



Motorized Dewar Cart Owner's Manual

Important Startup Instructions

1. Read the Owners Manual thoroughly before first use.
2. Charge the Motorized Dewar Cart for six hours before using it for the first time. If the battery completely discharges, recharging may take up to 18 hours. See pages 5-6 for battery and charging information.

Date of Purchase: _____

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Warranty

Magliner products have a one (1) year warranty unless otherwise specified from the date of purchase against defects in workmanship or material. Any part or component, except items covered by warranties of other manufacturers, returned to the factory or service center freight prepaid by the owner, found upon examination by Magline, Inc. to be defective or the result of improper workmanship by the factory will be repaired or replaced without charge and returned to the owner freight prepaid by Magline, Inc.

Alterations of Magliner products void any warranty or liability on the part of Magline, Inc.

Magline, Inc. does not guarantee product capacity if alterations are made.



Thank you for your purchase! If you have any questions regarding your new Magliner product please call our customer service department at 1-800-MAGLINE (624-5463) or (989) 512-1000. Please read this manual thoroughly to become familiar with the safe operation and maintenance of your new Motorized Dewar Cart.

General Safety Instructions

- Inspect before each use for damaged and loose fasteners/connections.
- Inspect the unit for cracks, wear or damage. Replace damaged components immediately.
- Keep hands and feet away from all moving parts.
- When unattended, leave the power switch in the off position.
- Operate at a safe speed; go only as fast as safety considerations allow.
- Do not use this product to transport people.
- Do not drive off curbs or ledges higher than one inch. An aluminum walk ramp must be used to overcome obstacles over one inch.
- Never use on a moving vehicle.
- Always stand beside the machine walking forward while operating in reverse. Never walk backwards with machine.
- Never exceed rated capacity, especially on ramps or hills. Damage to the cart and personal injury could result.
- Do not operate when the battery charger is plugged in.
- Never attempt to open the battery. If the battery is cracked or leaking, do not recharge it - it must be replaced.
- Always use a Magliner battery charger to charge your battery.

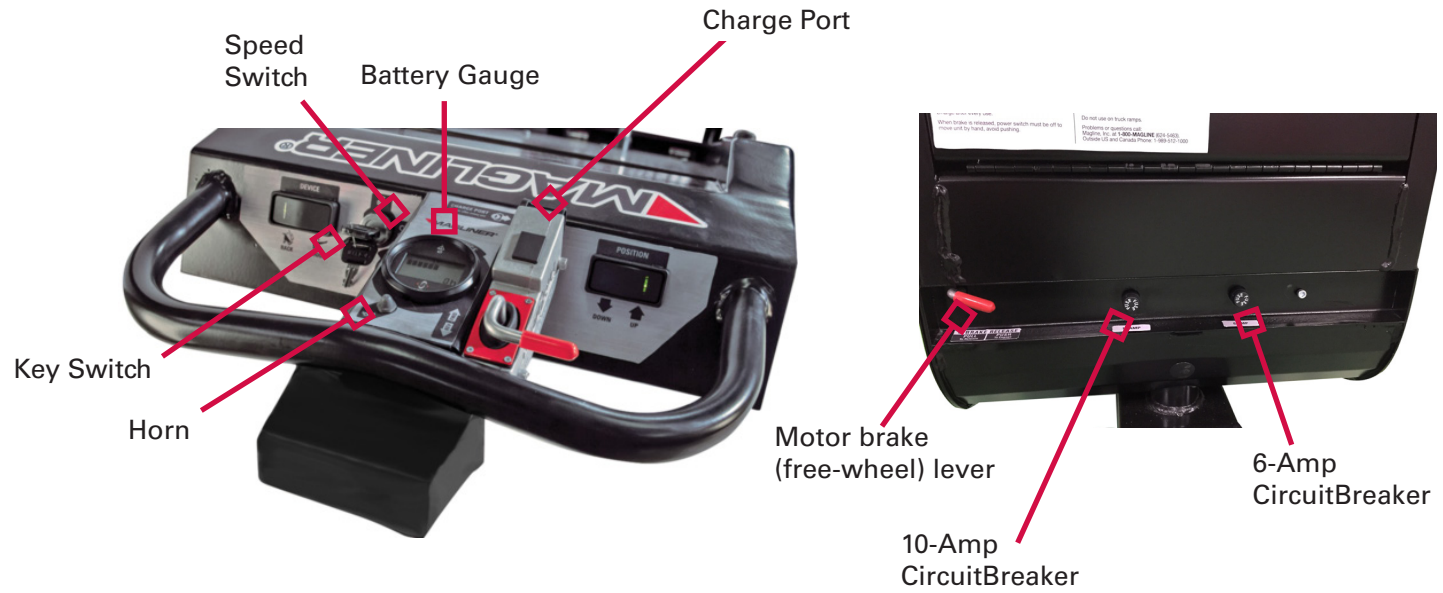
General Machine Care

- Charge the machine in a dry place, preferably at 50 degrees F or warmer
- Wash machine with warm soapy water. Do not use pressure washers.
- Do not drive machine through more than 2" of water, and never submerge drive system or battery box.
- Drive system is lubricated for life, so no maintenance is required for drive system.
- Keep pneumatic tires inflated to 20-25 psi.

Startup Instructions

1. Fully charge battery before first use, and charge the battery after each use to prevent total battery discharge and to maximize battery life.
2. Read manual thoroughly before first use.

Motorized Dewar Cart



Battery

The battery must be charged for a minimum of six hours before using it the first time. If the battery completely discharges, recharging may take up to 18 hours. When not in use, it is recommended to keep the battery plugged in to maintain a maximum charge and extend the battery life. The charger will not overcharge the batteries.

General Battery Warnings

- Do not connect accessories to the battery; this will cause premature battery failure.
- Unauthorized modification could create a hazardous condition and result in serious injury.
- Batteries contain sulfuric acid, which can burn eyes, skin, clothes, etc. Use caution! Always wear gloves when working with batteries. If contact occurs, flush immediately with water and get medical attention. Protect surfaces from battery damage by placing batteries on rubber or acid-safe plastic surfaces.
- Never place a battery near an open flame or heat.
- To prevent electrical shock, do not touch non-insulated parts of the charger output connectors, battery connectors or battery terminals. Do not use connectors that are cracked, corroded, or do not make adequate electrical contact. Use of damaged or defective connectors could result in fire or electrical shock.
- Keep sparks, flame and smoking materials away from batteries.
- Batteries can supply a large amount of current. Do not wear jewelry or watches when working on the batteries.

General Charging Warnings

- Use only the Magliner 36V charger designated for use with the Motorized Dewar Cart. Charge using a 110V electrical outlet.
- Do not operate the unit when the battery charger is plugged in.
- Do not expose charger to rain or snow.
- Store the charger in a dry, clean place.
- Use the charger only in a dry, well ventilated room without flammable fluids or explosive gases.
- Make sure the cord is located such that it will not be a trip hazard or otherwise subject to damage or stress.
- Do not operate a charger with a damaged cord or plug – replace immediately.
- Unplug the charging unit from the AC power supply source before attempting any maintenance or cleaning.
- Always use battery chargers supplied by Magline, Inc. Other battery charging units could cause damage to your batteries or personal injury.
- To avoid damage to battery charger connectors and cords, disconnect by grasping the plug body and pulling it straight out of the outlet or receptacle. DO NOT pull on the cord. DO NOT twist, rock, or pull the connector sideways.
- The metal tip on the end of the plug may be hot when it is first unplugged.

Battery Life

The Motorized Dewar Cart is powered by a 36V system using three non-spillable 12V AGM lead acid batteries connected in series.* A fully-charged battery pack will last at least one typical day; however, extreme temperature ranges and extreme loads can have an effect on the amount of power available during one charging cycle. You will know that your batteries need replacing when you notice diminished range or operational time.

*Battery has a warranty of six (6) months

Battery Care

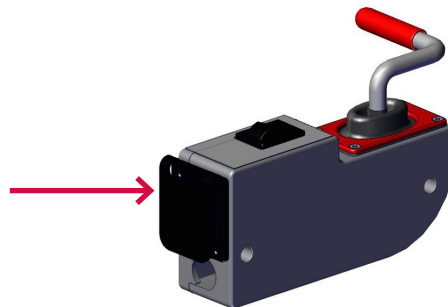
- Store and charge the Motorized Dewar Cart at temperatures between 50 and 100 degrees F.
- Always keep the machine on charge. Batteries stored for long periods of time will self-discharge and may get so low, that the charger cannot recharge them.
- Keep the terminals clean and tight.
- Handle the batteries with care.
- The batteries may require 4-10 charge/discharge cycles until batteries charge up to their full potential.
- **DEEP DISCHARGE ON A CONTINUAL BASIS WILL SHORTEN THE SERVICE LIFE OF THE BATTERIES.**
- Battery performance may be reduced when operating in temperatures less than 40 degrees F. You should anticipate a range reduction by 50% or more when operating at temperatures below 32 degrees F.

Battery Box

**Charging the Battery**

The Motorized Dewar Cart is provided with an off-board 36V charger. To charge the machine, plug one end of the charger into a 110V wall outlet, and the other end into charger port. An LED light on the charger will blink (or turn amber or red) while the unit is charging. When the unit is completely charged, the light will turn solid green. For optimum performance, charge in temperatures from 50-100 degrees F.

It is essential that the Motorized Dewar Cart be kept on a charger whenever it is not in use; the batteries will not overcharge. Before use, unplug the charger from the Motorized Dewar Cart by carefully pulling the connector out of the charger port in the throttle. Install the dust cover boot over the plug connector on throttle to keep the charger port clean.

**Battery Gauge**

The Dewar Cart is supplied with a battery charge level gauge that constantly monitors battery life and displays battery charge level. The gauge also provides diagnostic information if the control system experiences a fault (see below).

Gauge Indicators

Normal Operations:

With the key switch in the On position and the Dewar Cart operating normally, the gauge will indicate the calculated battery status via the 10-segment bar graph. It will also show the accumulated drive time. Ten segments indicate that the batteries are fully charged, and as battery charge is depleted, the segments will disappear.



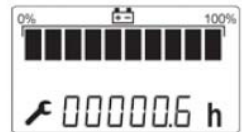
Charging Operations:

Once the Dewar Cart is placed on charge, the gauge will indicate the status of the charge and the actual values of charging voltage as shown. When all 10 segments of the bar graph are visible, the batteries are completely charged.



Service Timer Display

When the Dewar Cart is switched on, the service timer value is show for the first 5 seconds indicated by the wrench symbol. The service timer value represents the elapsed hours of drive time since the Dewar Cart was last serviced. If the wrench icon and fault LED blink slowly, the service timer value has been exceeding and it is time to schedule service for your Dewar Cart.





High Pedal Disable

The high pedal disable display is shown if the throttle position on your dewar cart is not at the neutral position (zero speed). The Dewar Cart will not operate in either direction, and the smart gauge will ripple the bar graph segments from one to 10 until the condition is cleared.

Fault Display

If the Dewar Cart develops a fault, the gauge will display a 4-digit code and the wrench icon will blink rapidly as well as a red LED fault light indicator. Two faults are indicated visually:

Temperature 

Motor Fault 

If the LED and wrench icon flash once every three seconds, there is a wiring fault preventing the gauge from proper display.



If you observe any of these fault codes, it is critical that you call Magline BEFORE operating the Dewar Cart.

Halo Hook and Rack Operation

The Dewar Cart is equipped with a power-operated halo hook and tilt-up rack. The powered hook is designed to keep the operator's hands away from the Dewar/hook engagement area to prevent finger and hand injuries. The design of the powered tilt up rack is to prevent the need to lift the cart into the vertical position to pick and capture dewar and cylinder tanks.

To operate the hook or rack, use your left hand to hold down the selector rocker switch, and your right hand to operate the positioning rocker switch. **NOTE THAT THE SELECTOR SWITCH MUST BE DEPRESSED IN ORDER FOR THE HOOK OR RACK TO MOVE UP OR DOWN.** Both the hook and the rack actuators can only operate when the propulsion is at zero, and when the green indicator light on the rocker switches is illuminated. This prevents operation of the hook or rack while the cart is in motion.

Rack/Hook Selector
(Light is on when switch is available to operate)

Up/Down Position
(Light is on when switch is available to operate)



Rocker switch lights are only when the cart is stationary. Both hands are required to activate hook or rack.

Rack down



Rack up



Halo Hook Variations

The Dewar Cart is capable of capturing most 20" diameter and 26" diameter dewar tanks. The shorter hook is designed to capture the 20" diameter tanks, and the longer hook is designed to capture the 26" diameter tanks. The spare hook should be kept inside the tool box located on the Cart. Hooks can be quickly and easily exchanged simply by pulling the 3/8" pin to release the current hook, and then using the pin to secure the next hook in place.

Load Carrying Configurations

The Dewar Cart is designed to be versatile enough to capture and carry or move all types and sized of dewars and cylinders. The three suggestions load configurations are show below. In all cases, the operator uses the rocker switches to position to rack into a vertical (upright) orientation for loading or unloading the cargo.

ALWAYS USE BOTH THE HALO HOOK AND RETRACTABLE RATCHET STRAP TO SECURE THE LOAD ONCE POSITIONED ON THE RACK.

20" Diameter Dewar Tanks:

Empty



Loading



Loaded



26" Diameter Dewar Tanks:

Empty



Loaded



NOTE: Due to the weight and geometry of a 26" diameter dewar, we recommend "tractoring" the dewar rather than tilting it back and carrying it on the cart. See following page for handling 26" diameter dewars with square bases.

High Pressure Cylinders:

Empty



Loading



Loaded



Additional Information for 26" Diameter Dewar Tanks:

26" diameter dewars, especially square base 26" diameter cylinders, are the most difficult to capture and transport. The Dewar Cart is not designed to carry the 26" dewars; it is designed to capture the dewar and then transport it by towing or pushing it.

For 26" dewars with a round base and all swivel casters, set the hook into the halo slot and transport as shown. However, for square base 26" dewars, the hook will probably not line up with the halo slot due to the flat of the square base.

1. Orient the square-based dewar so that the 2 fixed casters are facing the rack of the Dewar Cart, and the two swivel casters are facing away from the rack (Figure 1).
2. Position and set the halo hook under the halo ring, and then raise the hook to so it bears a little on the ring, then lift only the back wheels (fixed casters) of the dewar about an inch of the ground (Figure 2).
3. Use the strap(s) to secure the dewar to the Dewar Cart rack (Figure 3).
4. If needed, raise the hook another inch or so to lift the back (fixed) casters off the ground to allow more traction on the Dewar Cart drive wheels, and allow the front caster wheels to swivel freely during transport (Figure 4).
5. Use the propulsion system to transport the dewar in either forward (pushing) or reverse (towing). Steering can be a little difficult at first, but if you apply a little throttle while making a turn, it will make the unit much easier to turn.

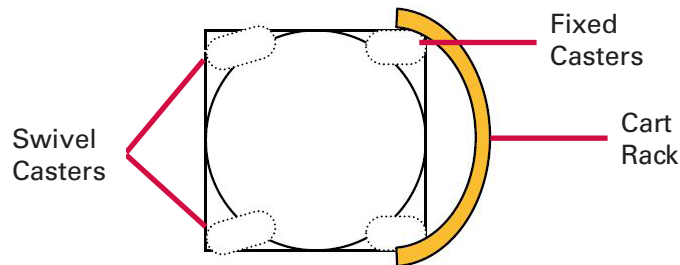


Figure 1



Figure 2



Figure 3



Figure 4

Motorized Dewar Cart Drive System

Automatic Electronic Braking

The drive system features regenerative braking by which the electronic controller uses the motor to slow down the machine in both forward and reverse directions. To slow down the machine, reduce throttle input, or release the throttle lever, and the machine will brake to a stop.

While driving downhill, this feature allows direct control over the speed of the machine, as long as the load on the machine does not exceed the design parameters. In addition, the drive system is equipped with an electromechanical park brake, which is automatically engaged when throttle input is zero. This locks the machine in place until there is throttle input from the operator, or the operator manually overrides it in manual mode (see below).

Manual Mode (Free Wheeling)

The drive system is equipped with a lever that overrides the electromechanical brake for manually pushing the Motorized Dewar Cart. This option should only be used if the batteries are too low to drive the system, or if the drive system becomes inoperable. To disengage the brake, push the lever down until it clicks into the disengaged position.

With the brake in the disengaged position, the power key switch and the ON/OFF rocker switch **MUST** be turned off, or the drive system will not move freely. The controller **WILL NOT** operate the motor when the brake is disengaged. This is a safety lock-out that prevents the operation of the machine when the electromechanical brake on the transaxle has been manually released.

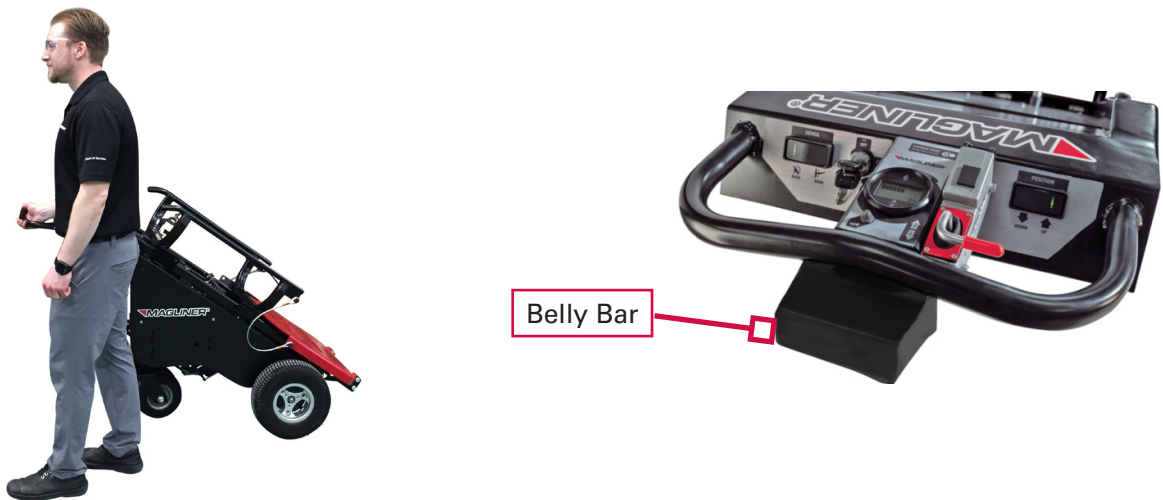
NOTE: A safety feature called “push too fast” will aggressively slow the machine down if the machine begins to move too quickly with the brake released and the power switch off. Its purpose is to avoid a run- away situation if the operator forgets to re-engage the brake.



Reverse Operation

While operating the Dewar Cart in reverse, **DO NOT** stand behind the unit driving it toward you looking over your shoulder. The proper way to operate the unit in reverse is to **STAND BESIDE THE UNIT**. However, just in case the operator does not follow proper reverse operation, the unit is equipped with a belly bar that prevents the operator from becoming pinned while operating in reverse. If the bar hits the operator during reverse operation, it will then activate the machine into the forward direction. Consult the daily checklist table to verify belly button is operable.

A reverse alarm sounds when the controller senses motion in the reverse direction. The volume of the reverse alarm is adjustable. See the Maintenance section for instructions to adjust volume.



Storage and Transportation

The Dewar Cart can be stored in any position as the batteries are sealed and there are no fluids to leak out. The most common (and suggested) storage orientation is unloaded (empty) sitting on its three wheels placed on charge. Leaving the cart loaded for an extended period of time is not suggested.

The most common orientation for transporting a Dewar Cart onboard a truck is in the vertical orientation while secured to a dewar. It is imperative that the halo hook is engaged into the dewar, and that the ratchet straps are firmly secured to the dewar. A second, separate strap should then anchor the dewar/dewar cart assembly to the truck **BEFORE** any transportation takes place.

Pre-Trip Inspection

1. Before each use, check for damaged or missing components. Replace damaged or missing components immediately with Magliner replacement parts.
2. Check all fasteners, and make sure to tighten or replace loose or missing hardware.
3. Check welds and material near welds for cracking or damage.
4. Make sure that pneumatic tires are properly inflated to 20-25 psi.
5. Check retractable ratchet straps to validate proper working order. If ratchet straps are not functioning properly, do not operate the machine until repaired.
6. Unplug the charger from the cart by carefully pulling the connector out of the charger port in the throttle. Install the dust cover boot over the plug connector on throttle to keep the charger port clean. Store the charger in a dry, clean place.
7. Test the On/Off key switch to be sure the unit will turn on and off as intended.
8. Always check that the propulsion system is functioning properly before beginning the day; with the unit On, test that the unit moves forward and backward with propulsion.
9. With the unit turned Off, release the park brake and push or pull the cart to make sure it is functioning properly in manual mode. Then reengage the transaxle.
10. Verify that the halo hook/rack rocker switch is operating properly by running the hook and rack without a dewar on it. If the safety hook/rack is not working, **DO NOT OPERATE** machine. Consult trouble shooting guide, and then call Magline.
11. Verify the belly bar is operating properly by running the cart in reverse, and manually activating the belly bar. If the unit does not instantly stop and travel forward for 2 seconds, **DO NOT OPERATE** machine. Consult trouble shooting guide, and then call Magline.
12. Check battery charge level indicated by the battery level gauge. If the batteries are not fully charged you may not have enough battery capacity to complete the work.
13. Test the horn by depressing the horn button. Depressing the button sounds the horn, releasing it stops it.

Using the Motorized Dewar Cart

On/Off Switch

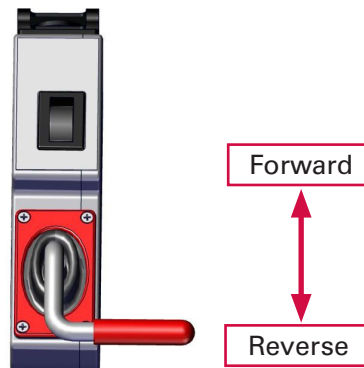
1. Insert key into the key switch and turn to ON position. Turn the rocker ON/OFF switch into the ON position.
2. If the switch is left on for approximately 20 minutes without use, the controller goes into a power save mode (sleep mode).
3. To wake the controller, cycle the rocker switch to the off position for 2 seconds, and then back to the on position.

Variable Speed Control

Moving the throttle lever increases speed in proportion to how far you pull or push it – the further you move away from home position, the faster you go forward or reverse. The maximum speed is approximately 3.8 mph forward and 2.5 mph in reverse.

Releasing the lever will automatically return it to zero, commanding the controller to slow down and stop the machine, locking it in place.

It is recommended operators set the Hi-Low speed switch to low when operating indoors and/or when loaded. Operating in high speed mode is suggested only when the operator has ample room to move and to stop, with few obstacles.



Moving with Propulsion

1. To use propulsion, be sure that the motor's brake lever is in the up position to engage the transaxle.
2. Turn the unit On. Check to be sure surroundings are clear.
3. Pull the throttle lever toward you to move in reverse; push the throttle away from you to move forward.
4. To increase the speed, push or pull the throttle lever further away from home position.
5. To slow the unit, move the throttle lever closer to home position.
6. When you release the throttle lever, the unit will slowly come to a complete stop and the park brake will engage.
7. The Dewar Cart will slow to a stop and park in place even on an incline, as long as the load on the cart does not exceed capacity.

Considerations When Using Propulsion

- Always operate the Dewar Cart only as fast as safety considerations allow.
- When turning tight corners, keep the unit close to the turn in the direction of travel; for example, when turning right, keep the unit close to the turn on the right. When turning left, keep the unit close to the turn on the left.
- Use extra caution when moving loads on ramps or moving loads in reverse as described below and on page 12.
- While unattended, turn the unit off.
- Do not drive the Dewar Cart through more than 2 inches of water, and never submerge the drive system or battery box.
- Do not drive off curbs or ledges higher than one inch. An aluminum walk ramp must be used to overcome obstacles over one inch.

Slopes and Inclines

The Motorized Dewar Cart can carry up to 1,100 lbs. max under propulsion up to an 8 degree incline or decline. If the degree of incline is steeper than 8 degrees under full load, you can simply assist the climb with a slight push to assist the drive system.

At the End of the Day

1. Make sure the Dewar Cart is unloaded - do not leave tanks or cylinders on the machine for an extended period of time.
2. While unattended, turn the unit Off.
3. The Motorized Dewar Cart when batteries are installed should be stored and charged indoors and in a dry environment. To maximize battery life and minimize charge time, temperatures should be between 50 to 100 degrees Fahrenheit.
4. Charge the batteries as soon as possible upon returning with the Cart from use. Charge daily or after every use in a dry, well ventilated area away from sparks, heat and flames. Do not use an extension cord if possible, and do not use the charger if the cord is damaged.

Preventative Maintenance

Area	Inspection Frequency	Procedure/Normal Condition
Drive Wheels	Daily	Inspect wheels and tires for wear and cracks. Keep pneumatic tires inflated to 20-25 psi.
Fasteners	Daily	Tighten any loose hardware.
Battery Charging	Daily	Red, amber or green charging light should turn on when charging.
Casters	Daily	Inspect for wear; clean dirt and debris.
Transaxle	Daily	Transaxle should be kept free and clear of debris. When stored, the transaxle lever should be kept in powered mode with the power OFF to keep unit from rolling freely.

Troubleshooting

Problem	Possible Causes	Remedy
Motor does not run	<p>Power switch in OFF position</p> <p>Controller in sleep mode</p> <p>Batteries are drained</p> <p>Motor brake lever released on drive system</p> <p>Electrical fault</p>	<p>Turn switch to ON position</p> <p>Cycle switch, OFF 2 sec, then ON</p> <p>Recharge batteries</p> <p>Re-engage motor brake on drive system</p> <p>Unplug, then plug in both motor and throttle connectors</p>
Motor shuts off during use/ abruptly stops	<p>Circuit breaker has tripped</p> <p>Controller trip due to thermal overload (weight and/or climb angle may exceed controller capacity)</p> <p>Broken motor wire or connector</p>	<p>Push circuit breaker to reset</p> <p>Release throttle, allow controller to cool down at least 30 seconds. Unload some weight, cycle power switch, operate machine again.</p> <p>Check motor wires and brake wires to make sure none are broken, and also check connector to make sure wires are secure in connector</p>
Insufficient range	<p>Hilly or soft terrain</p> <p>Batteries not "broken in"</p> <p>Cold batteries</p> <p>Battery not fully charged</p> <p>Damaged, old batteries</p> <p>Low tire pressure</p>	<p>Push to assist drive system</p> <p>Charge and discharge 4-10 times before optimum range</p> <p>Keep batteries warm</p> <p>ALWAYS keep machine on charge when not in use</p> <p>Replace batteries</p> <p>Inflate pneumatic tire(s) to 20-25 psi</p>
Machine slows down aggressively while in manual release mode	<p>"Push too fast" safety feature</p>	<p>Do not push machine so fast while in manual release mode</p>
Actuator does not run (LED on rocker switch is not lit)	<p>Safety Switch not depressed</p> <p>6 -Amp fuse is blown</p> <p>Actuator is damaged or broken</p>	<p>Depress Safety Switch</p> <p>Replace fuse, check weight of dewar to make sure weight capacity is within specifications.</p> <p>Remove actuator, position hook manually until replacement is available.</p>
Belly Bar does not operate	<p>Broken switch or damaged wire</p>	<p>Remove right side cover; look for red LED indicator light. If not lit, do not operate machine, call Magline.</p>

NOTES _____



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