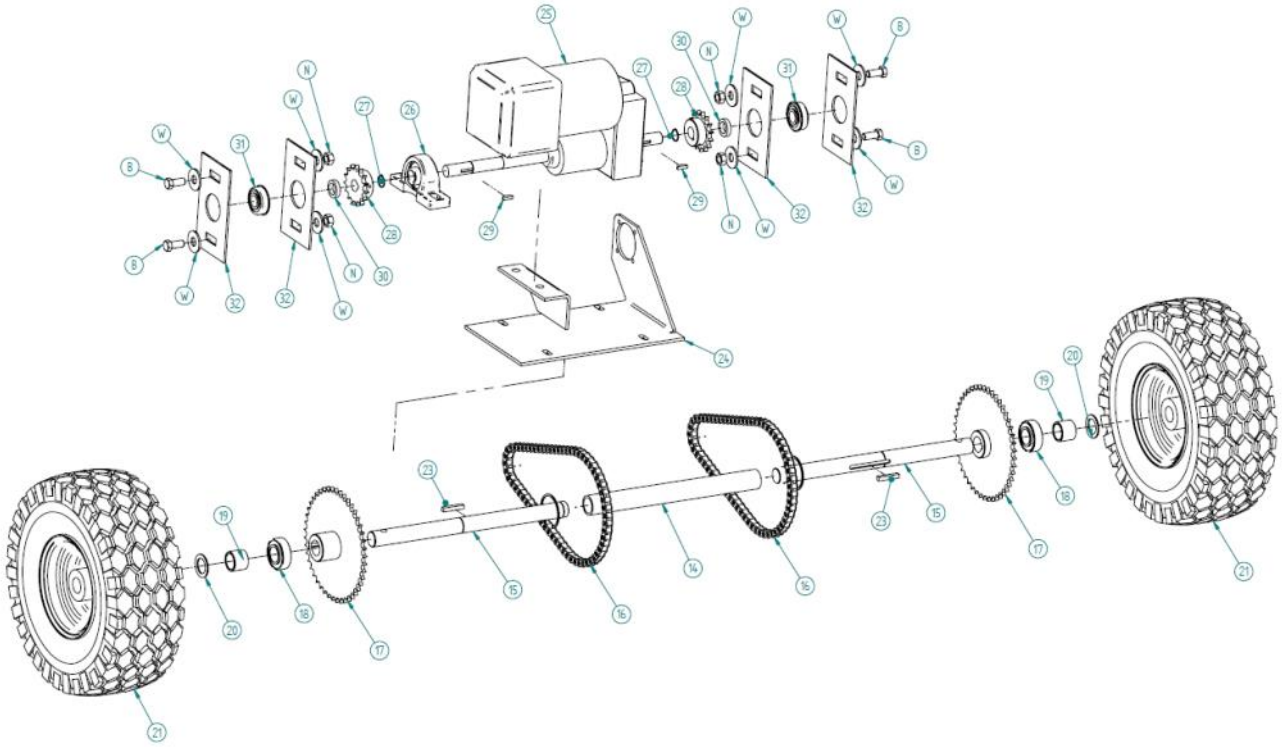
*The technical documentation for the machinery is available from the above address*

# MACHINE - EXPLODED VIEW & PARTS LIST




1. Headset Assembly (1)
2. Handle (1)
3. Top Plate (1)
4. Hook (2)
5. Sounder Alert (optional) (1)
6. IEC (1)
7. Back Plate (1)
8. Sounder/Light Key Switch (optional) (1)
9. Control Fuse (1)
10. Control Board (1)
11. Free Wheel Hub Assembly (2)
12. Tyre/Wheel Assembly (2)
13. Wheel Guard (2)
14. Main Body (1)
15. Battery Plate (1)
16. Charger Mount Plate (1)
17. Battery Divider Plate (1)
18. Light Beacon (Optional) (1)
19. Emergency Stop (1)
20. Battery Indicator Gauge (1)
21. Nu-Star Chargemaster 502 (1)
22. Battery Clamp (1)
23. EM60 Batteries (2)
24. Lid (1)

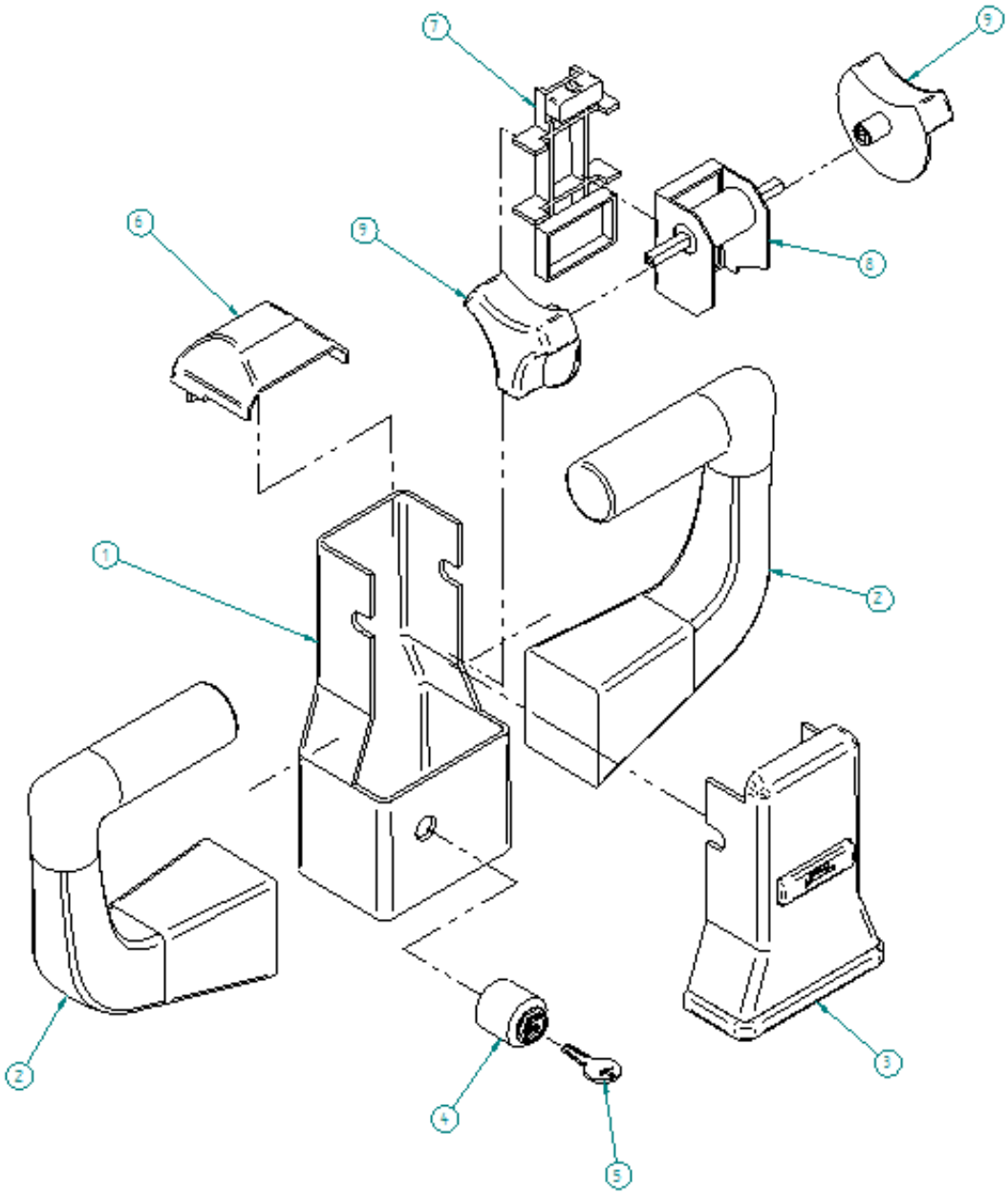
# DRIVE SYSTEM - EXPLODED VIEW & PARTS LIST



## Drive System - Exploded View Parts List

14. Housing, Main Axle
15. Axle, Main
16. Drive Chain,
17. Sprocket, Main Axle
18. Bearing, Axle
19. Spacer, Collar for Axle
20. Washer, Axle Spacer
21. Wheel, Rim with Tyre
22. Free Wheel Hub Lock
23. Key, Main Axle
24. Bracket, Transaxle Mounting
25.Transaxle Assembly
26. Bearing, Mounting Transaxle
27. Circlip, Transaxle
28. Sprocket, Transaxle
29.Key Transaxle, Woodruff
30. Spacer, Sprocket
31.Bearing, Differential
32. Bracket, Bearing Differential

## HEADSET- EXPLODED VIEW




**Headset - Exploded View Parts List**

| Item | Description | Part Number |
|---|---|---|
| 1 | Headset Body | HH-EU-001 |
| 2 | Handle | HH-EU-002 |
| 3 | Front Cover | HH-EU-003 |
| 4 | Keyswitch | HH-EU-004 |
| 5 | Key | HH-EU-005 |
| 6 | E/R Button Assembly | HH-EU-006 |
| 7 | E/R Micro Switch and Cradle (Throttle cable) | HH-EU-007 |
| 8 | Throttle Assembly (Throttle Unit) | HH-EU-008 |
| 9 | Throttle Butterfly | HH-EU-009 |

# MACHINE - WIRING DIAGRAM