



Tug Axis 1T/2T

Operating Manual

Tug Axis 1T and 2T Operating Manual—OM0024E-1-AXIS-1T-2T

This manual contains important safety, installation and operating instructions for this unit. Read this manual thoroughly and completely, and retain for future reference. This unit can cause serious injury to personnel or damage to property if used incorrectly, therefore do not use this machine for any other purpose apart from its intended use. Using this unit incorrectly may void warranty.

Any damage audible or visible to this unit should be addressed at the time of discovery. Electrodrive Pty Ltd can provide parts and service support on request through its service partner company:

Serviced Equipment Pty Ltd

p: 1300 934 471

e: service@fallshaw.com.au

Made in Australia by:

Electrodrive Pty Ltd

2A Ayton Street, Sunshine North VIC Australia 3020

p: 1300 934 471 (within Australia)

p: +61 (03) 9300 8521 (International)

e: sales@electrodrive.com.au

w: www.electrodrive.com.au

© Electrodrive

Contents

Introduction.....	5
Features	5
Controls	6
Operating instructions	6
Controls	7
Driving instructions	9
Safety check	9
Hitching to a trolley	9
Unhitching.....	10
Steering.....	10
Charging	10
Tug hitching options.....	11
Pin hitch	11
Auto-latching hitch	12
Tow ball A-frame hitch	13
Clamp hitch.....	14
Groove hitch	15
Double wheelie bin hitch.....	16
Maintenance	17
Batteries.....	17
Tyres.....	17
Motor and transmission.....	17
Brakes.....	17
Motor controller	17
Throttle lever	17
Fuses	17
Self-resetting circuit breaker.....	18
Warranty	19
Unauthorised maintenance.....	19

Misuse	19
General wear items not covered under warranty.....	19
Appendix 1: Machine rating conditions.....	20
Appendix 2: Fault codes	21
Appendix 3: Wiring diagram	22
Appendix 4: Charging procedures for SLA batteries	23
Charging setup	23
During charging	23
Charger manual	23
Appendix 5: Spare parts list.....	24
Service log	25

Introduction

Move your existing manual trolleys with the battery powered Tug Axis.

The Tug Axis simply hooks on to your existing trolley with a simple hitch. This converts your heavy trolley into a powerful, easy to move motorised unit. Productivity is greatly increased, and back or shoulder strain is eliminated.

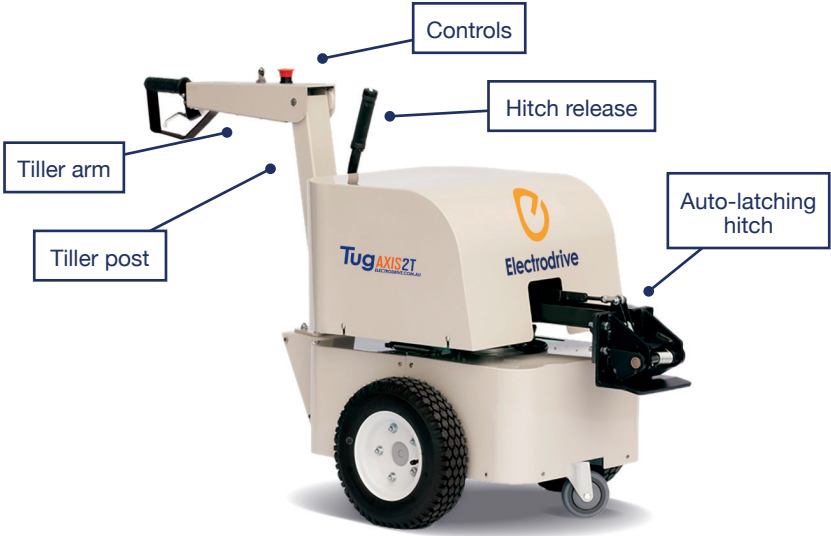
The Tug Axis allows an operator to effortlessly move heavy trolleys:

- Through long corridors, factory aisles, round tight corners.
- Up and down ramps.
- On and off lifts.

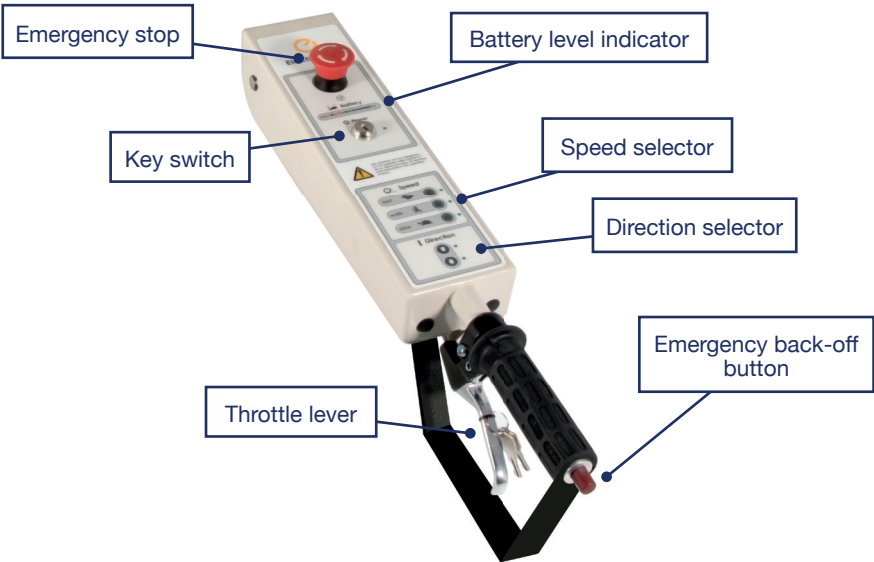
Features

- Rated to tow up to 1000 kg (1T) or 2000 kg (2T).
- 24 Volt DC power.
- Variable speed drive unit.
- Electro-magnetic park brake.
- Travel speed—up to 5 kph.
- Robust steel chassis.
- Tiller handle steering that folds up to reduce space when not in use.
- Programmable motor controller.
- Automatic charger.

Operating instructions



Controls



Controls

Key switch

The key switch must be turned clockwise to switch the unit on. When ON, the LED status indicator will be illuminated. If a fault occurs with the electronics, this LED light will flash an error code (refer to Appendix 2). It is important to note that the unit should be switched off and the key removed, whenever it is not in use. This eliminates the risk of unauthorised movement and also prevents an unnecessary use of battery power.

Emergency stop and back-off button

The controls have two emergency buttons.

1. Emergency stop button—in an emergency, push this button to stop the unit. To release, slightly twist the button and it will pop back up.
2. Emergency back-off button—when pressed, the unit will travel backwards until released, to avoid pinning the operator against an obstacle.



Only use the emergency buttons in an emergency.

Direction selector

This determines the direction of travel. Push the button corresponding to the desired travel direction (forward/reverse).

Throttle lever

This lever provides variable speed control from zero up to 100% of the governed speed. Releasing the lever stops the unit.

Speed selector

The speed selector will always start in the SLOW position. Select a speed that you are comfortable using. The speed can be changed whilst driving. It is advisable that you operate this unit at a slow speed when entering a confined area.

Battery level indicator

The battery level indicator indicates the amount of charge left in the batteries. When it appears to be running low, return the unit to the closest charging station to charge the batteries. Being aware of the level of charge of the batteries will eliminate the possibility of running low on power whilst away from the charging station. Red light only indicates no usable battery power remaining.

Horn (where fitted)

Push to sound the horn, release to turn off.

Charger socket

The charger socket is located on the body panel of the unit, next to the tiller post.

Brakes

When the speed control lever is released, the unit is slowed electrically by dynamic braking until the machine and load comes to a complete stop.

Capacity

Refer to the serial plate for the unit's safe working load, located on the body adjacent to the tiller post.

Driving instructions

Safety check

Before using the Tug the operator should complete the following check:

1. The battery charger is not connected.
2. The direction selector works.
3. The emergency stop button is released.
4. The brakes operate correctly when the throttle lever is released.
5. The battery indicator shows adequate charge.
6. There is no visible damage to the unit.

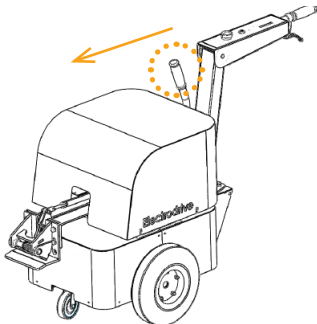
Hitching to a trolley

This Tug is fitted with an auto-latching hitch (EDHT1810-024). Other hitches are also available (see 'Tug hitching options' on pages 11-16).

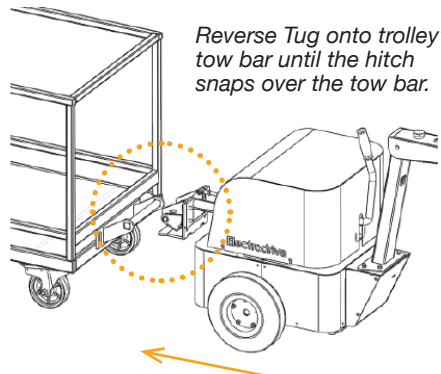
1. Ensure that the hitch release handle is pushed forward to allow the hitch to lock.
2. Carefully reverse the Tug back onto the trolley's tow bar.
3. Once aligned, the hitch will automatically 'snap' over the tow bar. If it doesn't snap, check that the Tug is parallel to the trolley.

In all cases, ensure that the trolley being attached to has its brakes engaged (or chocked) and is free from obstruction. Inspect the trolley and ensure that the trolley castors are in good condition.

Push hitch release handle forward.



Reverse Tug onto trolley's tow bar until the hitch snaps over the tow bar.





Towing a trolley with castors in poor condition can overload the Tug, and cause damage not covered under warranty.

Unhitching

Always make sure the trolley is on a flat level surface.

1. Apply the castor brakes (if fitted) or chock the wheels of the trolley.
2. Pull the hitch release toward the tiller to open the hitch.
3. Carefully drive the Tug forward away from the trolley.

Steering

The tiller arm provides easy steering. The Tug with an attached trolley can be manoeuvred through tight areas.



It is STRONGLY RECOMMENDED that the operator lead the Tug and trolley, rather than using the Tug to “push” the trolley. This will ensure that the operator has a safe unobstructed view ahead. This will also make the Tug and trolley easy to manoeuvre.

Charging

Ensure regular recharging of batteries (charging overnight after a day's usage is recommended). Irregular charging may cause the batteries to prematurely fail.

Leaving a machine in storage without charge for periods greater than a month can also lead to premature battery failure. This is not covered under warranty.

For detailed charging procedures refer to Appendix 1.



Only use the battery charger supplied with this Tug.

The automatic features of the supplied charger ensures that the sealed gel batteries are not overcharged, and only a minimum amount of gas, if any at all, are expelled during charging.

Tug hitching options

Pin hitch

**EDHT1810-002 or EDHT1313 (16 mm diameter)
EDHT1810-043 or EDHT1316 (19 mm diameter)**

Typically used on trolleys with tow bars such as meal trolleys and stock trolleys, the pin hitch can also be mounted upside-down to suit spring-loaded drawbars that push upwards.

These are becoming more common in workplaces, as no bending is required.

Suitability

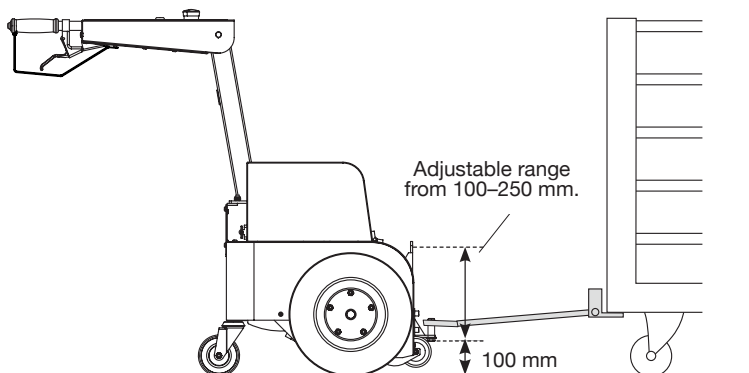
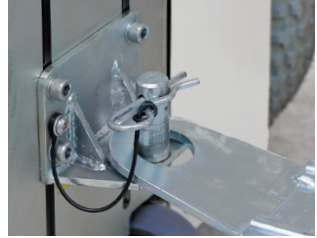
For use on:

- Compact Tug (16mm and 19mm).
- Tug Rise 1T (19mm only).
- Tug Axis 1T and 2T (16mm and 19mm).
- Tug Axis 4T and 5T (19mm only).

Note: When fitted to the Tug Axis, the turret must be locked to disable pivoting, otherwise uncontrolled movement will occur.

Applications

Meal trolleys for hospitals, roll cages for supermarkets.



Auto-latching hitch

EDHT1810-024

To use the auto-latching hitch, a trolley with a 25 mm diameter tow bar is needed.

Electrodrive can provide a tug hitch bar (EDHT1010) which can be welded or bolted to your trolley if required (pictured).

The auto-latching hitch enables limited vertical movement.

Horizontal movement is provided by the Tug Axis's rotating turret.

The hitch is set at 320 mm from the ground.

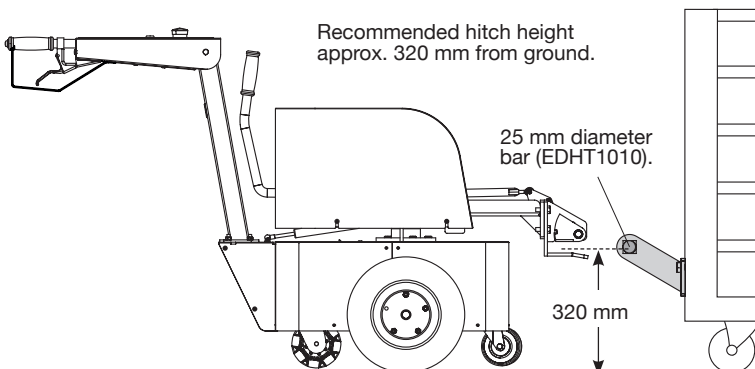
Suitability

For use on:

- Tug Rise 1T.
- Tug Axis range (1T, 2T, 4T and 5T models).

Applications

Industrial, heavier-duty trolleys with loads of 1-2 tonne.



Tow ball A-frame hitch

EDHT1810-023

The tow ball hitch is most commonly used for the movement of trailers, caravans or boats.

The tow ball position can be adjusted manually to suit a height of 500 or 600 mm from ground.

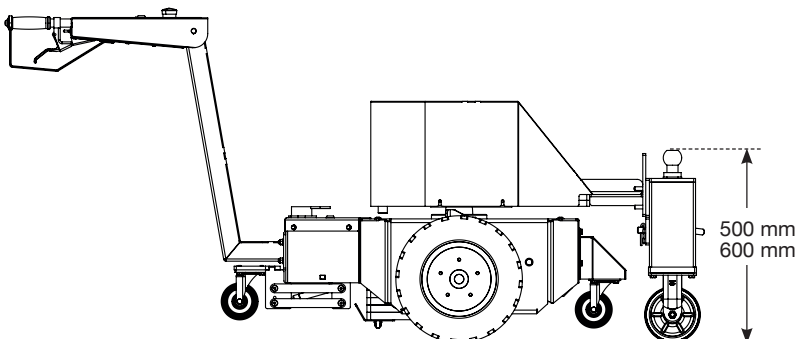
Suitability

For use on

- Tug Axis range (1T, 2T, 4T and 5T models).

Applications

Single-axle trailers or caravans fitted with a standard 50 mm tow ball coupling and a jockey wheel to safely lower the load over the tow ball.



Clamp hitch

EDHTCLAMP001 (General duty)

EDHTCLAMP002 (Heavy duty)

Clamp hitches grab the trolley frame from the outside, by clamping the load between two hooks.

These hitches are commonly seen on linen trolleys belonging to linen companies, hospitals and hotels.

The clamp hitch has a range of 520–720 mm so it suits trolleys with a width between these two numbers.

EDHTCLAMP001 hitch must be supplied with EDHT1810-006 (self-centering hitch) for the Tug Compact or EDHT1810-035 (optional skate hitch). EDHTCLAMP002 does not require self-centering.

Suitability

The general duty clamp hitch (EDHTCLAMP001) is suitable for use on:

- Tug Compact.
- Tug Axis 1T and 2T models.

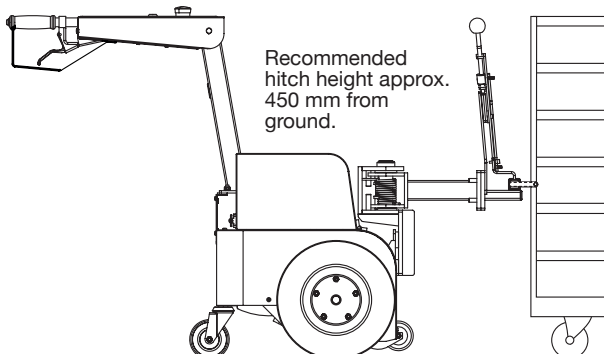
The heavy duty clamp hitch (EDHTCLAMP002) is suitable for use on:

- Tug Rise 1T.

Clamp hitches are ideal for trolleys that do not have an existing hitch point to connect to.

Applications

Linen trolleys, roll cages and trolleys with wire mesh sides.



Groove hitch

EDHTGROOVE0484

Groove hitches are designed for plastic tub trolleys with slotted handles or metal linen trolleys.

EDHTGROOVE0484 hitch is our new swivel mechanism which locks the tubs from inside the handle grooves.

These hitches are normally used on plastic linen trolleys which don't have an exposed or open frame to grab onto from the outside.

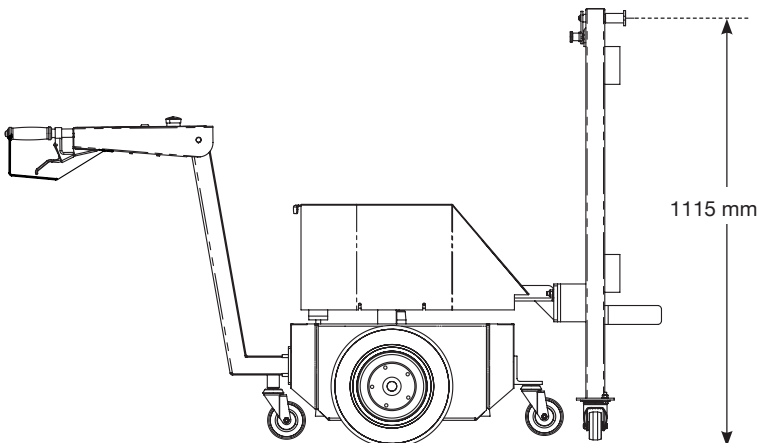
Suitability

For use on:

- Tug Axis 1T and 2T models.

Applications

Rotomould linen trolleys with slotted handles.



Double wheelie bin hitch

EDTWINBINHITCH

Move up to two wheelie bins at the same time using this hitch.

To hitch or unhitch the bins, simply lift the handle.

The height of the hitching point can be manually adjusted with two wing knobs located on the side of the vertical frame.

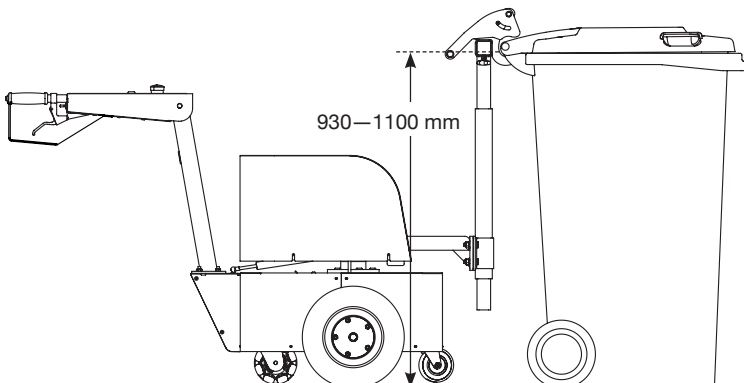
Suitability

For use on:

- Tug Compact.
- Tug Axis range.

Applications

Suitable for moving moulded wheelie bins ranging from 80 to 240 litres with adjustable height and width.



Maintenance

Batteries

If this unit is not being used for an extended period of time, it should be connected to the battery charger to check the battery level on a regular basis, and placed on charge overnight if required. This will ensure the batteries are kept in good condition.

The batteries are sealed and maintenance free. DO NOT attempt to open these batteries. If the unit is not charged as above, the batteries may be exhausted and have dropped below the charging threshold of the battery charger. The supplied charger cannot begin to charge the batteries unless they have a small amount of charge. If this occurs, contact Electrodrive or your local service agent.

A sign that the batteries need replacing is when they no longer hold charge.

Tyres

The tyres should be maintained at a pressure of 40 psi. For replacement tyres, please contact an authorised Electrodrive technician.

Motor and transmission

The transaxle is a sealed unit and does not require regular maintenance.

Brakes

The dynamic braking system does not require regular maintenance.

Motor controller

This unit is not serviceable. Any difficulties experienced with speed control should be referred to Electrodrive.

Throttle lever

The throttle lever and cable do not require maintenance. Should the lever or cable suffer damage they should be replaced. If the handle loosens with wear, the hinge nut can be gently tightened. However, first confirm that the lever is in the correct position as it may need to be reset. (Test by squeezing the lever slightly. The Tug should slowly move, release and the Tug should completely stop).

Fuses

The control circuit is protected against inadvertent current over-loads. This fuse is located adjacent to the controller under the top cover.

Self-resetting circuit breaker

This Tug is fitted with a self resetting circuit breaker in case of momentary over-load. This circuit breaker can be found beneath the top cover on the main electrical control panel. If the unit repeatedly over-loads, test the machine, as the motor may be damaged, and continued use could damage the unit further.

Warranty

Electrodrive Pty Ltd warrants that this product is free from defects in materials and workmanship for a period of twelve months from the date of dispatch from the Electrodrive plant.

If a defect is reported, Electrodrive will repair or replace the defective part, at its own discretion. This warranty does not apply if this unit has been misused, damaged, or modified in any way.

Please be aware that modifications and misuse will void your warranty. The following activities (including, but not limited to) are examples of these:

Unauthorised maintenance

- The machine is re-wired by an unauthorized service agent.
- The motor controller is re-programmed by an unauthorized service agent.
- There are modifications to the body or frame of the machine.
- Use of non-specified parts.
- The machine is serviced by an unauthorized service agent.

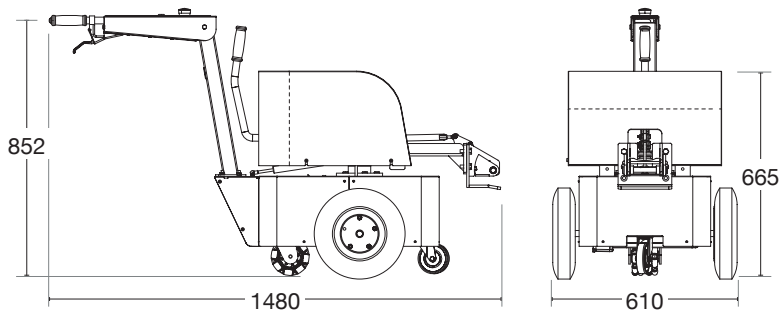
Misuse

- Overloading the unit either during towing or lifting.
- Carrying people or other foreign objects.
- Exposed to rain or other precipitation, unless weatherproof option is installed.
- Using the emergency back-off system to change direction regularly.
- Exposed to a corrosive environment.
- Driven off road—potholes, gravel, etc.
- Driven on slopes with a steeper gradient than 8 degrees.
- Not being charged adequately.
- Using the emergency stop button as an ON/OFF button.

General wear items not covered under warranty

- Tyres and tubes.
- Drive wheels and motor brushes.
- Hand grips.

Appendix 1: Machine rating conditions



Model	Safe Working Load	Max Load
TUGAXIS1TNH	1000 kg	1000 kg
TUGAXIS2TNH	2000 kg	2000 kg





















































































The Tug Axis has been designed to move the rated weight capacity on a level firm surface. Variations in the working environment may impede the performance of this unit. Such parameters include (but are not limited to) the following:

- Ramps and sloped surfaces
- Soft surfaces (for example carpet)
- Slippery surfaces (gravel, water, oil on the ground, etc)



It is important that the Tug Axis IS NOT to be operated outside of the recommended conditions.

Appendix 2: Fault codes

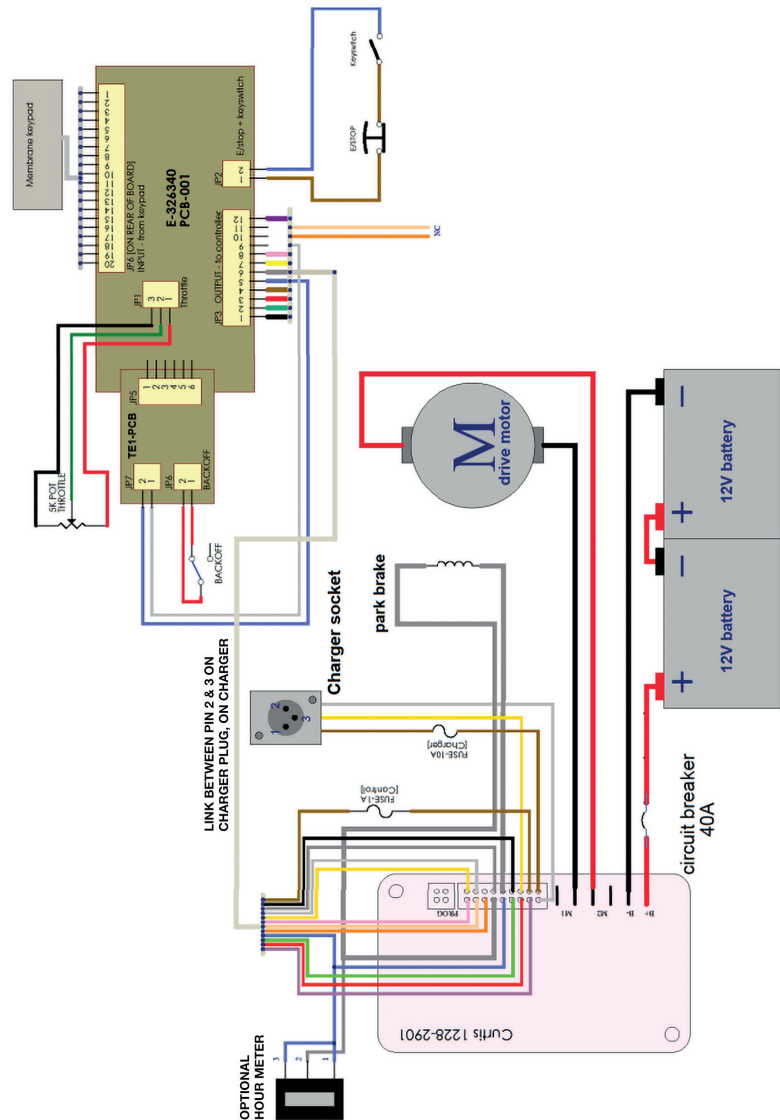
		LED codes	Explanation
LED off			No power or defective controller.
Solid on			Controller operational; No faults.
<hr/>			
1, 1			Thermal cutback fault.
1, 2		 	Throttle fault.
1, 3		  	Speed limit pot fault.
1, 4		   	Undervoltage fault.
1, 5		    	Overvoltage fault.
<hr/>			
2, 1		 	Main contactor drive 'off' fault.
2, 3		  	Main contactor fault.
2, 4		   	Main contactor drive 'on' fault.
<hr/>			
	3, 1	   	HPD fault present for > 10 seconds.
	3, 2	   	Brake 'on' fault.
	3, 3	    	Precharge fault.
	3, 4	    	Brake 'off' fault.
	3, 5	     	HPD (high pedal disable) fault.
<hr/>			
	4, 1	    	Current sense fault.
	4, 2	    	Motor voltage fault (hardware failsafe).
	4, 3	    	EEPROM fault.
	4, 4	     	Power section fault.

 = Must cycle keyswitch to clear.

† = Must use programmer to clear, as follows: Select 'parameters menu'; alter data value of any parameter; cycle keyswitch.

Note: Only one fault is indicated at a time, and faults are not queued up.

Appendix 3: Wiring diagram



Appendix 4: Charging procedures for SLA batteries

- Always charge batteries when work is complete and the equipment is not required for use.
- Opportunity charging is NOT recommended. This can also shorten battery life.
- Never leave batteries in a discharged state as this will shorten the batteries life.
- For maximum battery life, a battery must be recharged to 100% capacity. Recharging less than 100% may result in premature battery failure. Batteries are not covered under warranty if they are not recharged properly.
- If batteries are disconnected from the machine and not used for lengthy periods of time, it is recommended to give them a maintenance charge once every two months.

Charging setup

- Ensure you have the correct charger for the batteries. The correct voltage and current is important to ensure the full life of the batteries.
- Check all connections are tight and in good condition.
- The green charger LED will illuminate to confirm charging is in progress.
- If charger lights do not come on, call your service technician.
- When charger is plugged in, drive function of machine is automatically inhibited.

During charging

- Ensure there is enough airflow to help keep the batteries as cool as possible.
- If the batteries are swollen turn off immediately and call your service technician.
- Always leave batteries on charge until the charge is COMPLETE. This is indicated when charger LED turns off.

Charger manual

Please read BA1105—Battery Charger Operating Manual for more information.

Appendix 5: Spare parts list

Part	Description	Part	Description
BA1010	Battery—12V 50 Ah	GM2210	Tiller pin—zinc plated
BA1030	Battery—12V 70 Ah (optional)	TX1010	Transaxle—V24 250W 85 RPM
BA1105	Charger—24V 7 Amp	WH1200	Rim 6" white 5 bolt
CL1052	Tiller handle membrane loom	WH1260	Tube (for 410 x 350-6 Tyre)
CL1130	Loom—charger with socket	WH1390	Tyre 410x350-6 BLK
CL1141	Loom—controller suit tiller	WP1049	Tiller handle—complete
CS1030	Grey PU castor—100 mm	WP1875	Tiller post
CS1202	Single Rotacaster wheel		
EL1041	Battery leads blue/white		
EL1100	Blanking plug—13mm		
EL1910	Circuit breaker—40 Amp		
EL2110	Motor controller—Curtis 1228		
EL2338	Emergency reverse button		
EL2380	Emergency stop button		
EL2450	Fuse 1 Amp (charger) (3AG)		
EL2470	Fuse 10 Amp (control) (3AG)		
EL2500	Fuse holder panel mount		
EL2620	Horn button (optional)		
EL2720	Key switch with key		
EL2775	Membrane key pad		
EL2805	Hour meter 12–48V		
EL3010	Potentiometer—5k (internal)		
GM1810	Handgrip 7/8" x 5"—tiller		
GM2040	Spring—tiller handle position		
GM2051	Tiller pot spring		
GM2107	Spring—compression C315-01		
GM2150	Throttle cable		
GM2170	Throttle lever for tiller handle		

Service log

Service recommendations

To ensure this equipment is kept in a safe and reliable condition, it is important to follow a preventative maintenance program. Maintain a log of the service work on the cards below, and always use an approved Electrodrive service agent to conduct the works. Approved service personnel will be provided with all necessary documents and components in service repair, including but not limited to, circuit diagrams, component part lists, descriptions, service checklists and spare parts.

6 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

12 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

18 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

24 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

30 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

36 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

42 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

48 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

54 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

60 month service

Date of service		Service agent	
Machine serial number			
Summary of works			
Next service due			

Mobility solutions to help you push, pull and lift with ease.

www.electrodrive.com.au