FriendlyRobotics®

Operating & Safety Manual

RoboMower®

RL350/550/850

www.friendlyrobotics.com

DOC0015D

QuickStart

QuickStart Reference Guide

1 CHARGE THE UNIT

- Raise wheels to highest setting.
- To raise rear wheel, move adjustment setting handle located in the rear power pack compartment, to its lowest setting.
- To raise front wheel, rotate front wheelbase- each “click” represents one notch of height.
- Insert fuse, place power pack in unit.
- Plug charger into wall unit.
- Plug charger into manual controller base plug.

2 PERIMETER SWITCH

- Open perimeter switch cover.
- Install three (3) C batteries.
- Close perimeter switch cover.
- Install on perimeter switch stake. (After laying the perimeter around your designated plots, you will attach the ends to the green switch connectors to close the perimeter loop.)
- Mount vertically in ground, at least 5 feet from the perimeter wire.

6 INITIAL SETTINGS

- Place the mower inside the lawn perimeter on level ground.
- **FOR FIRST OPERATION ONLY:**
- Press the "GO" button. The display will read “Warming Up” and then “Set Country”.
- Press the "GO" button again. The display should read, ‘Not Set!’
- Scroll to your country and press the "GO" button.
- Press the “GO” button once again. 'Calibration Req' message will appear. Press "GO" once more. 'Activate Motors' message will appear. Press "GO" to activate calibration.
- The Robomower will rotate through several circles while the calibration process is occuring, pausing for several seconds at various points in the circle. When complete, the message 'Test Passed - Press C' will display. Press the 'C' button.

7 START MOWING

- Position your robomower inside the perimeter wire at least four (4) feet from the wire and not aimed at a corner.
- Make sure perimeter switch is on and press the"GO“ button.

IT MOWS. YOU DON’T.

- After mowing, recharge your battery.

For product service please contact your service dealer or visit us on the web at **www.friendlyrobotics.com**

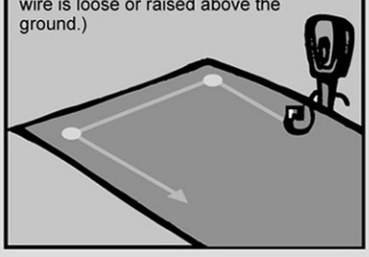
Reference Guide

3

SET UP PERIMETER WIRE

- Lay the wire around lawn edge and peg down tight.
- Use ruler for appropriate spacing on all perimeter wire placement.
- Narrow areas, less than 5.5 ft. wide and obstacles closer than 4 ft. from lawn edges should be left out of the installed area.

(Helpful hint: Peg the wire at each corner. Fill back in with additional pegs where the wire is loose or raised above the ground.)



4

PROTECTING FLOWERBEDS AND OTHER OBJECTS

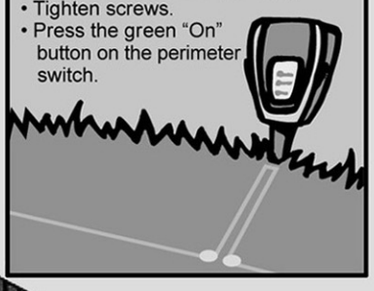
- Wire around any area you don't want the mower to enter: around trees, flower beds, ponds, swimming pool, young trees, holes and ditches etc.
- The two wires leading from the edge to the protected area and back must be parallel, touching and pegged down side-by-side.
- The mower's bumper will recognize trees and solid obstacles higher than 6 inches. No need to protect them with a wire.

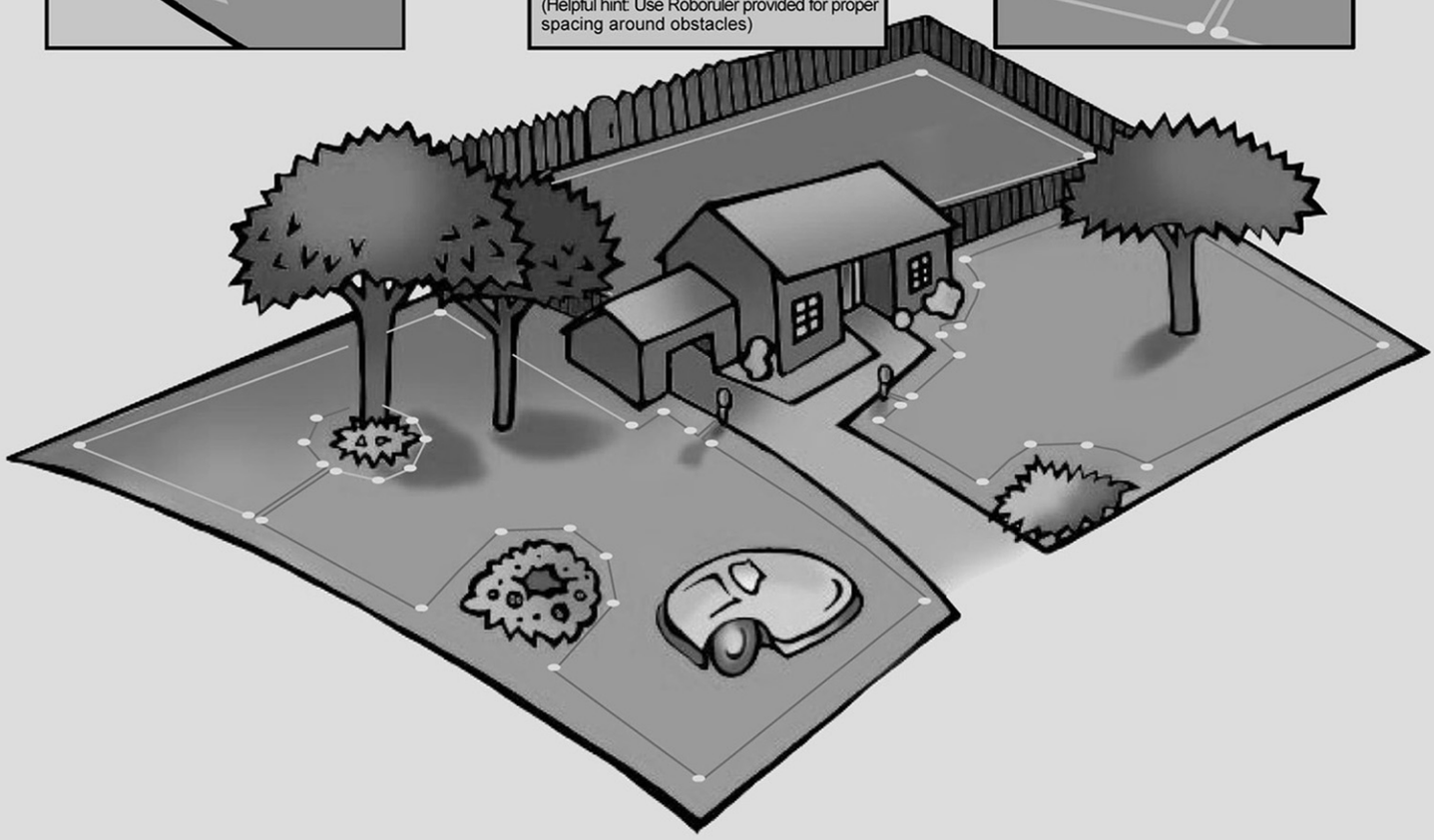
(Helpful hint: Use Roboruler provided for proper spacing around obstacles)

5

COMPLETING THE LOOP

- After completing your wire installation:
- The wires leading to the perimeter switch should be parellel, touching and pegged tightly to the ground.
- Make sure the perimeter switch and wires leading to it are at least 5 ft. from the perimeter wire.
- Strip 1/4 in. of plastic from the wire ends and insert into the green switch connector (one wire per hole).
- Tighten screws.
- Press the green "On" button on the perimeter switch.





EC Declaration of Conformity

1. **F. Robotics Acquisitions**, Hatzabar St., Industrial Zone, Pardesiya, Israel declares that the machines described in item 2 conforms with the directives listed in items 3 & 4.
2. Product: 24 Volt Battery operated automatic lawn mower, models RL350, RL500, RL550, RL800 RL850 and RL1000*.

   Serial number: see mark on the machine.
3. Tested by the British Standards Institute (BSI) to comply with the supply of Machine (Safety) Regulation 1992 Essential Health and Safety Requirements relating to the design and construction of machinery.

   The following European standards were taken into consideration when testing the machine:
   EN 292: Parts 1 and 2:1991, Safety of Machinery - Basic concepts, general principles for design.
   EN 294: 1992, Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs.
   EN 418:1992, Safety of Machinery - Emergency stop equipment, functional aspects - Principles for design.
   EN 60204: Part 1:1997, Safety of Machinery - Electrical equipment of machines - general requirements.
   EN 60335: Part 1:1994, Safety of household and similar electrical appliances.
   In addition the following National standard and draft were taken into consideration when testing the machine:
   BS 3456: Part 2: Section 2.42: 1997, Safety of household and similar electrical appliances - Section 2.42 Battery-operated lawnmowers.
   PrEN 50338: 1999, Safety of household and similar electrical appliances –Particular requirements for pedestrian controlled battery powered electrical lawnmowers.
   Noise level testing was conducted to the requirements of: 79/113/EEC and 88/181/EEC.

   Results are published by BSI in report number 282/4077203 dated 14 July 2000.

   Marylands Avenue, Hemel Hempstead, Hertfordshire HP2 4SQ, UK.
4. Also tested by Hermon Laboratories to comply with The Electromagnetic compatibility directive 89/336/EEC. Results are published By Hermon Laboratories in report number Frienmc_EN.14123 dated 21 June 2000.

   Rakevet Industry Zone, Binyamina, 30550, Israel.
5. Measured sound power level: 85 db.
6. Guaranteed sound power level: 90 db.
7. Technical documentation kept by Mr. Dedy Gur, QA director.

I hereby declare that the above product conforms to the requirements as specified above.

*The original RL500 was tested by BSI in 2000. All Friendly Robotics models currently sold were tested by F.Robotics Acquisitions Ltd.

Issued at
Pardesiya, Israel

Shai Abramson – Senior VP R&D

The products are manufactured by F. Robotics Acquisitions (Friendly Robotics).

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CE approved.

Welcome to the world of home robotics with the Friendly Robotics RoboMower!
Thank you for purchasing our product. We know that you will enjoy the extra free time you will have while using RoboMower to mow your lawn. When set up and used properly, RoboMower will operate safely on your lawn and provide you with a quality of cut matched by a few mowers of any kind. You will be impressed with your lawn's appearance and best of all, RoboMower did it for you.

IMPORTANT!

The following pages contain important safety and operating instructions. Please read and follow all instructions in this manual. Carefully read and review all safety instructions, warnings and cautions contained in this manual. Failure to read and follow these instructions, warnings and cautionary statements may result in severe injury or death to persons and pets or damage to personal property.

Table of Contents

Safety Warnings & Precautions

Training and Instructions

1. **Read this manual carefully before operating RoboMower®. Be familiar with the controls and the proper use of RoboMower® and follow all safety and warning instructions.**
2. **Do not use RoboMower® for any purpose other than for which it is intended.**
3. **Never allow children or people unfamiliar with these instructions to operate RoboMower®.**
4. **Never mow while people, especially children, or pets are nearby.**
5. **The user is responsible for accidents or hazards occurring to other people or their property.**
6. **It is strongly recommended to use the "Child Guard/Safety Guard" menu option in order to prevent operation by children or other who are not familiar with the safe operation of the mower.**

Preparation

7. **Make sure to layout and install the perimeter wire according to the instructions.**
8. **While mowing using a manual controller always wear substantial footwear and long trousers.**
9. **Periodically inspect the area mowed by RoboMower®, and remove stones, sticks, wires, bones and other objects. Objects struck by the blades may be thrown and cause severe injuries to people.**
10. **Before using RoboMower®, always remove the power pack and visually inspect the blades for wear or damage. Replace any worn or damaged blades.**
11. **Only use accessories and attachments designed for this product.**

Operation

12. **Never let RoboMower operate without supervision.**
13. **When using the Manual Controller mow only in daylight or in a good artificial light.**
14. **Do not operate RoboMower® using the manual controller when barefoot or wearing open sandals. Always wear substantial footwear and long trousers.**
15. **Avoid operating RoboMower® on wet grass. Do not use it in rain.**
16. **When using manual controller always be sure of your footing on slopes.**
17. **Do not operate the mower on slopes greater than 15 degrees or use it in manual operation on slopes where a firm footing is not possible.**
18. **Keep all guards, shields, safety devices, and sensors in place. Repair or replace damaged parts, including decals. Do not operate RoboMower® if any parts are damaged or worn.**
19. **Do not operate RoboMower® if any safety feature or device is damaged or inoperable.**
20. **Do not attempt to disable or defeat any safety feature or device.**
21. **When using the manual controller always switch on the motor according to instructions and with feet well away from the blades.**
22. **This machine has sharp rotating blades! Never operate the mower if unattended; keep bystanders, children and pets away from mower when in operation.**
23. **Never allow anyone to ride or sit on mower.**

24. **Use caution when lifting RoboMower, it's heavy! Before lifting it, always take out the battery.**
25. **Keep hands and feet away from the cutting blades and other moving parts.**
26. **Never pick up or carry this appliance while the motors are running.**
27. **Never attempt to service or adjust the mower while it is in operation.**
28. **Never raise the mower or attempt to inspect the blades while the mower is operating.**
29. **Always remove the power pack before lifting the mower or attempting any adjustments.**
30. **Do not start RoboMower® operation in automatic mode outside the plot bounded by the perimeter wire.**

Maintenance and storage

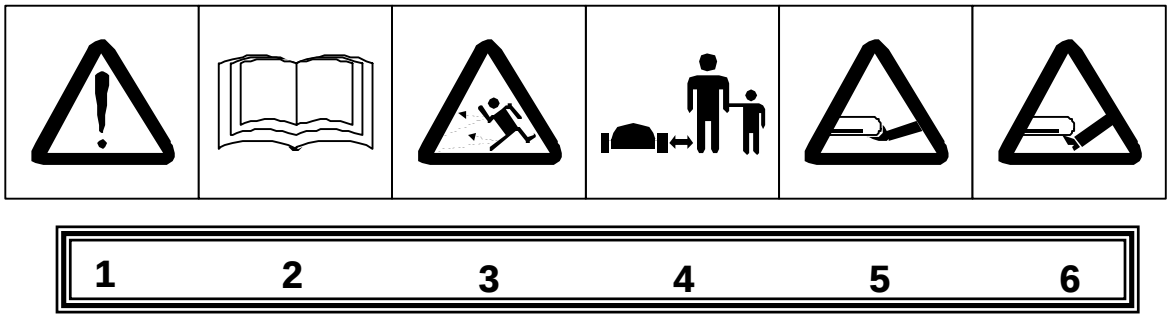
31. **Maintain, service, and store RoboMower® according to the instructions (refer to chapter 9).**
32. **Keep all nuts, bolts, and screws tight to assure safe condition of this appliance.**
33. **Replace worn or damaged parts for safety.**
34. **Use heavy gloves when inspecting or servicing the blades.**
35. **Use only the original equipment, power pack and power supply with this mower. Incorrect use may result in electric shock, overheating or leakage of corrosive liquid from the battery.**
36. **The Power Supply is for indoor use only. Do not use in areas where moisture or water is likely. It is required placing it in a sheltered place, dry location, which is well ventilated and not exposed to direct sunlight.**
37. **Do not open or mutilate the power pack. Released electrolyte is corrosive and may damage the eyes or skin.**
38. **Wear eye protection and use gloves when installing the perimeter wire and driving the wire stakes/pegs. Firmly drive all pegs in order to keep the wire from becoming a tripping hazard.**
39. **Do not use the power supply if the cord has damaged.**
40. **Transport - to safely move from or within the working area: 1. Use caution when lifting RoboMower, it's heavy! Before lifting it, always take out the battery. 2. Use the Manual Controller to drive it from place to place (See section 2.4) 3. In case of different height level or stairs, remove the Power Pack from the mower and carry the mower by the carrying handle (See Figure no. 2.1).**

Product end of use

41. **RoboMower and its accessories should be collected separately at the end of their life to prevent waste electrical and electronic equipment from ending up in landfill sites, to promote the reuse, treatment and recovery of electrical and electronic equipment in purpose to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally.**
42. **Do not dispose RoboMower or any other part of it (including the Power Supply, Charging Station and Perimeter Switch) as unsorted municipal waste – it should be collected separately.**
43. **Ask your local distributor/dealer about return and collection systems available.**
44. **Do not dispose of the battery pack in a fire and do not place used batteries in your household trash. The battery must be collected, recycled, or disposed of in an environmentally sound manner.**

Safety Warnings & Precautions

Warning Decal Definitions



1. **WARNING-this is a dangerous power tool. Use care when operating and follow all safety instructions and warnings.**
2. **Read the owner/operating manual carefully and follow all safety instructions.**
3. **Objects can be thrown from mower while operating, take caution.**
4. **Keep children, pets and bystanders away from mower.**
5. **Sharp rotating blades. Keep hands away and do not attempt to lift mower from this area.**
6. **Sharp rotating blades. Keep feet away.**

DANGER! Sharp rotating blades. Keep hands and feet away. Serious injury can occur.

.

CAUTION! Remove battery/power pack before attempting to lift the mower for any reason.

Do not dispose RoboMower or any other part of it as unsorted municipal waste – it should be collected separately.

RoboMower® - Safety Features

1. **Child Guard / Safety Guard**
   This menu option offers a safety feature to help prevent children or others not familiar with the safe operation of the mower to operate it freely.

2. **Lift Sensor**
   There is a sensor located on the front caster wheel of the mower. In the event the front of the mower is raised approximately 1-inch from its resting position on the ground during blade operation, the blades will stop rotating immediately (< 1 second).

3. **Sensor Equipped Bumpers**
   The front and rear bumpers are equipped with contacts that will activate when the mower strikes a solid, fixed object when that object is at least 6-inches in vertical height from the supporting surface of the mower. When the bumper sensor is activated, the mower will stop movement in that direction and reverse itself away from the obstacle. In manual blade operation, bumper activation will stop the rotation of the blades immediately (<1 second).

4. **Emergency Stop Switch**
   Located on the top outer surface of the manual controller, red in color. Pressing this button at any time during operation will stop all mower movement and stop the rotation of the blades immediately (<1 second).

5. **Automatic Mode Recognition**
   The RoboMower is designed so that it cannot be operated in the manual mode while the Manual Controller is in its pocket and it cannot operate in the automatic mode while the Manual Controller is removed.

6. **Two-Step Operator Presence Control**
   While in manual mode, it requires two independent finger actions in order to engage the mower blades. Once engaged, the mower blade button must remain depressed to continue blade operation. Once released, the two-step engagement process must be repeated.

7. **Electronically Controlled Charging System**
   The RoboMower is equipped with an on-board charge control system. This allows you to keep the **Power Supply** connected at all times, even after the battery is fully charged. The control system will prevent an overcharge to the battery and keep it fully charged and maintained for the next use.

8. **Sealed Power Pack**
   The power pack that operates the RoboMower is completely sealed and will not leak any type of fluids, regardless of position. In addition, the power pack contains a one-time-use fuse in the event of a short-circuit or power malfunction.

9. **Perimeter Switch and Perimeter Wire**
   The RoboMower cannot operate without a perimeter wire installed and activated through the Perimeter Switch. In the event the Perimeter Switch is turned off or otherwise fails to function, the RoboMower will stop operating. Likewise, should a break in the perimeter wire occur the RoboMower would again stop operation. A break in the perimeter wire prior to operation will prevent the RoboMower from operating. The RoboMower can only operate within the boundary of the perimeter wire.

10. **Auto-Off Perimeter Switch**
    The auto-off feature of the perimeter switch shuts down the perimeter switch operation after approximately 5 hours of continuous operation. This is typically 1 to 2 hours after which a fully charged Power Pack will need to be re-charged. This helps to prevent unauthorized persons from attempting to re-start the RoboMower after it has completed its operation.

11. Over-Current Monitoring Protection

Each of the three blade motors and each of the two wheel drive motors are monitored continuously during operation for any situation that may cause these motors to over-heat. In such event, the RoboMower will stop operation of at least that motor and possibly the mower itself and indicate that the motor is cooling down. While unusual, this may happen when the mower is put in grass that is severely overgrown; the underside of the mower is clogged from poor cleaning maintenance; the mower has encountered an obstacle that is unable to activate the bumper sensor preventing it from moving; or a problem landscape area has caused the mower to get stuck and is preventing it from moving.

12. Automatic departure warning alert

When the mower is scheduled to depart the Docking Station automatically per a scheduled time, a warning buzzer and the operating lamp will activate 5 minutes prior to departure. This is a warning notification to clear and inspect the area.

WARNING!

This warning symbol will be found at several points throughout the pages of this manual. It is intended to highlight an important safety, warning or cautionary message. Please pay particular attention to these areas and be sure you fully understand the message before proceeding.

What's in the Box
(RoboMower®)

1. **RoboMower®**


1

2. **Power Pack**


2

3. **Operating & Safety Manual**

4. **Standard** Power Supply
   Used for recharging the RoboMower power pack. Indoor use only.


4

5. **RoboRuler**
   Used for setting the distance of the perimeter wire from the lawn edge.


5

6. **Pegs**
   Used for securing the perimeter wire to the ground around the lawn perimeter and around obstacles.


6


7

7. **Wire**
   Used to create a virtual wall for your RoboMower.

8. **Perimeter Switch (& C-Cell Batteries)**
   Activates the perimeter wire, which defines the area in which the RoboMower will operate.


8


9

9. **Perimeter Switch Mounting Stake**
   Used for supporting the perimeter switch in the lawn.

10. **Wire connectors**
    Used for splicing wires (as needed).


10

11. **Plot connector**
    Used for connecting the completed perimeter wire set-up to the perimeter switch.


11

A Basic
How It Works

A small wire, called the perimeter wire, is placed around the perimeter of the lawn and any other areas where you do not want the mower to enter. A small signal is generated from a device attached to the perimeter wire, called the Perimeter Switch. When turned on, this signal is carried through the perimeter wire, creating what we define as a *virtual wall.* The virtual wall is visible only to the RoboMower, keeping the RoboMower where you want it, on your lawn. The perimeter switch must be turned on to activate the perimeter wire before the RoboMower will operate.

Chapter 1
Perimeter Wire Setup

1.0 Where To Start

In order to determine the best location to begin the setup, it is best to first make some basic decisions based on your lawn. While many lawns can be effectively cut during the course of one single, most lawns and homes are not laid out in such fashion to efficiently allow the RoboMower to operate freely all over the lawn. Because of this, the typical setup of the perimeter wire may actually be two separate areas or zones, as they are called. For each zone that is set up, allow for placement of one Perimeter Switch for that zone. Find a convenient spot **outside the perimeter** of each zone, but a location that is relatively easy for you to access. It is recommended to place the perimeter switch in a dry and sheltered location. Consider placing the perimeter switch near shrubs or bushes to hide them. Now, knowing the Perimeter Switch location, you can begin the setup by starting the wire at each of the Perimeter Switch locations.

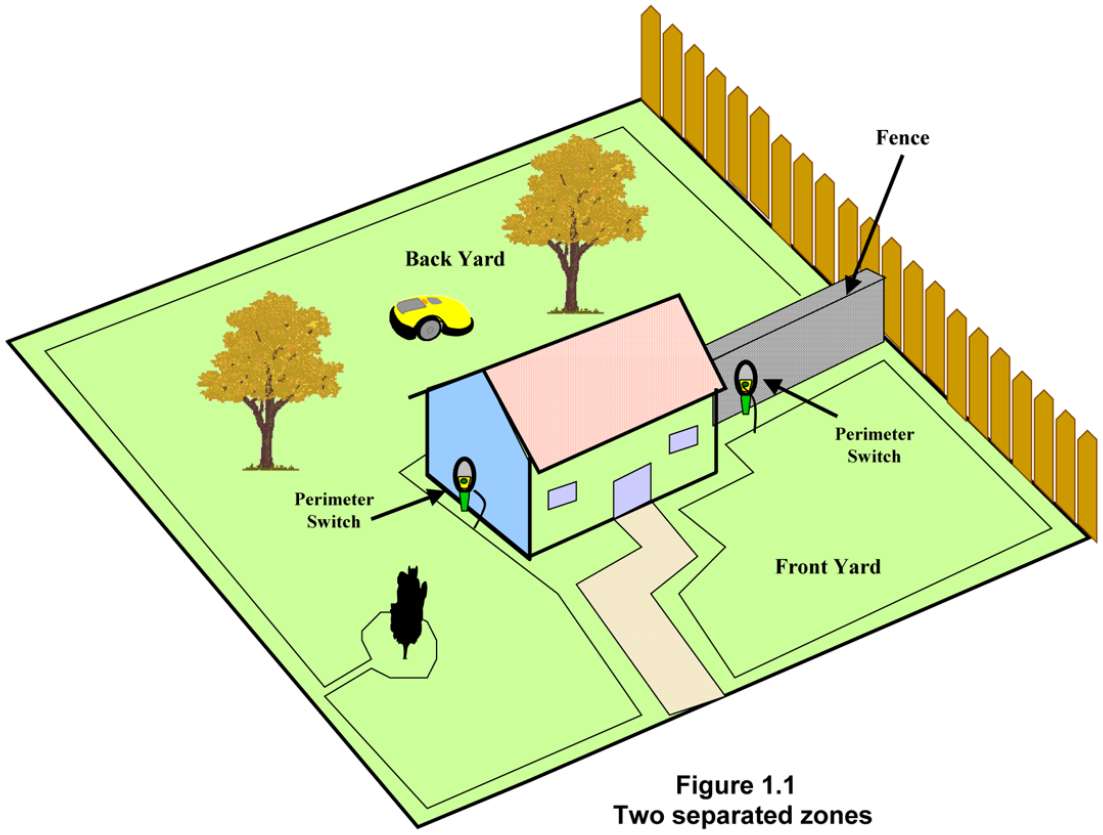


Figure 1.1
Two separated zones

In figure 1.1, the front yard and the back yard are physically separated by fence. The fence prevents the RoboMower from moving freely between the front and the back. In this example, there are two zones, one for the front and one for the back. Knowing ahead of time that two zones will be needed will help the setup go smoothly.

1.1 Using The RoboRuler

The RoboMower includes a ruler style measurement stick called a RoboRuler that is used to help position the perimeter wire along walls, fences, sidewalk, driveways, flower beds and other perimeter zones. There are two basic measurements that are used on the RoboRuler. The shorter distance is used along perimeter edges where the area outside the immediate perimeter (about 12 inches/30 cm) is free of obstacles and is the same relative height as the perimeter edge. The longer distance is used along perimeter edges where the area outside the immediate perimeter has obstacles or differences in the height along the perimeter edge. See Figure 1.2.

Note: Use the short distance of the RoboRuler to set the wire position around the obstacle while creating a Perimeter Island (See section 1.8).

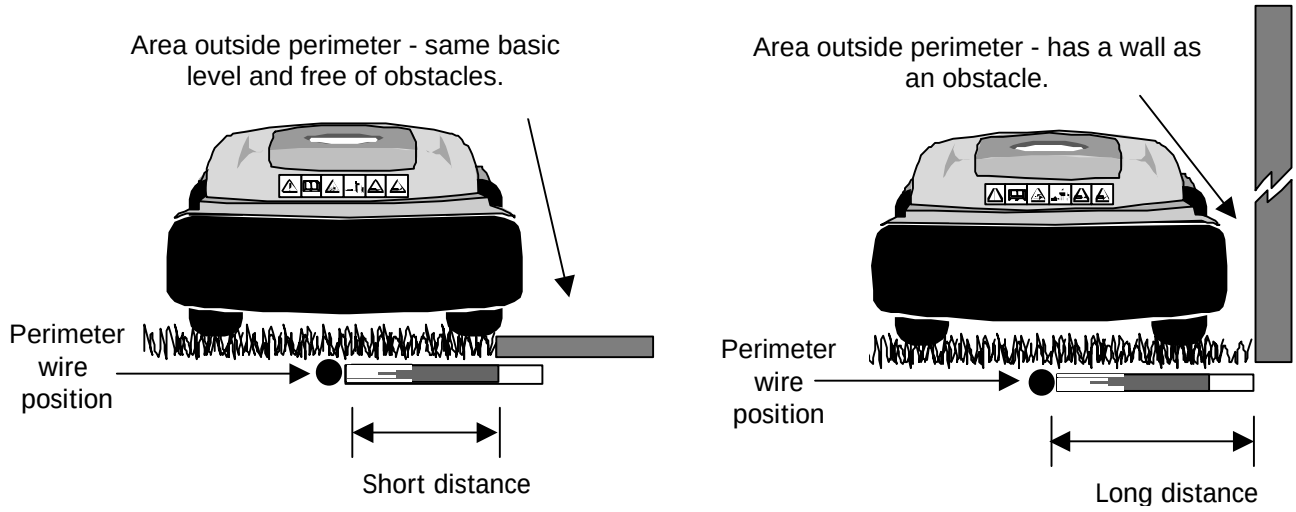


Figure 1.2 – Using the RoboRuler

1.2 Perimeter Wire Setup

Puncture the plastic covering of the perimeter wire with your finger and feel around inside the center of the wire spool for the end of the wire. Pull the wire end out of the plastic covering. The plastic covering is designed as a dispenser for the wire, so do not remove the wire spool from the covering.
If an additional wire is required in order to complete the set-up, use the wire connectors to connect between the two wire ends, as explained in chapter 8.6.

IMPORTANT: It is necessary to first read this chapter (Perimeter Wire Setup) before starting to layout the Perimeter Wire, in order to be aware of all setup rules and instructions.

Starting at the location of the Perimeter Switch, begin pulling the perimeter wire out of the plastic covering as you walk along the area of the lawn you are setting up. Be sure to leave enough wire at the beginning, where the Perimeter Switch will be located. Leave no less than 5 feet (1.5 m) of wire at the beginning of the setup.

After removing enough wire within a given section, use the RoboRuler (see section 1.1) to identify the correct placement of the wire. Initially place a minimum number of pegs to fasten the wire down. You will want to test the proper position of the wire for the edge mowing process and you may find some areas where you will need to move the wire position slightly. See section **2.8** for details on testing. You can lightly insert pegs into the ground by hand to hold the wire temporarily in place before driving the pegs to the ground level with a hammer.

WARNING!

Damage to the eye is possible. Use proper eye protection and wear appropriate work gloves when hammering the pegs. Hard or dry ground may cause pegs to break when driving them in. In extreme cases, watering the lawn where the pegs will be driven can be beneficial.

1.3 Fastening The Wire To The Ground

It is not necessary to bury the perimeter wire, though you may do so if you wish, up to 3 inches (7.5 cm). Small pegs or stakes are supplied with the RoboMower and they are used to fasten and hold the perimeter wire to the ground, below grass level. They resemble a small tent stake. When properly fastened to the ground, the wire and pegs will soon disappear under the growth of new grass. The pegs simply hold the wire in place at the ground level to allow for the grass to grow over it. Pegs should be driven at distances between one another that will keep the wire down below the grass level and prevent it from becoming a tripping hazard while in the process of being covered with grass growth. See Figure 1.3. Remember, you want to test the wire setup for edge mowing before you fill in the additional pegs. See section **2.8** for details on testing.

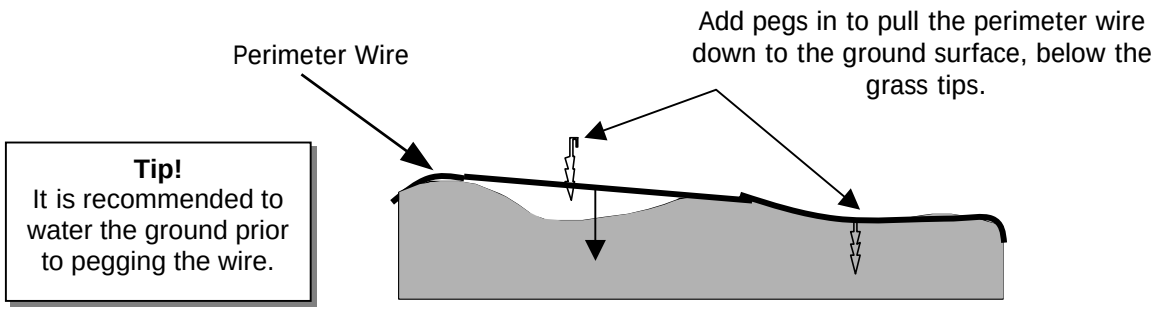


Figure 1.3 – Pegging the Perimeter Wire

1.4 Corners & Sharp Turns

Care must be taken not to create a corner sharper than 90 degrees when setting up the perimeter wire. A corner sharper than 90 degrees can cause the RoboMower to lose track of the perimeter wire. In situations where a corner may require a wire placement of less than a 90-degree angle, placement can be adjusted using several angles to avoid this. See Figure 1.4.

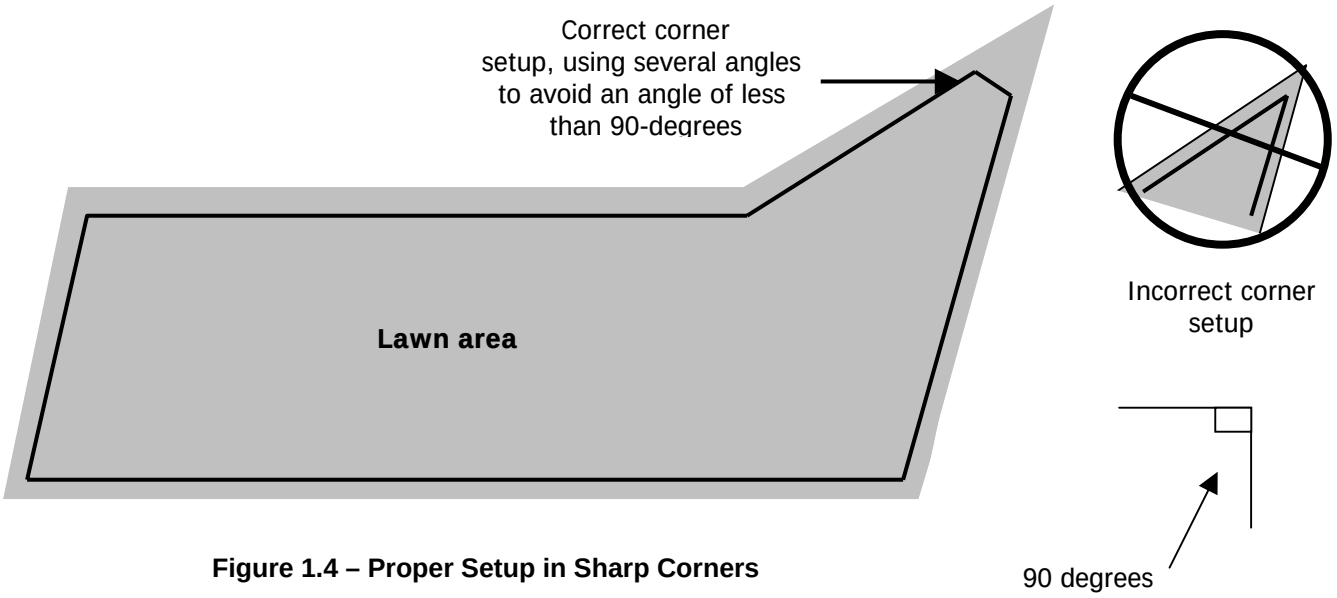


Figure 1.4 – Proper Setup in Sharp Corners

1.5 Narrow Areas And Narrow Passes

There is a limitation to the width of an area the RoboMower can effectively navigate through in order to move into another larger, but attached area. A narrow pass is defined as an area that narrows down substantially from the initial width and in which the RoboMower must pass through in order to access and cut other zones, an hourglass shape. The minimum distance for an effective narrow pass is 5.5 feet (1.7 m) between perimeter wires. The larger a pass can be made, the better access RoboMower will have between the zones. This will greatly improve the effectiveness and efficiency of the mower. See Figure 1.7. For an area that is narrow in width, but does not provide access to another section of the same zone, there is a minimum working distance of 5.5 feet (1.7m). Figure 1.7.

1.6 Defining Obstacles-Perimeter Islands

Many obstacles can be left in the lawn without consideration to excluding them using the perimeter wire. The basic rule of thumb is that the obstacle must be at least 6 inches (15 cm) high from the ground and the obstacle must be relatively rigid. Good examples of these kinds of obstacles include many trees, phone poles and power poles. When obstacles like this are encountered in the lawn, it is easiest to allow the RoboMower to bump into them, causing the bumper sensor to activate and assist in navigating around them. Young, sapling aged trees are not good examples, as they are not very rigid. Other obstacles that are not rigid and at least 6 inches high (15 cm) must be protected from the RoboMower using the perimeter wire. This is done as part of the setup process and is commonly referred to as a perimeter island. Good examples of these types of obstacles are flowerbeds, islands, small trees and low bed edging.

The RoboMower is designed to easily work in the lawn with both types of obstacles, however, for the most gentle and silent operation, it is preferable to demarcate all fixed objects in and around the working area. If you are unsure about a particular obstacle, it is best to exclude it with the perimeter wire. It will have no effect on the efficiency of the mower and can later be removed if not needed.

To create a perimeter island, take the wire from the perimeter section closest to the obstacle and peg the wire around the obstacle, returning back to the same spot of the perimeter. There are two keys to setting up the perimeter wire to exclude an obstacle; 1) place the wire going **to** the obstacle from the perimeter and the wire going **from** the obstacle to the perimeter adjacent to one another. This area is between the obstacle and the normal lawn edge where the perimeter wire is set up; and 2) follow the direction of installation when going to the interior of the lawn to exclude an obstacle. While the picture in figure 1.5 may appear to have the wires leading to and from the island set up with a space between them, this is for illustration purposes only. A proper placement of these two wires is to have them touching one another, but in no event should they be farther than 1/8 of an inch (3 mm) apart from one another. For the best results, place both wires under the same peg when placing them in the lawn around obstacles. Placement of the wires as described allows for the signal in the two wires to cancel, but only in the area where they are installed adjacent to one another and touching. By canceling the signal in this section, the RoboMower is free to cross this area but will still recognize the signal of the perimeter island.

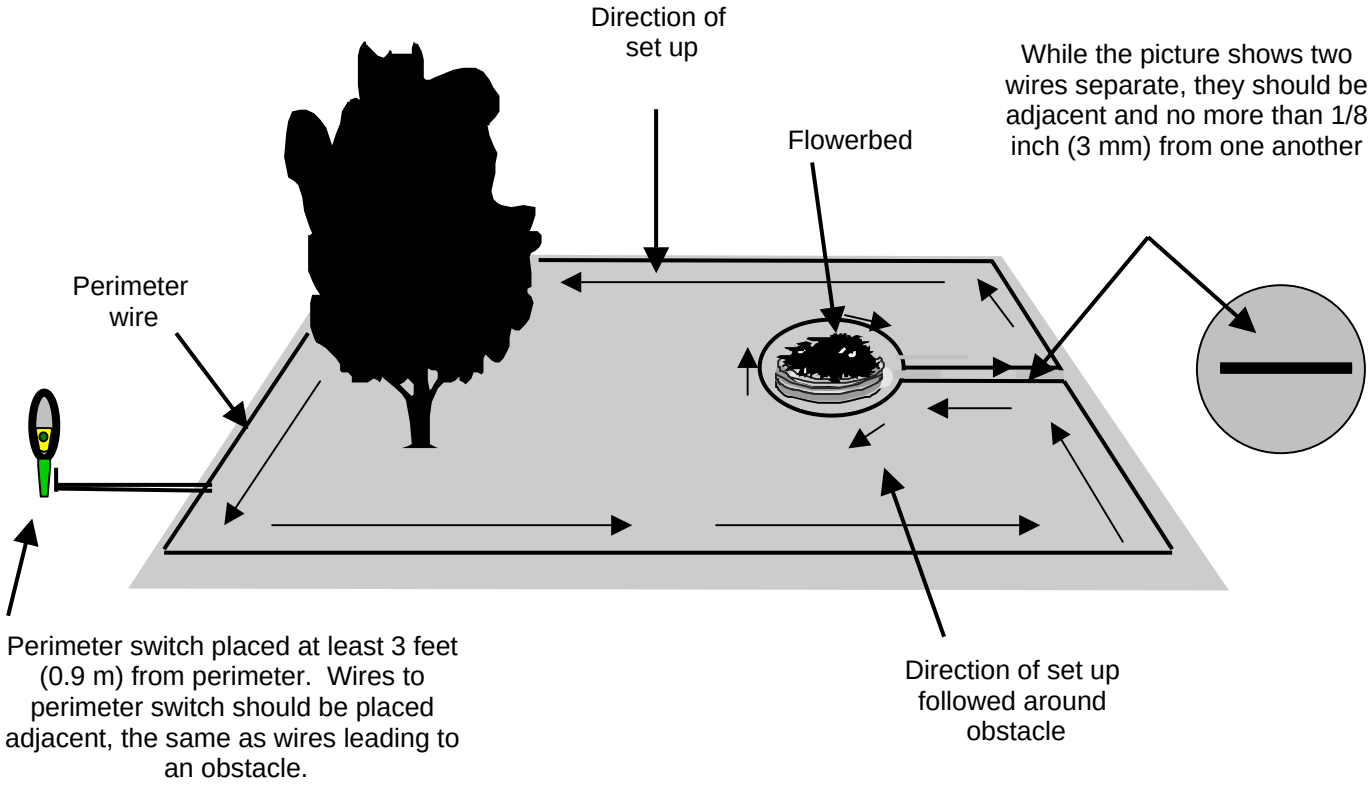


Figure 1.5
Excluding Obstacles With the Perimeter Wire

Figure 1.6 – Perimeter Wire Setup Distances for Obstacles

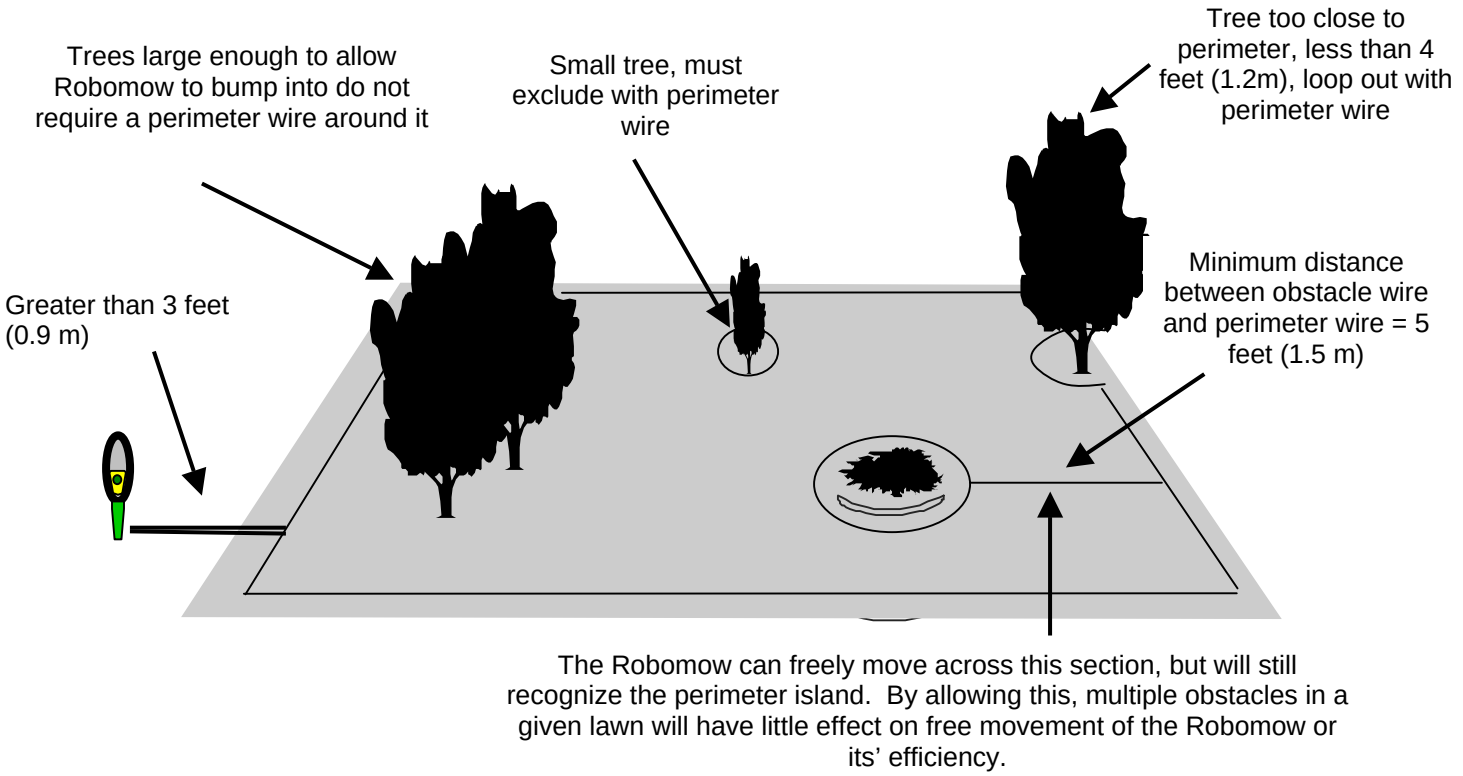
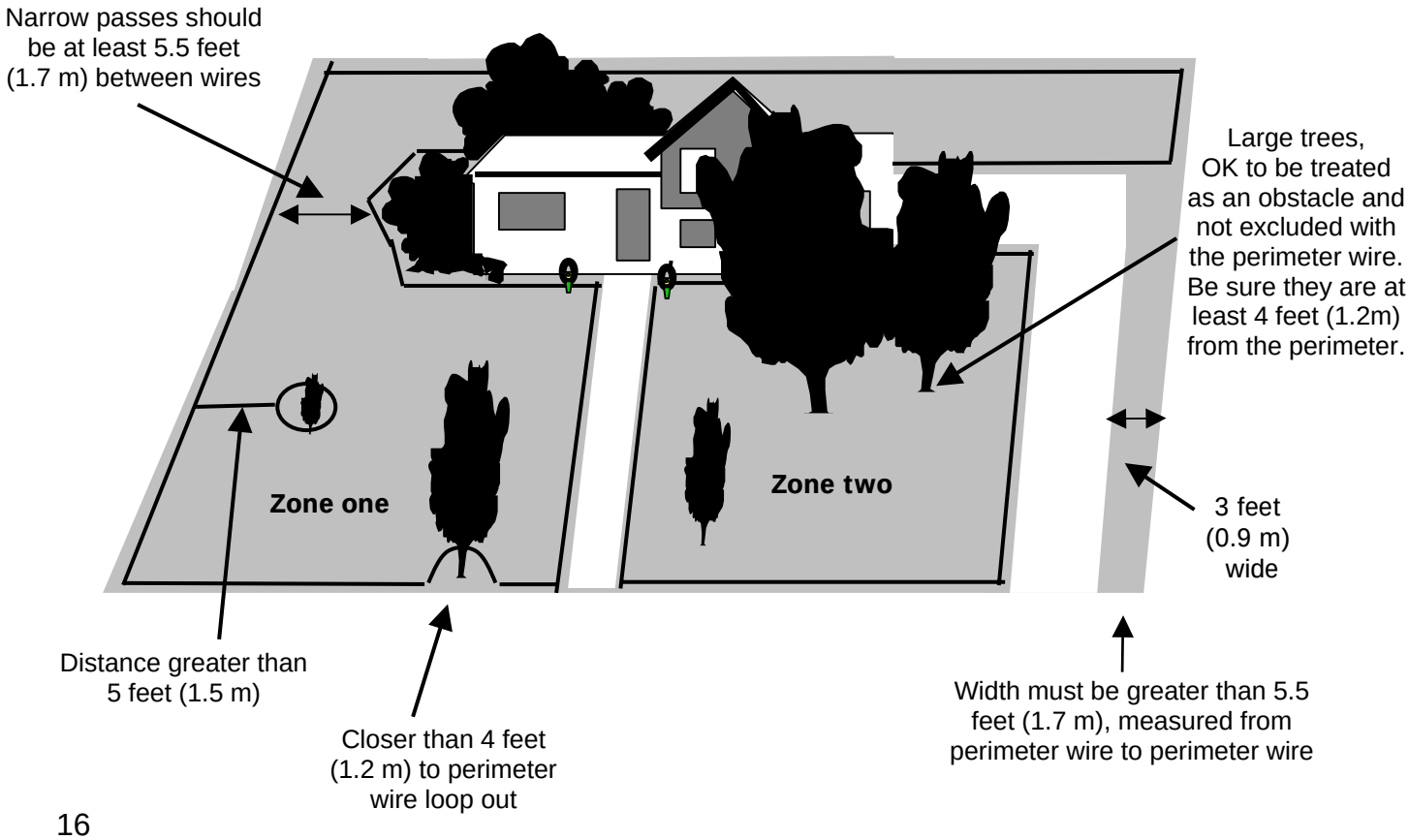


Figure 1.7 – Two Zone Setup



1.7 Multiple Zones/Areas

As mentioned earlier, your home may require more than one zone to be set up in order for the RoboMower to work in all of your lawn effectively. Having two or even three zones does not affect the efficiency of the RoboMower and in many circumstances is more desirable than one large zone. It is suggested that each zone be no larger than what the RoboMower can mow in one full Power Pack charge cycle. Where grass areas are not contiguous, or are separated by fences or other objects, it is also recommended to make each of these a separate zone. A simple but effective and common way to set the RoboMower up is to have one zone for the front yard and one for the back yard. The side yards can be included with a front or back section, or even set us a separate zone if desired.

The key is to set up the zones that will allow the RoboMower to operate with the greatest efficiency, even if it is more than one or two zones. You will quickly find that mowing the lawn in these zones is an easy process that will allow you greater flexibility in your mowing habits. The RoboMower gives you the ability to control the operating time for each zone independently, up to four different zones. In this way, if one zone needs a shorter operating time than another, it can easily be set for such a process. See **Chapter 5, Operator Settings and Advanced Features** for detailed information on how to use this feature. There are several ways to set up these zones, including the placement of the Perimeter Switch, depending on the actual layout of the lawn. Examples are given in figures 1.7 and 1.8.

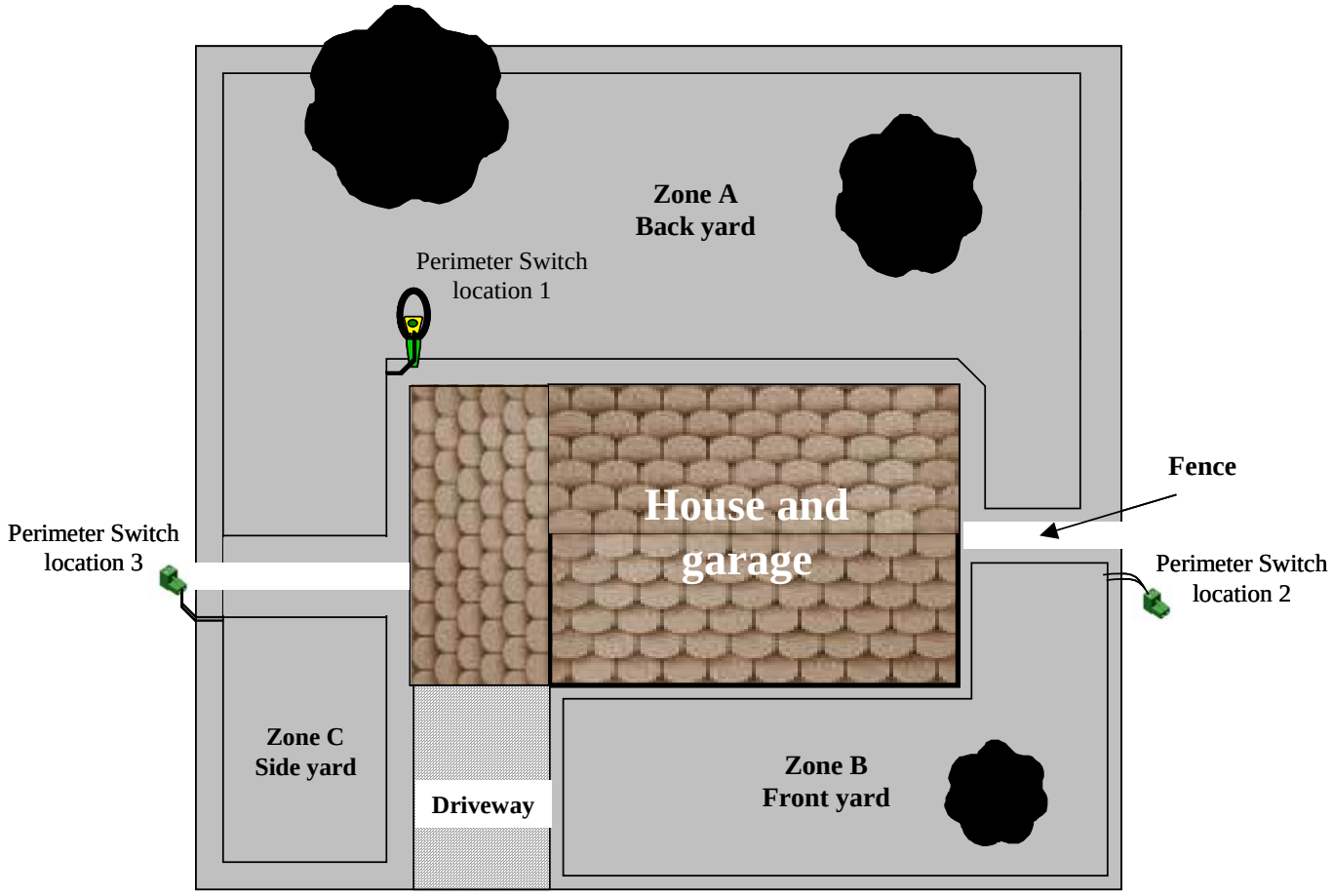


Figure 1.8 – One Perimeter Switch for Multiple Zones

1.8 Slopes

As a general rule of thumb, any slope that can safely be cut using a walk behind mower can also be cut using the RoboMower in the automatic mode. The maximum slope limit is **15 degrees**, the same as a traditional walk behind mower. Bear in mind that a 15-degree slope, though it may not sound very steep, is in fact a relatively steep slope. In cases where it is attempted to operate the RoboMower on a slope that is too severe, normally the front of the machine will try to rise from the ground surface slightly when climbing the slope vertically. The lift sensor will then activate, shutting the blades down for safety. The mower will drop back into position and may attempt the maneuver again. In any event, a slope that causes the front of the mower to raise from the ground while climbing is too steep and should not be included as part of the cutting area. In some cases, this area can be cut manually with the RoboMower, using the manual controller. Insure that you can maintain a sure and safe footing before attempting to cut a slope area in manual. If you are unsure as to whether a slope is too steep or not, attempt driving the RoboMower manually up the slope. If the front of the mower does not lift from the ground, the slope is fine to include in the cutting area. If however it does lift, exclude this section from the cutting area.

WARNING!

Severe injury can occur. When attempting to mow sloped areas that are too steep for automatic operation of the RoboMower, insure that you can maintain a safe and sure footing before attempting to mow. Cut across slopes for safety. Always wear appropriate closed toe shoes when operating the RoboMower manually.

1.9 Completing The Setup

- Once the perimeter wire is completed and pegged to the ground, the last step to complete is attaching the Perimeter Switch to the perimeter wires and testing the setup. A properly set up perimeter will have two loose wire ends located where the perimeter set up was started; the wire end from the start of the perimeter setup and the wire end from finishing the perimeter setup. See Figure 1.9. Pull the two loose perimeter wire leads taut and peg them down to the ground, **adjacent to one another**, as you move away from the perimeter and towards the Perimeter Switch location (use the same pegs to attach the two wires from the lawn to the Perimeter Switch location).

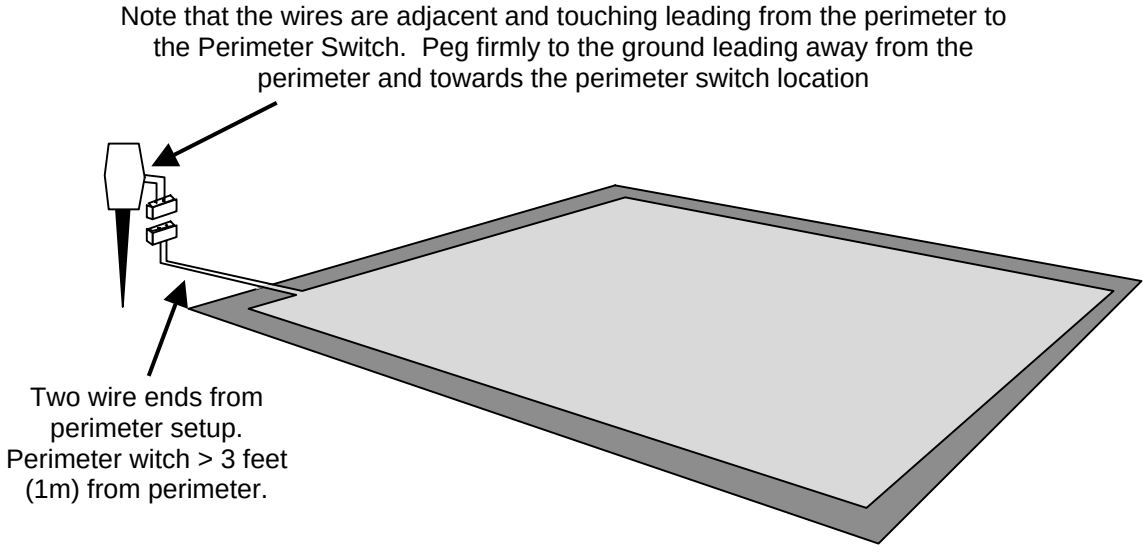
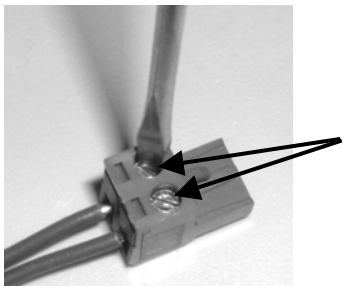


Figure 1.9 – Completing Perimeter Wire at Perimeter Switch

- At the location of the perimeter switch, cut the two loose perimeter wires so they are of equal length, removing any excess wire. Strip back ¼ inch (6 mm) of insulation from each wire end. Insert the wire ends to the connector (either wire to either screw, as there is no polarity) and tighten the screws as shown in figure 1.10.

Strip back ¼ inch (6 mm) of insulation from each wire end and insert each perimeter wire end into hole of connector.



Using a small flat blade screwdriver, tighten these two screws to secure the perimeter wires into the connector

Figure 1.10 – Inserting and Fastening Perimeter Wire to Connector

- Take the Perimeter Switch and squeeze the tabs on both sides of the Perimeter Switch as shown in figure 1.11, and remove the back cover from the Perimeter Switch.
- Insert the 3 C-cell batteries in the battery holder as shown in Figure 1.12 and reassemble the Perimeter Switch.

Figure 1.11 -
Squeeze to remove cover

Figure 1.12 –
Inserting Batteries

1.10 Test the Perimeter Switch

- Plug the perimeter wire connector into the Perimeter Switch (see figure 1.13) and press the ON button. A small flashing green light next to the ***'ON'*** button indicates the system is on and functioning correctly. The Perimeter Switch also has an indicator for low batteries and for a disconnected/broken perimeter wire. Figure 1.14.

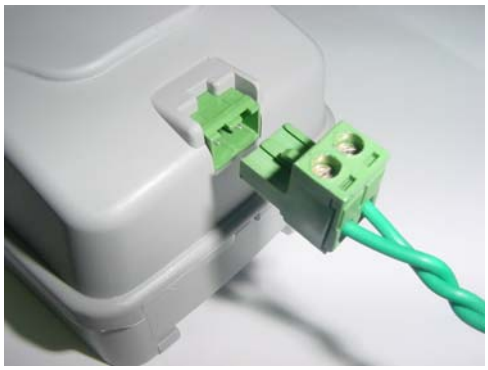


Figure 1.13 –
Plug the plot connector into the Perimeter Switch

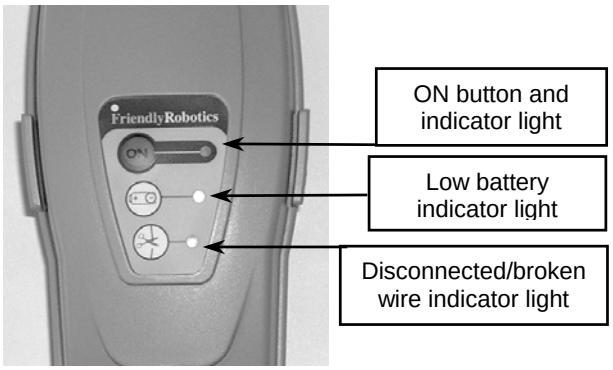


Figure 1.14 –
Perimeter Switch Operating Panel

- The Perimeter Switch has an automatic shutoff feature, eliminating the need for you to turn it off after each use. It will shut itself off after 5 continuous hours of operation. You can expect a good set of alkaline batteries in the Perimeter Switch to last most, if not all, of a normal cutting season. You may manually turn the perimeter switch off by pressing the '***ON***' button continuously for 3 seconds. A beep will be heard after the three seconds, indicating you may release the button and the switch is off.

1.11 Placing The Perimeter Switch

The Perimeter Switch connector is designed for quick and easy disconnection, a flexible feature should your lawn require more than one plot. You easily disconnect it by simply pulling the connectors apart. This allows you to easily move the perimeter switch between plots. The Perimeter Switch also comes with a large stake that fastens to the back of the perimeter switch, making movement from one plot to another easier by allowing you to disconnect the switch and move it with the stake still attached. Simply stick it into the dirt and plug it into the perimeter wire for each plot. See Figure 1.15

Another placement option is to mount the switch onto a vertical surface, such as a wall or deck railing. There are three small bosses on the back of the switch cover in order to mount it in this way. Use #6 or #8 sheet metal screws, or equivalent. See Figure 1.16. <u>In any event, the switch must be mounted vertically in order to maintain its' water resistance and preferably in a dry and sheltered location</u>.

Figure 1.15 – Perimeter Switch with mounting stake attached

Mounting the Perimeter Switch using three mounting bosses on back cover

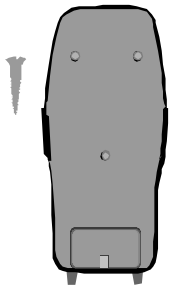


Figure 1.16

Chapter 2
Preparing The RoboMower®

Figure 2.1 - A basic 'what is what' of the RoboMower ®

2.1 Inserting Power Pack Fuse

Your RoboMower is shipped with the Power Pack fuse removed and it will not operate without it. The fuse is contained in a small plastic bag attached to the top of the Power Pack. Remove the Power Pack from the RoboMower and insert the fuse. The fuse can be inserted in either direction. See Figure 2.2

Carefully lower the Power Pack into the RoboMower. The RoboMower now will power up (wake up). The Power Pack is charged at the factory and has plenty of power to perform the initial setup and test run. However, after the initial set-up process is completed the Power Pack needs to be charged for a full 20 hours before the first operation. See Chapter 4, Power Pack Charging & Power Management.

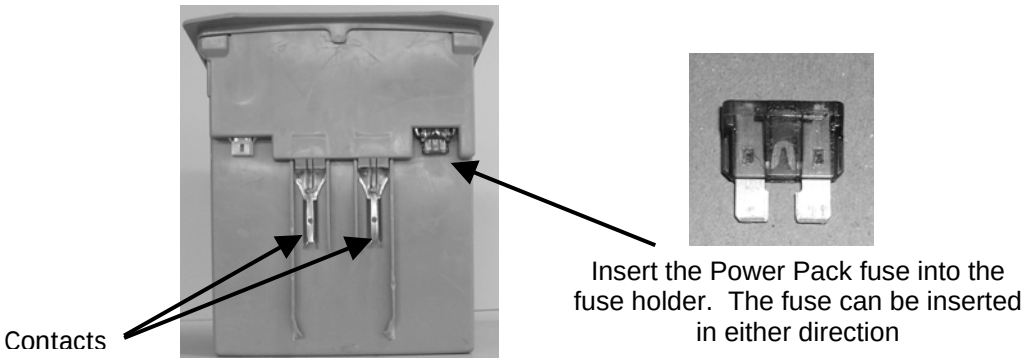


Figure 2.2 – Inserting Fuse Into Power Pack

2.2 Using The Manual Controller

The RoboMower is equipped with a Manual Controller. It enables you to manually drive and operate the mower. To get started on using the Manual Controller, study figure 2.3 to view the various operating controls and their functions. Refer to Chapter 5, Manual Operation for full details regarding use of the Manual Controller.

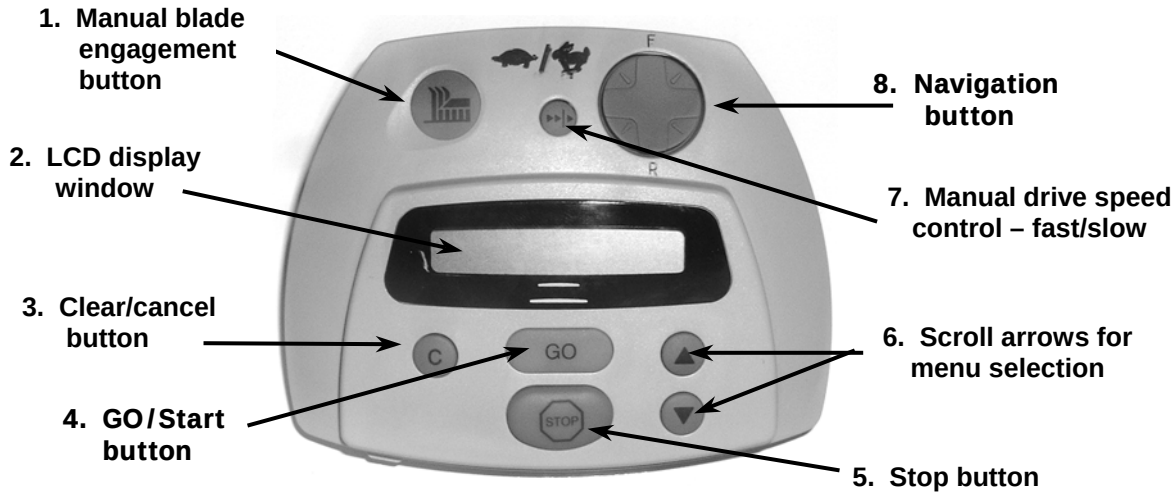


Figure 2.3 - Manual Controller Layout

1. **Manual blade engagement button –** manual engagement of the blades requires two distinct button operations in order to operate. This is called a two-step OPC design, where OPC stands for Operator Presence Control. If at any time you release the blade engagement button the blades will stop and the previous steps must be repeated. See section 3.8 for full details on manual mowing.
2. **LCD window display** – displays the text messages using a Liquid Crystal Display (LCD). Also shows current battery status. If exposed to direct sunlight for extended periods, the display may be difficult to read. Move it to a spot out of direct sunlight or otherwise shade the display and it will quickly return to normal.
3. **Clear/cancel button** – as described in item 1, this button is used as part of the two-step button sequence in order to engage the blades in manual mowing. In addition, this button is used to cancel a selection shown in the LCD window when making user selections. It is also used as a means to reverse back out of the menu options that can be accessed in user options, returning you to the main screen.
4. **GO/Start button** – the main operating button for automatic operation. In addition it is used as a button for making or confirming selections made under user options in the LCD window.
5. **Stop button** – pressing this button will stop all operation of the blades and wheel motors when in the automatic operation mode. It can also be used to stop an operation in progress before it has commenced.
6. **Scroll for menu selection** – there are various options and settings available to the user, which are accessed through the Manual Controller. These menus and options are shown on the LCD window as text. Some of these items require selecting a specific option, where more than one is available. The arrow button, up and down, allows you to scroll through these different options.
7. **Manual drive speed control** – the manual drive function is equipped with two ground speeds, fast and slow. In order to change the ground speed, press the button once to switch to the opposite speed of travel. When in fast mode, a button press will switch it to slow and vice versa. The mower must be moving using the drive control feature for the feature to work.
8. **Navigation button** – pressing this button in the desired direction will allow manual driving of the mower. Use light pressure on the navigator pad, gently rolling it to the desired direction of travel for driving. The drive button is omni-directional in forward and reverse and constant pressure must be maintained for continued operation.

2.3 Manual and automatic operation

The RoboMower is safely designed so that operation in the manual mode is prohibited unless the Manual Controller has been removed from its' holder and is in the possession of the user to operate the buttons. See Figure 2.4. The manual mode is used to primarily move/drive the RoboMower into the lawn and to return it after mowing. It is also used for moving the RoboMower around to other areas if needed.

As a convenience feature, the Manual Controller will also permit manual operation of the blades. Combined with the driving function, this will allow you to do light trimming and mowing in areas where the RoboMower cannot operate. Likewise, automatic operation is prohibited while the Manual Controller is removed from its' holder and in the possession of the operator. The Manual Controller must be firmly seated into its' holder and pivoted flush with the top of the mower before operation in automatic can proceed. See Figure 2.5.

Removing the Manual Controller and using it in the manual mode.

Driving the Robomow using the Manual Controller

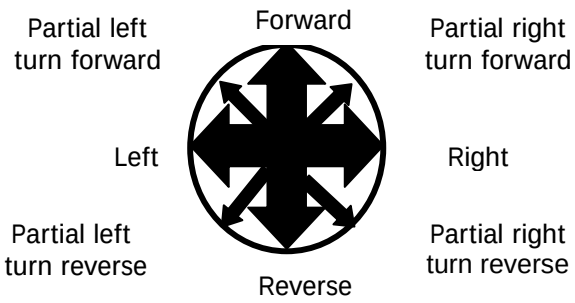
Figure 2.4 – Manually Driving RoboMower

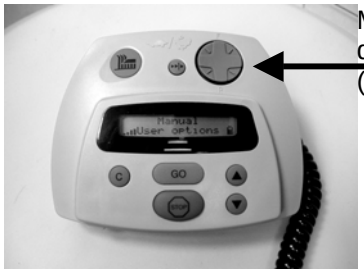
Manual Controller holder pivoted down and flushes with top of mower

Figure 2.5 – Pivoting Manual Controller Flush

2.4 Driving the RoboMower

In order to drive and move the RoboMower using the Manual Controller, place your finger in the indention of the mower at the front left of the Manual Controller and pivot it upwards, allowing you to grasp and remove the Manual Controller. Figure 2.3. Driving is accomplished by lightly pressing the directional pad with your thumb or index finger in the direction you wish the RoboMower to drive. See Figure 2.6. Forward and reverse are marked on the housing directly above and below the corresponding arrow on the direction pad. Forward and reverse are determined from a position standing at the rear of the mower. The RoboMower will turn left when the left arrow direction is pressed and right when the right arrow direction is pressed. Pressing between the primary arrows in any direction will yield a partial turning in that direction.





Manual Controller directional driving pad (navigation button)

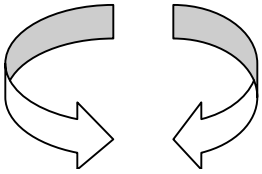
Figure 2.6 – Using the Navigator Button

2.5 Setting The Cutting Height And Ground Clearance

Remove the Power Pack before making any adjustments. The RoboMower has two basic adjustments, cutting height and ground clearance. When using the high cut blades, the cutting height is adjustable from approximately 1.5 inches to 3.5 inches (3.8 cm – 8.9 cm) and with the low cut blades from 1 inch to 2.5 inches (2.5 cm – 6.4 cm). By using the small wheels the minimum cutting height received is 0.75 inches (20 mm). The ground clearance has two (three when using the small wheels) adjustment positions. The cutting height adjustment is located at the front wheel and is controlled by rotating the front wheel hub in or out, which effectively causes the front wheel to be raised or lowered. See Figure 2.7.

Rotate the front wheel hub in (lower) or out (higher) to adjust the cutting height. Each click represents about 1/4 inch (6 mm) in height of cut.

Rotate this direction for higher cut



Rotate this direction for lower cut

Figure 2.7 – Adjusting the Height of Cut

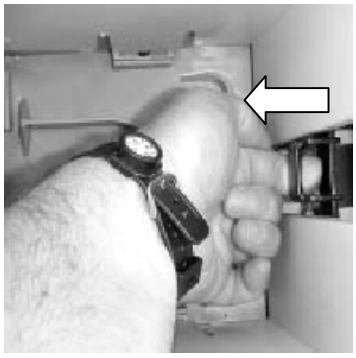
WARNING!

Severe injury is possible. Always remove the Power Pack when attempting to adjust the height of cut or otherwise lifting the mower off the ground. Never lift the mower or attempt to adjust the cutting height during operation. Blades are very sharp and severe cuts or lacerations are possible. When working around or near the blades always wear heavy gloves.

The ground height adjustment is located in the Power Pack compartment of the mower. See Figure 2.8. It has two positions, upper and lower. *(RL550 Europe has three; upper, lower and middle)* The lower position (closest to the bottom of the Power Pack compartment) provides the highest level of ground clearance while the upper position (farthest from the bottom of the Power Pack compartment) provides the lowest level of ground clearance. See Figure 2.9. It is typically recommended to adjust the rear ground clearance for maximum clearance, which is the setting closest to the base of the Power Pack compartment. European lawns and lawns where the grass is cut at extremely low levels of less than 2.0 inches (5 cm) may find that adjusting the ground clearance to the minimum level may work best for them.

Rear ground height adjustment is located in the Power Pack compartment**.**

Figure 2.8 – Ground Clearance Location



To adjust ground clearance, pull out on tab as shown and slide tab up or down.

Figure 2.9 – Adjusting Ground Clearance

2.6 Set Country and Perform One Time Calibration

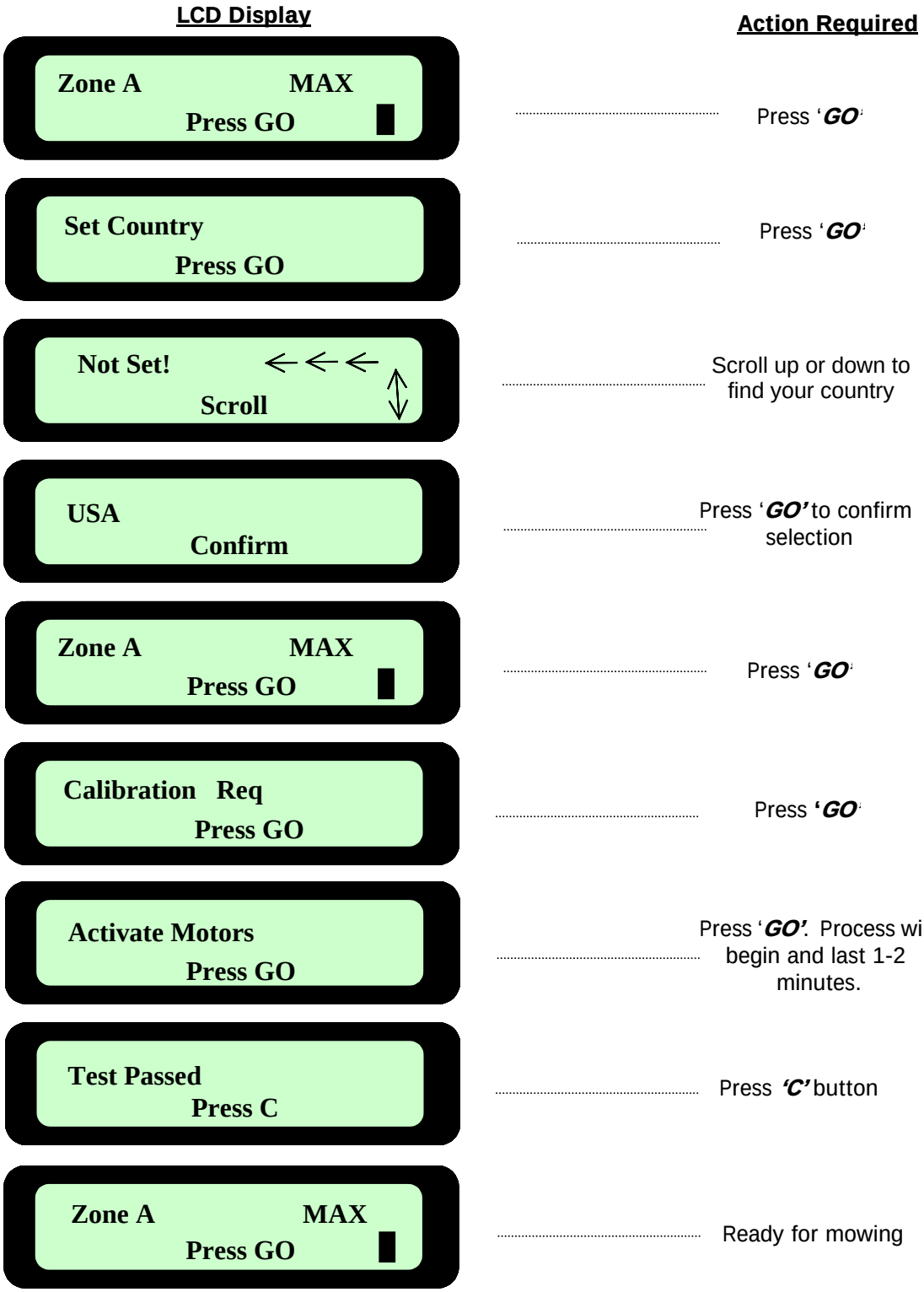
The RoboMower uses a sophisticated navigation system that utilizes an on-board compass type device, which responds to the magnetic poles of the earth. Magnetic North can vary from one point on the earth to another, based on geography. In order to accommodate this variance, it is necessary to calibrate the compass device to the area of the earth where the mower is being used. This is a one-time process and need not be repeated unless the mower is moved several hundred miles from its' present location. See Figure 2.10.

The calibration process is simple and the RoboMower is designed to ask you to perform this step before it can ever be used in the automatic mode. Remove the Manual Controller from the holder and drive the RoboMower to a smooth and horizontal area inside the lawn. If the grass is extremely high, adjust the height and ground clearance adjustments to their highest position relative to the ground. Position the RoboMower in the center of the area and insert the Manual Controller back into the holder and pivot the holder flush with the top surface of the mower. You may have to help push the coiled cord attached to the Manual Controller into the space below the controller in order to get the holder flush with the top. Turn the Perimeter Switch on to activate the perimeter wire, as it must be in operation to perform this process. You will now be at the first display as seen in Figure 2.10. Follow the sequence pictured in Figure 2.10 to complete this process.

During the calibration process, the RoboMower will begin rotating slowly in a circle, pausing from time to time. The RoboMower can make up to four complete circles during this process, pausing several times for several seconds each time along the way. The LCD panel will have a text message of **'*Wait'*** flashing on and off during this process. Only when the text message, **'*Test Passed Press C'*** is shown on the LCD is the process complete. Press the '***C'*** button to return the LCD text message back to the main menu message of ***'Zone A – MAX'***.

Though unusual, it is possible that the first attempt to calibrate can fail, where the text message on the LCD is **'*Retry Elsewhere'***. While unusual it does not indicate a problem with the RoboMower. It simply means that something nearby is introducing too much interference to get an accurate calibration. It can be metal objects or even underground wires. Once the calibration is completed, this interference will not cause any problems to the RoboMower. To re-calibrate, simply drive the RoboMower to another smooth level spot at least 10-15 feet (3 - 4.5 m) away from the spot first used, and repeat the same steps for calibration. Once calibration is successful, the message requiring you to calibrate will never be seen again.

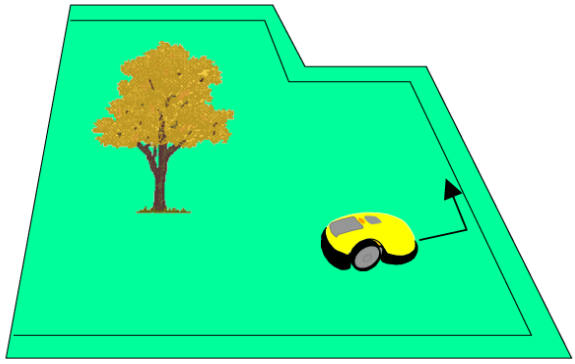
Figure 2.10 – Calibrating Sequence



2.7 Test the Perimeter Wire Position for Edge Mowing:

As mentioned in Chapter 1, it is best to test the position of the perimeter wire on edge mowing to determine if any small adjustments need to be made to the wire position before driving the rest of the wire pegs into place. Because the bumpers are active during edge mode, if the wire is positioned too close to a wall or other fixed object, the bumper will activate when striking the object then move off the edge to bypass the obstacle, retuning to the edge. There are other scenarios where the wire may need to be adjusted, such as along flowerbeds or along street edges where there is a drop off at the curb.
Manually drive the mower approximately 3 feet (1m) from the perimeter wire. Position the RoboMower towards the perimeter wire (See figure 2.11) along any edge in the zone. Insert the controller back into the holder; making sure it is pivoted down flush with the top. Insure the Perimeter Switch is turned on.

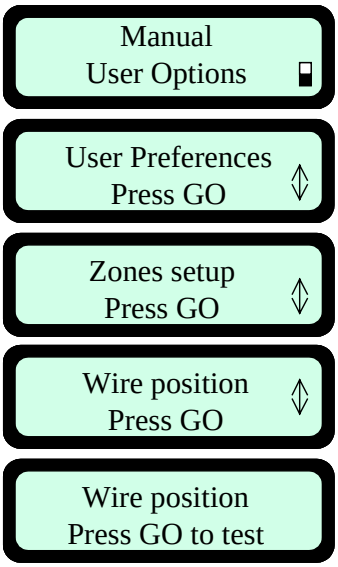
Figure 2.11 – Testing the Perime Wire Position



Position the RoboMower towards the wire

Press the down scroll arrow for the **'User Options'** and follow the instructions below (Figure 2.12):

Figure 2.12 – 'Wire Position' menu option



Press 'GO'

Press 'GO'

Scroll down twice to 'Wire position' option

Press 'GO'

Press 'GO'

Walk along the side of the RoboMower while it is following the edge. At any point where the mower position is too far to the outer edge of the lawn area, note this area and slightly move the wire towards the interior. For example, if the bumper of the mower is hitting the wall of your home while trying to mow the edge, the wire is too close to this edge and needs to be positioned more towards the interior of the lawn, and away from the wall. Conversely, if the mower is not mowing close enough to fixed objects like walls or fully onto adjacent and level areas such as a driveway, the wire needs to be positioned farther from the interior of the lawn, out towards the wall or driveway. Reposition the wire along each section where a change needs to be made, usually moving it only a little each time, and then test the edge mowing in this area once again.

Repeat this process for the entire edge until it can complete the perimeter without striking any object and you are satisfied with the cutting distance over onto adjacent level areas.

Once complete, walk back along the perimeter and add in wire pegs to those areas of the wire where it is not pulled down below the level of the grass tips and close to ground level.

Chapter 3
Manual and Automatic Operation

3.1 Activating The Perimeter Switch

The RoboMower cannot operate unless the Perimeter Switch is turned on and the mower is on the inside of the active perimeter. Locate or connect the Perimeter Switch to the zone, which you would like to mow. Press the ***'ON'*** button to turn on the switch. You will hear one short beep when the switch is first pressed, indicating it is on. To verify switch operation, there is a green LED located next to the ***'ON'*** button that will flash when operating properly. If an intermittent beeping is heard shortly after turning the switch on, there is a problem with the batteries or the perimeter. Look to see which red LED is flashing to determine which is the problem. You must correct the problem before the RoboMower will operate automatically. In a case where you have forgotten to turn on the Perimeter Switch the LCD on the Manual Controller will display 'No wire signal' message (Figure 3.0), reminding you to turn the switch on.

If a cut wire indicator is flashing be sure you connected the Perimeter Switch to the perimeter wire using the small green connector. If the low battery light is flashing, insert fresh c-cell alkaline batteries. If this does not correct the problem, refer to Chapter 6, Text Messages and Troubleshooting for further help.

Figure 3.0
No Wire Signal Display

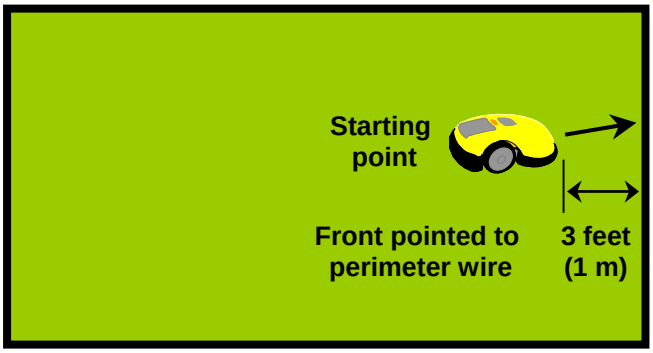
WARNING!

Serious injury or death can occur. This machine has sharp rotating blades. When operating in automatic mode, keep children, pets and bystanders away from mower. When operating automatically, do not leave unattended if children, pets or other persons will come in contact with the mower during operation. Never allow persons or pets to ride on this machine or block the path of travel.

3.2 Positioning RoboMower On The Lawn

Remove the Manual Controller from its' holder and drive the RoboMower into the lawn area to be cut. The manual driving speed of the RoboMower has two speeds, slow and fast. You may select the opposite speed by simply pressing the 'Speed' button once while in the process of driving the mower. Position the RoboMower at least 6-8 feet (1.8 – 2.4 m) from any straight length of perimeter wire, with the front of the mower pointing to the perimeter wire. Figure 3.1.

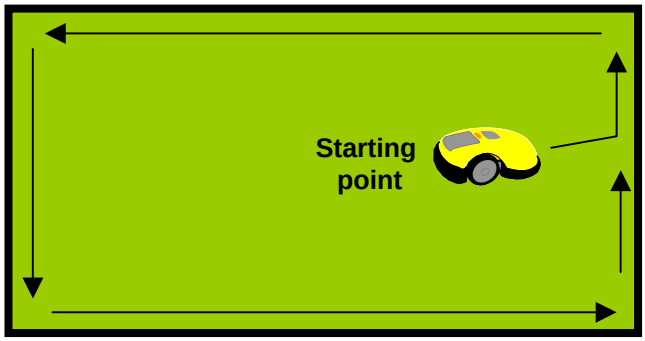
Figure 3.1
Positioning RoboMower on Lawn



3.3 Edge Mowing

The first mowing chore for the RoboMower is mowing the edge. By edge, we mean the outer perimeter of the active zone the RoboMower is working within. This is essentially where you placed your perimeter wire in the wire set-up. Edge mowing provides a clean even cut around the perimeter and helps to minimize the amount of trimming along walls and other obstacles. The RoboMower will always mow the edge in a counter-clockwise direction. Figure 3.2. The RoboMower will automatically find the edge (perimeter), mow it and then turn off into the lawn to complete the mowing.

Figure 3.2
Edge Mowing



In order to start the automatic mowing, including the edge mowing, the Manual Controller must first be placed back into the holder and pivoted down. Once the controller is placed into position, the LCD will display a text message indicating it is in the automatic mode. Figure 3.3.

Figure 3.3
Automatic mode display

Once the message is displayed, press the green 'GO' button once to start the automatic mowing sequence. A short warm up sequence will begin, the operating lamp will begin flashing and then the blades will start rotating. The LCD display will change to the text message in Figure 3.4. Once it reaches the edge, it will generally straddle the wire at about the center of the mower. It will now begin mowing the edge, completing one to two complete passes around the perimeter. At the point the RoboMower is satisfied the perimeter has been cut, it will stop and then rotate towards the inner area of the lawn. It will then drive into the lawn and begin what is called the scanning process. This is simply the methodical mowing of the lawn using the advanced navigation system of the RoboMower, RoboScan®. The LCD display will change to the text message in Figure 3.5.

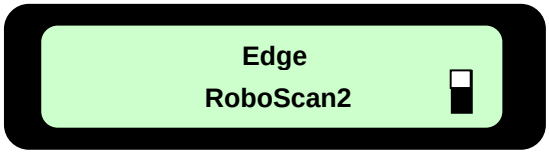


Figure 3.4 – Text on Edge Mowing

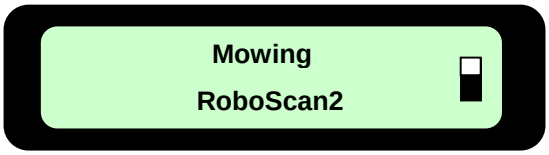


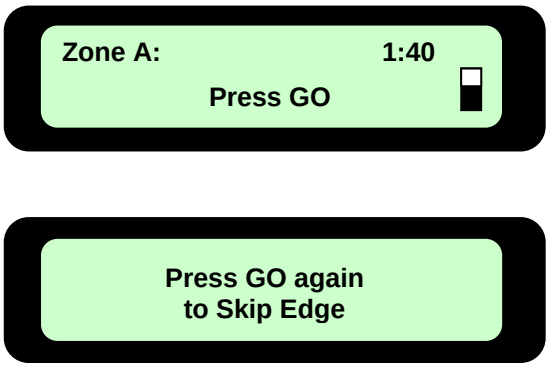
Figure 3.5 – Text in Scan Mowing

3.4 Scanning (Mowing)

The scanning process is simply a process whereby the RoboMower is systematically moving across your lawn while it is mowing. It will generally move in a right to left direction and then a left to right direction. During this process, it will also make other turns and moves in order to navigate itself back and forth across the lawn. Keep in mind that the RoboMower will not mow all the grass on its first pass; in fact it will leave uncut grass in between many of the legs it makes. This is expected and is entirely normal. These uncut areas will be cut on subsequent passes of the RoboMower across the lawn. Just like a dishwasher, wait until the job is finished before you can appreciate the results. The RoboMower will continue to run for the amount of time selected or for the default 'MAX' time, which is generally 1.5 to 3 hours, depending on RoboMower model, grass type and condition. See Chapter 5, Settings and Advanced Features for more detail on setting operating time.

3.5 Skipping Edge Mowing

The RoboMower provides a means that will allow you to skip the edge mowing process and start directly with the scanning (mowing) process. In order to do this, simply press the 'GO' button two times at the initial startup of the mower. Pressing 'GO' the second time immediately following the first press will tell the mower to skip mowing the edge. See Figure 3.6. You may start the mower anywhere within the perimeter that you choose, but at least 3 feet (1m) away from the closest perimeter wire.



Ready to start in automatic mode display. Pressing *'GO'* will take you to the next screen.

To skip the edge mowing, press 'GO' once more, otherwise it will begin in edge mow.

Figure 3.6 – Text Message After Pressing 'GO'

3.6 Mowing Complete

When the RoboMower has operated the allotted time, it will simply stop in the lawn, waiting for you to drive it back home and plug it into the Power Supply, ready for the next mowing session. As discussed earlier, there will always be plenty of Power Pack energy available to drive the mower back to the area where it is stored and charged. See Chapter 4 –'Charging' for more on charging instructions. The LCD will display a text message as seen in Figure 3.7 if the mowing time is set to the default time of '***MAX***' or the message as shown in Figure 3.8 if the mowing time has been selected to any time other than '***MAX***'.

Figure 3.7 – Text Message After 'MAX' Mowing

Figure 3.8 - Text Message After Mowing Pre-set Time

If the RoboMower has completed its mowing and it is more than 20 minutes before you arrive to move it, the LCD screen will be blank. The RoboMower will shut itself down into a sleep mode after 20 minutes of inactivity at all times. This is an energy saving feature. Pressing the 'GO' button or removing the Manual Controller from the holder will 'wake up' the RoboMower and display the message that was on the LCD when it went into sleep mode. In this case, either the message in Figure 3.7 or 3.8.

3.7 Driving and Navigation

The RoboMower is equipped with a Manual Controller that allows you to easily drive it from the lawn back to a storage area when not in use. It also allows you to manually engage the mowing blades, and while driving, to trim small areas of grass.

The Manual Controller can only operate in manual mode when removed from the holder, which holds it in place during automatic operation. For safety it is designed in such a way that manual operation is prohibited while in the holder and automatic operation is prohibited when removed from the holder. You will also notice that the Manual Controller contains the keypad for starting automatic operation as well as the emergency stop.

To access manual operation, remove the Manual Controller as seen in Figure 3.9. The controller is designed to be grasped by both hands while operating, with the blade control buttons to the left side and the driving/navigation button to the right. Once the controller is removed, driving the RoboMower from place to place is very simple. Using your thumb or index finger of your right hand, gently press the navigator button in the direction you want to drive. The button is omni-directional, allowing for slight turns as well as sharp turns, all the way to a complete circle. It takes little pressure to activate the drive motors using the navigator button, and use is best obtained by lightly rolling your finger in the direction you wish to drive. Continuous pressure is required to drive, so once released the mower will cease movement. Figure 3.10.

Manual driving has a slow and fast speed. You can change the speed to the other level at any time by pressing the speed button once while driving. Another press and the speed returns to the opposite level. See Figure 3.10.

Figure 3.9 - Removing the Manual Controller from its' holder

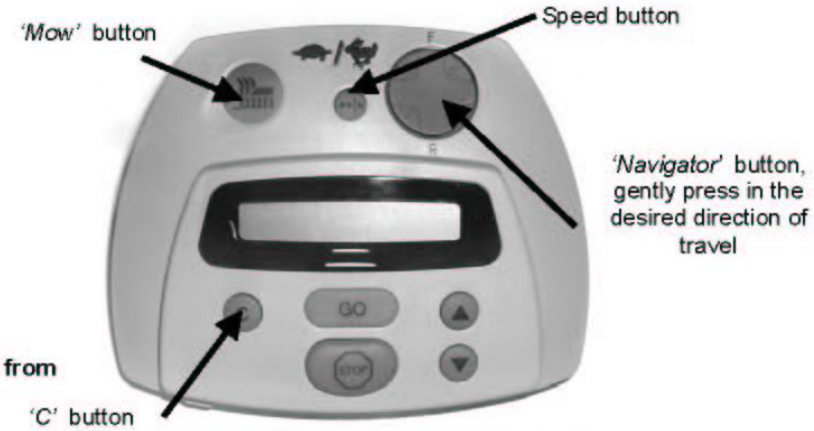


Figure 3.10 – Manual Controller Layout

WARNING!

Serious injury can occur. Always wear appropriate footwear when driving and using RoboMower in the manual mode. Keep a safe distance from the mower when operating it manually. Note that the reverse driving direction is from the point of view standing at the rear of the mower. Always look behind when you are using the reverse direction drive. Do not operate RoboMower in areas not suitable for manual operation or on slopes where a sure footing is not possible. Cut across slopes for safety. Do not drive RoboMower with persons sitting on it and do not manually operate within 10 feet (3m) of other persons or pets.

3.8 Manual Mowing (not available in RL350)

You have the ability to manually activate the blades on the RoboMower in order to trim small areas. After the blades are activated you may drive the mower using the navigator button and you may cut in any direction the navigator button will operate, including reverse.

The manual mowing operation on the Manual Controller is a two-step OPC (Operator Presence Control) type system for safe use. It requires two separate and independent steps to activate the blades and once activated, release of the button will immediately stop the blades. At any time the blades have been stopped, it will require the OPC activation process to be repeated. During manual mowing operation, activation to any bumper sensor will shut down the blades. Figure 3.11.

Figure 3.11 – Manual Mowing With Manual Controller

Step 1

Using right thumb, press and hold *'C'* button.

Step 2

While holding the 'C' button, press the '*Mow*' button with your left thumb. The blades will now start.

Step 3

Release the *'C'* button. Maintain pressure on the '*Mow*' button with your left thumb. Navigate and drive the mower using your right thumb on the '*Navigator*' pad.

Chapter 4
Charging

4.1 Charging

Of all the areas regarding the RoboMower, proper charging of the Power Pack is second only to safety in importance. Failure to follow the charging guidelines will result in poor performance and a short Power Pack life. After the completion of any daily cutting session it is very important to bring the RoboMower to its storage area and plug it into the Power Supply as soon as possible, preferably within 6 hours from the time it stopped.

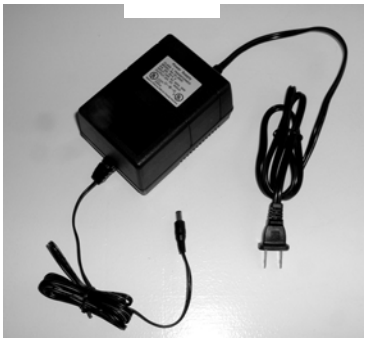
The standard Power Supply, Figure 4.1 is actually an indoor power supply, where the voltage output is DC and the current flowing to the Power Pack for re-charging is regulated inside the mower. The charging system and Power Pack are designed such that they can remain plugged in at all times of non-use without concern to over charging, over heating or damaging the Power Pack. In fact, it is the preferred way to maintain your Power Pack, always keep it plugged into the Power Supply between uses. The power supply will re-charge the Power Pack from the ***'Recharge Battery'*** level in approximately 20 hours, depending on conditions. There is a fast charger available as an accessory. See the accessories available for your RoboMower in Chapter 9.

4.2 Charging Using the Standard Indoor Power Supply Connected to the Charging Socket

Connect the Indoor Power Supply to a regular household receptacle, 120 Volts AC *(models outside the US utilize 230 volts mains power)* and the output lead of the Power Supply, Figure 4.2, into the charging socket, located under the Manual Controller holder, Figure 4.3, and the charging process will begin. Lightly pivot the Manual Controller down, allowing it to rest gently on the charging cord. DO NOT attempt to force the Manual Controller all the way to the flush position. The RoboMower Power Supply is designed for indoor dry use only. Do not charge the RoboMower where wet contact is likely.

WARNING!

Shock hazard. Injury or electrocution can occur. The RoboMower Power Supply is designed for indoor use in dry locations only. Never use the Power Supply or charge the RoboMower in areas where extreme dampness or wet contact is likely. Never use a Power Supply when the leads are damaged. Use only the recommended Power Supply with your RoboMower.

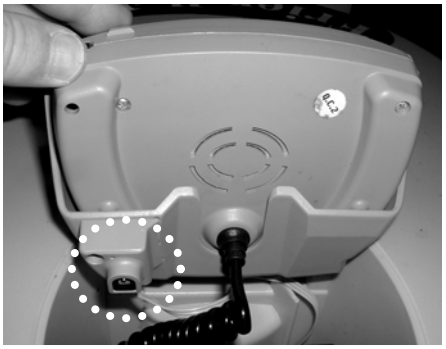


Indoor Power Supply 120 volt shown

Figure 4.1

Power Supply plug

Figure 4.2



Power Supply connector socket

Figure 4.3

The LCD on the Manual Controller will display the text seen in Figure 4.4 and the battery icon will continually move from empty to full to show the charging. Once the battery is fully charged, the message will change to that as shown in Figure 4.5, reminding you to keep it connected to the Power Supply until the next use.

Charging is such an important aspect for assuring good performance and Power Pack life that a special alert and power management system is incorporated into the mower to remind and alert you when the proper charging process is not occurring.

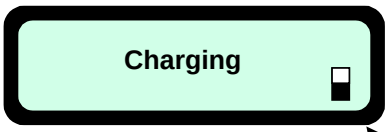


Figure 4.4

Figure 4.5

Battery Icon

The importance of proper charging and maintenance of the RoboMower Power Pack cannot be stressed enough. Failure to follow the recommended charging procedures will result in poor performance of the RoboMower and shorten the life of the Power Pack.

When the Power Supply plug is disconnected from the Manual Controller holder, the following message will be displayed on the LCD screen. See Figure 4.6. Press any button on the Manual Controller and the main screen, 'Manual – User Options' display will appear on the LCD.

Figure 4.6 – LCD Display when disconnected from Power Supply

Important! The Power Supply is **'IN DOOR USE ONLY'**, place it in a sheltered place, dry location, which is well ventilated and not exposed to direct sunlight

4.3 Power Management & Charging Alerts

The RoboMower is equipped with a sophisticated power management and alert system that operates at two levels; 1) to use the energy provided from the Power Pack in the most efficient manner during operation and non-operation and 2) to help remind or alert you when the charging system is not being used properly in order keep the Power Pack in top condition for peak performance and service. Level one is a somewhat transparent level to the user, but under certain conditions will communicate information to the level two system in order to alert you that something regarding the Power Pack and charging system needs your attention. It is the level two system that communicates to you through LCD messages and audio.

The basic assumption of the system is that the RoboMower will be connected to a Power Supply at all times when a Power Pack is inserted in the mower, except when in operation. This assumption is made because this is the only way to insure that the Power Pack will always deliver satisfactory performance during operation and will also provide a reasonable service life. Given this, the system alerts the user at several different levels and frequencies when this is not happening. In addition, the system can also alert

the user when something has interrupted the charging operation, such as a loss of power to the Power Supply for example.

The Power Pack should be fully charged before initiating any operation. In addition, you should have examined the mower before operation to look for problems that may cause excessive energy consumption and thereby less than optimum run-time. Examples include dull blades or heavy grass accumulation around the blades. Other examples can be found in Chapter 6 Text Messages and Troubleshooting**.** First and foremost, insure that the Power Pack is indeed fully charged before putting it to work. Only when the LCD displays the message in Figure 4.5 is the RoboMower fully charged and ready for mowing. And lastly, use the RoboMower for the job it was designed to do, cutting normal levels of grass growth.

The RoboMower can operate under two different run-time scenarios; 1) operate the maximum time allowable by the system, where this time is dictated solely on the remaining level of energy in the Power Pack and 2) where the run-time is set to operate a fixed amount of time set by the user, such as one hour for example. Maximum operation will always display ***'Recharge Battery"*** after the cutting session and a fixed time will display ***'Time Complete'*** after the session. Under either of these operating scenarios it is important to retrieve the RoboMower and place it on the Power Supply as soon as practical, preferably within 6 hours from the time it stops operation.

The ***'Recharge Battery'*** level has a higher priority in the power management system than ***'Time Completed'*** for the obvious reason that the Power Pack voltage is at a lower level. For this reason, immediately following a ***'Recharge Battery'*** message the RoboMower will emit a buzzer sound every 30 seconds for the next 20 minutes in order to alert you that the mowing session is completed and it is now time to re-connect the Power Supply to the RoboMower. If the RoboMower is not connected to the Power Supply within the next 21 hours, a higher-level alarm will sound. If the Power Supply is still not connected after this alarm series, the mower will enter a deep sleep mode to conserve power. If the RoboMower enters a deep sleep mode, the Power Pack must be removed for 10 seconds and then re-inserted in order to wake up the RoboMower. However, if the mower reaches this level and the Power Supply is not connected soon, you risk causing poor performance and service life to the Power Pack.

Similar alarms will alert you to connect the Power Supply if not connected after a fixed time, when operating under fixed run-time settings. Lastly, if the Power Supply is disconnected, even after the fully charged message, the alert system will operate to remind you to keep the Power Supply connected until ready to use for mowing.

4.4 Off-season storage

When preparing the RoboMower for off-season storage, first fully charge the Power Pack and then store it separately from the RoboMower in a dry location where the temperature will not drop below -20 ºC (-4ºF). Recharge the Power Pack every three months while in storage.

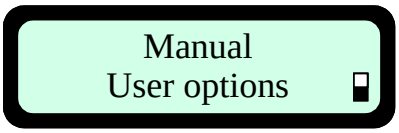
Important! For more details regarding the winter storage please refer to section 8.7.

Chapter 5
Settings and
Advanced Features

5.1 User Options

Lifting the Manual Controller from its holder will change the text display on the LCD to the manual operating menu, as seen in Figure 5.1.

Figure 5.1



Pressing '***GO***' once will take you to the next screen, ***'User Preferences'***. Figure 5.2.
Using the '**Up ⇑ Down ⇓**' arrow keys will allow you to scroll through the menu items, as shown in figure 5.2.

Figure 5.2

(Not accessible to user
Password required)

The '***GO***' button is used as a means to select or confirm different menu options or settings. By pressing the '***GO'*** button, it will generally select or confirm what is shown on the second line of the LCD text message. There are several settings for which the operator can make changes to or features to enable/disable. Pressing the '***C***' button at any time during the menu selection process will bring you back to the main menu. The following menu options are available to the user and may be changed as desired; (not all options are available on all models)

5.2 User Preferences

Press ***'GO'*** to view the menu of user preferences, beginning with ***'Zones setup',*** Figure 5.3. Using the '***Up ⇑ Down ⇓***' arrow keys will allow you to scroll through these menu items. Pressing '***GO***' will take you to these various preferences. Figure 5.3.

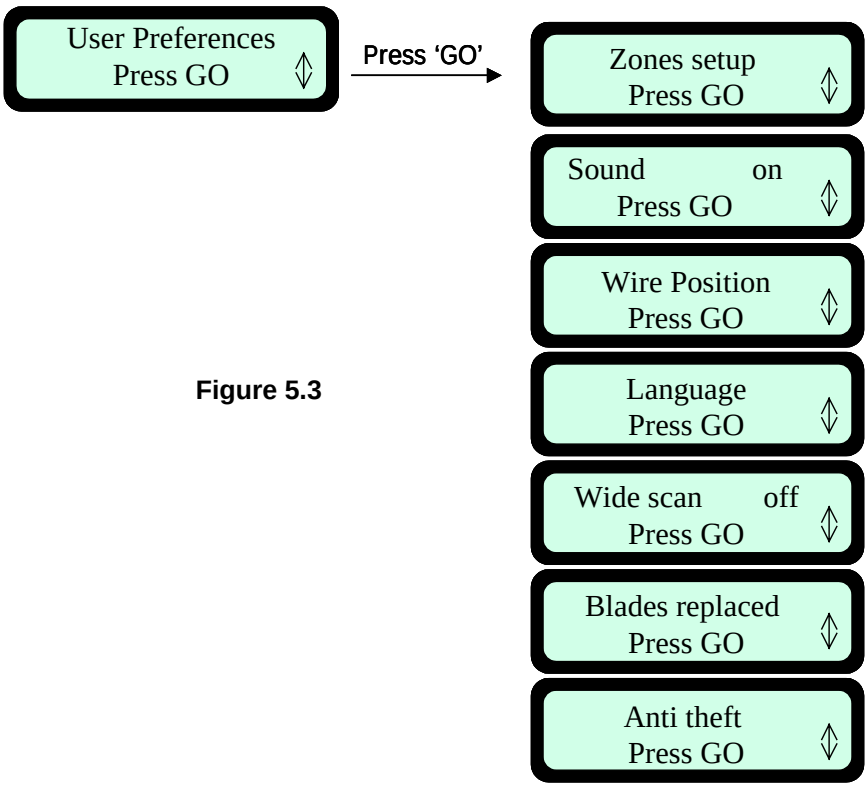


Figure 5.3

5.2.1 Zones setup

Allows user to set the parameters that are specific per zone (Figure 5.4):

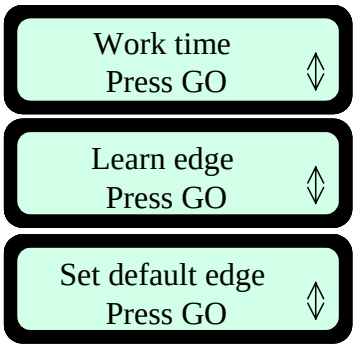


Figure 5.4
Zones setup options

5.2.1.1 Work Time

Allows the user the option of setting the operating time from the '***MAX'*** default setting to times ranging from 20 minutes up to 2:40 hours (1:40 hours in RL350). Figure 5.5. This option is available for up to 4 different zones, Dock Zone, Zone B, C or D. Having four different zones can allow you to set operating time for several different zones that are of varying sizes, not requiring the same operating time for mowing.

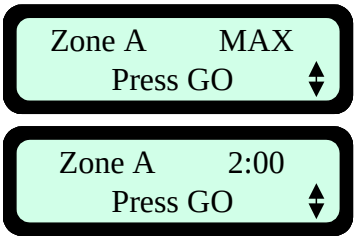


Figure 5.5

Scroll to select different zones.

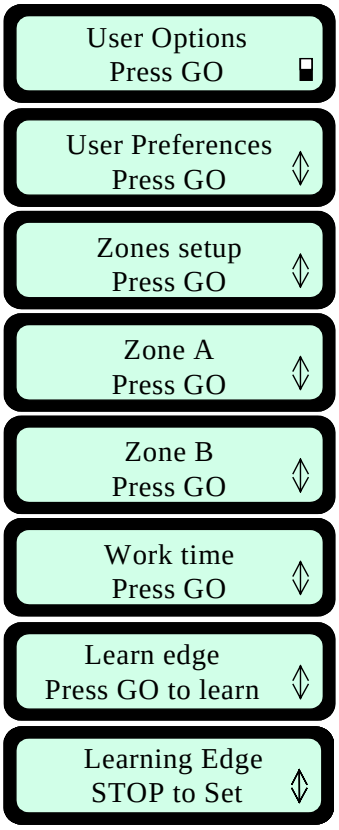
Scroll to select different operating times. Times range from: 20 minutes to 2:40 hours to '***MAX'***

5.2.1.2 Learn Edge

The default distance for edge mowing is approximately 1.5 to 2 rounds around the perimeter. This feature allows the user to learn a specific distance in each operating zone in order to cause the mower to cut the edge a specific distance, such as one full round. It will remain as a learned distance until the edge is re-learned or the factory default edge is selected. It should be done when the Manual Controller is in the holder and flush with the mower top. 'Learn Edge' gives you the ability to have the RoboMower learn the distance around the edge. Figure 5.6.

- Position the RoboMower to start edge mowing and place the Manual Controller in its holder
- Follow the steps described in Figure 5.6 to begin the process
- ***'Learn Edge'*** is specific to each zone, so be sure you have selected the correct zone where you want the edge learned

Figure 5.6



Use the '***Up'*** ⇑ or '***Down'*** ⇓ arrow keys to scroll to the 'User Options' display and press '***GO*****'.**

Press '***GO***'

Press '***GO***'

Scroll down to the zone you want to learn the edge distance

Press '***GO***'

Scroll down once to 'Learn edge' option

Press '***GO***'

Driving around perimeter. Follow the mower and press the '***Stop'*** button when the desired distance has been reached.

5.2.1.3 Set Default Edge

Selecting Default Edge restores the factory default edge distance to the specific zone selected.

5.2.2 Sound

Allows user to shut off non-safety related operating sounds.

5.2.3 Wire position

Allows user to test the wire position in 'Edge' mode while the mowing motors are switched off to prevent any damage to the perimeter wire after the initial setup of the wire is completed.

5.2.4 Language

Allows the user the option of viewing the LCD text in several different language versions.

5.2.5 Wide Scan

Wide scan provides the RoboMower a secondary navigation technique, which can prove to be beneficial in some lawns. Wide scan will increase the distance between subsequent legs of mowing after each movement off of the perimeter wire. If it appears that the RoboMower is simply driving along the same path back and forth, activate wide scan.

5.2.6 Blades replaced

Choose this option after replacing the blades to restart the reminder counter. A reminder to replace the blades again will be displayed after the next 200 hours of operation. Blades are easy to replace, refer to section 8.2.

5.2.7 Anti-Theft

The anti-theft system provides the user a disabling function that will prevent anyone from using or driving the RoboMower unless they have the valid code to enter. You will be prompted to enter a four-digit code of your choice to use as your personal security code. Use the scroll arrows in order to change each digit position to a different number and then press ***'GO'*** to move to the next digit to select. You will find a place to record your personal security code in Chapter 7 of this manual. Be sure to record your code for future reference.
To change the password chose the 'Change password' option under the 'Anti theft' menu (see figure 5.7). You will be promoted to enter your old password before setting the new one.

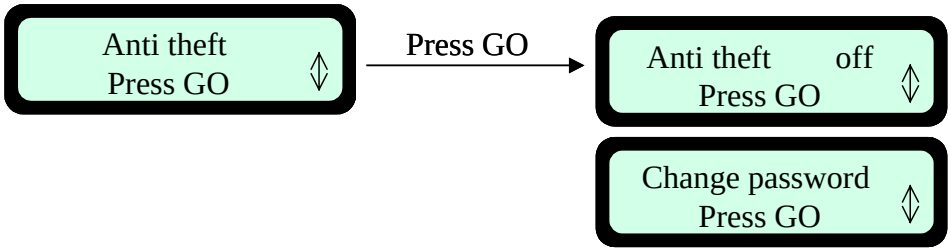


Figure 5.7

5.3 Information

Pressing 'GO' at the '***Information'*** display will open the option to scroll between the following menus (Figure 5.8):

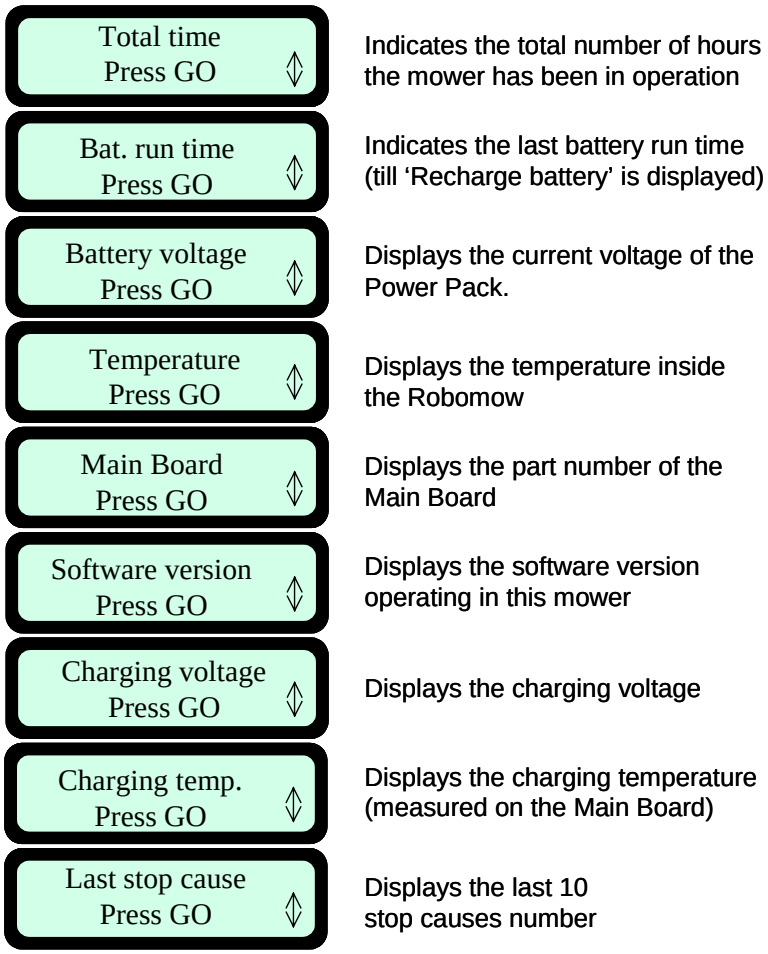


Figure 5.8 Information menu

5.4 Child Guard

Child guard is a feature that when activated will help deter use by young children and other unauthorized people. It will prevent operation without a proper code, but it is a much simpler code and is intended as a means to prevent operation to those not familiar with or suitable for operating the mower. The key sequence to unlock the guard for operation is the same for all mowers, press the '***Up'*** ⇑ arrow key and then the ***'C'*** key to unlock the controls. One minute of inactivity will re-lock the keys.

It is strongly recommended to use the "Child Guard/Safety Guard" menu option in order to prevent operation by children or other who are not familiar with the safe operation of the RoboMower.

5.5 Safety Tests

When selected, the safety test feature will allow you to test the primary safety devices on the RoboMower; 1) front and rear bumpers, 2) lift sensor and 3) the Manual Controller buttons. Follow the prompts on the menus for testing. Never use the RoboMower with a safety device or feature not properly operating. Never attempt to disable or bypass any safety device or system. See an authorized Friendly Robotics service facility for repair or information regarding any safety system or device.

Chapter 6
Text Messages and Troubleshooting

6.1 Messaging

The RoboMower is equipped with a sophisticated monitoring system that will notify you in the form of a text message in the LCD panel when common operational faults occur. In addition, it will also communicate in text form several messages that are meant as a prompt to the user to perform a certain function or action. If the LCD screen is blank, pressing the '***GO'*** button one time will wake the mower up and the last fault or message displayed prior to stopping will now be displayed. . If a specific problem re-occurs, it is recommended to identify the fault code prior to calling for service. The code will be displayed in the 'last stop cause' under the 'information' menu.

While it is impossible to list every circumstance that will result in a message display, the most common reasons for a particular message are provided in the following chart. Following this chart, in Section 6.2, you will also find additional operational and fault issues that may not display a particular text message in the LCD panel. For issues that cannot be resolved through the use of these charts please contact your service provider.

Message Displayed	Probable Cause/Event	Corrective/User Action
Blocked path	- Bumper pressed during warm up. - Bumper pressed for >2 sec during manual mowing. - Bumper pressed while departing from the Docking Station - Bumper pressed when the mower turns into the lawn to mow the inner area	- Move mower away from obstacle pressing on bumper. - Manually drive mower away from obstacle.
Calibration Req.	- Displayed on first use only	- Follow prompts on LCD to calibrate mower
Charging Failure	- The charging process is not active	- Contact service provider
Check Mow Height	- Mowing motors have faced over-current for too long or some obstacle is stuck or wrapped around the blades. - Something is preventing a blade from rotating freely. Severe grass accumulation under the mowing deck; rope or similar object wrapped around mowing blade. - Object jammed under mower preventing blade from rotating.	**CAUTION** – Remove power pack before lifting the mower. - Inspect blades for foreign material or debris preventing rotation. - Clean out accumulated grass clippings using a wooden stick.
Check Power	- Power supply is not plugged properly into the main power supply - Charging plug is not fully inserted into the charging socket of the mower - The charging process has stopped due to a temporary power loss.	- Disconnect the charging plug from the mower, confirm power supply is plugged into the main power receptacle and re-connect the plug to the mower to resume charging.
	- No power to receptacle or main power is shut off	- Turn power on to the main receptacle.
Drive Overload Cooling, Wait…	- The drive motors have been working under a severe load for too long.	- There is no need to do anything – RoboMower will renew automatically the operation, as the drive motor will cool down.
Drive problem	- Internal failure	- Contact service provider
Enter Code	- The theft guard system is activated	- Enter the correct 4-digit code. '***Theft Guard'*** can be deactivated under 'User Preferences'. Contact your service provider for assistance in a lost code situation.
Front/Rear bumper disc. Contact your service provider for repair before using.	- Internal bumper failure	- Contact service provider

Message Displayed	Probable Cause/Event	Corrective/User Action
Front/Rear bumper pressed	- Front or Rear Bumper is constantly being pressed	- Move mower away from object pressing against bumper.
Front Wheel Problem	- The Front Wheel has left the ground for more than 8 – 10 seconds.	**CAUTION** – Remove power pack before lifting the mower
		- The RoboMower has driven onto an obstacle, raising the front end. Remove or exclude this object from the mowing area.
		- The RoboMower is being used on a slope too steep for safe mowing. Exclude this from the mowing area.
		- High grass is preventing the front wheel from fully riding on the ground. Raise the cutting height.
		- The ground contains large holes or indentions where the front wheel can drop into when passing across. Fill these areas with dirt and level off.
High temp. Disc. charger	- RoboMower is charged through the plug and ambience temperature is out of range (above 158ºF / 70ºC)	- RoboMower charging is not allowed when the ambience temperature is raised above 158ºF / 70ºC; Disconnect the Power Supply plug and wait until the temperature will go up or take the RoboMower to be charged in a cooler place.
Keep charging if not used	- Message is displayed every time the Power Supply plug is disconnected from the mower. - Displayed when the mower isn't in operation and not connected to the Power Supply/ Charging Station for a long time.	- Press any key to change the display back. - Send the mower back to the Charging Station for charging / connect the charging plug or continue in operation
Keys locked	- Child lock feature has been activated	- Press the **Up** ⇑ arrow key and then press the **'C'** button. Child lock can be deactivated under **User preferences**.
Low temp. Disc. charger	- RoboMower is charged through the plug and ambience temperature is out of range (below 32 ºF / 0 ºC); disconnect the Power Supply plug from the RoboMower.	- RoboMower charging is not allowed when the ambience temperature is going down below 32ºF / 0ºC; Disconnect the Power Supply plug and wait until the temperature will go down or take the RoboMower to be charged in a warmer place.
Left/Mid/Right mow problem	- Mowing motor is faulty or disconnected	- Contact service provider
Move from Wire	- The RoboMower is positioned too close or on top of the perimeter wire	- Move the RoboMower approximately 6 – 10 feet (1.5 – 3m) away from the perimeter wire and start again.
Mowing Overload Cooling, Wait	- The mowing motors have been working under a severe load for too long of a time.	- There is no need to do anything – RoboMower will renew automatically the operation, as the mowing motor will cool down.
No Wire Signal	- Perimeter Switch is not turned on or not connected to the zone intended to mow	- Make sure the Perimeter Switch is connected to the correct zone and is turned on
Rain GO for override	- RoboMower detects rain upon GO pressing	- Do not operate RoboMower in rainy weather and wet grass; If you chose to override press the GO button; The overriding is valid for the current operation only
Ready Keep Charging	- The battery is fully charged	- Keep the power supply connected and operating
Recharge Battery	- The maximum operating time has been reached	- Connect the Power Supply to the mower
Replace blades every 200 hours	- An automatic reminder to replace the blades is displayed every 200 hours	- Replace the blades and restart the counter of the blades replacement reminder by choosing the '**Blades replaced – Clear reminder'** option under the '**User Preferences'** menu

Message Displayed	Probable Cause/Event	Corrective/User Action
Replace lamp	- The Operating Lamp is burnt out	- Confirm the message and replace the Operating Bulb as soon as possible
Retry elsewhere	- Calibration failure from interference in the immediate area	- Move the RoboMower 10-12 feet (3-4m) from this spot and attempt calibration again.
Set Country	- Displayed only on first use.	- Follow prompts on LCD screen to set country
Set Time	- Displayed every time the power pack is taken out of the mower (reset operation)	- Set real time clock (day and hour)
Start Elsewhere	- An unknown fault has occurred and user help is required	- Manually drive the mower away from this particular area and restart operation
	- Wheel drive motors have been working under a severe load	- Check to insure the mower is not stuck, allowing the wheels to slip
Thermistors fail	- Faulty / disconnected Thermistors (overheat protection)	- Contact service provider
Time Completed	- The operating time set for that zone has been reached	- Connect to the Power Supply if all mowing has been completed for the day.
Waiting for signal…	- RoboMower has stopped the operation in Dock zone, because there is no signal received from the Charging Station	- Check the power to the Charging Station. - There is electrical power interruption. There is no need to do anything – RoboMower will renew automatically the operation if the power will come back within an hour from the break.

7.2 Other Operational or Fault Problems

Problem Encountered	Probable Cause/Event	Corrective/User Action
Perimeter Switch will not activate when turned on.	- Batteries are completely discharged.	- Install fresh alkaline C-cell batteries
	- Batteries installed with wrong polarity position.	- Verify correct placement of batteries.
	- Perimeter Switch not installed vertically and exposed to water/rain.	- Water/moisture protection of the Perimeter Switch can only be insured when mounted vertically. Replace Perimeter Switch.
'Cut wire' indicator flashing on Perimeter Switch	- Wire disconnected from switch	- Confirm wire is plugged in and wire leads are firmly attached
	- Perimeter wire cut	- Walk along perimeter, including islands and obstacles excluded with the perimeter wire and look for obvious cuts or breaks in the wire. Repair with RoboMower wire splice connectors.
	- Poor connections	- Check and repair all loose/poor or corroded connections

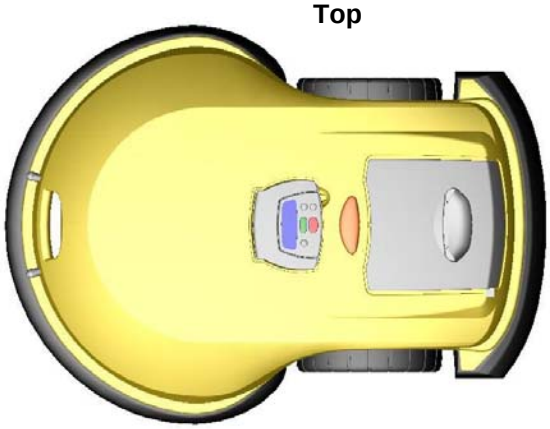
Problem Encountered	Probable Cause/Event	Corrective/User Action
'Replace Battery' indicator flashing on Perimeter Switch	- Weak batteries	- Install fresh alkaline C-cell batteries
	- Poor wire splicing (confirm that when the Perimeter Switch is turned on, first the 'Cut wire' indicator is flashing once). - Twisted cables, or a screw terminal, insulated with insulation tape is not a satisfactory splice. Soil moisture causes the conductors to oxidize and after a while result in broken circuit.	- Use the connectors supplied in the box. It is waterproof and gives a reliable electrical connection.
	- Perimeter wire too long for one zone	- A maximum perimeter wire length of 1000 feet (300 m) is recommended. Areas requiring longer lengths should be broken into separate zones. If the 'Cut Wire' indicator flashes once when the Perimeter Switch is activated, this confirms a length too long for a single perimeter zone.
RoboMower will not operate and nothing will display on the LCD screen.	- Mower is in deep sleep.	- If not connected to the Power Supply at all times when not in use, the RoboMower will conserve power by entering into a deep sleep mode. Lift Power Pack from mower and re-insert it after 10 seconds.
	- Power Pack has been discharged from lack of charge maintenance.	- It is required for the Power Supply to remain connected to the RoboMower when not in use. Failure to do so can cause permanent Power Pack damage. Contact your service provider.
RoboMower drives but blades will not mow.	- 'Mowing 'has been turned to off.	- Change back on under 'User Preferences'
Short run time, operates less time than normal.	- Power Pack is not fully charged	- Connect the Power Supply to the mower and keep it connected until the 'Ready – Keep Charging' message displays in the LCD screen.
	- 'Work Time ' for that zone is set to stop at a pre-determined duration.	- Work time can be changed under 'User Preferences'
	- Grass is extremely over grown or very wet.	- Raise cutting height. Always mow the grass frequently enough to prevent over growth. Refrain from cutting wet grass.
	- Power Pack is reaching a normal end of life state.	- Replace Power Pack. Properly maintain Power Pack per instructions.
	- Manual Controller is not firmly pivoted down flush in holder, allowing it to bounce up and stop the mower.	- Confirm the coiled cord is fully placed into the holder below the Manual Controller and the Manual Controller closes flush with the top of the mower.
RoboMower operating lamp flashes once when Power Pack is inserted, but no display is seen in the LCD display.	- Power Pack fuse has not been installed.	- Install Power Pack fuse.

Problem Encountered	Probable Cause/Event	Corrective/User Action
RoboMower has crossed over wire during operation **CAUTION** The RoboMower is designed to remain within an active perimeter of your lawn when properly installed. In the unlikely event that the mower does cross over the wire, **DO NOT** use the mower until the problem is corrected. If changing the perimeter wire placement does not correct this problem, contact you service provider.	- Improper perimeter wire setup OR adjacent zone (closer than 13 feet / 4 m) operated simultaneously.	- Refer to the setup rules for wire placement, particularly for corners. Do not operate adjacent plots simultaneously when closer than 13 feet (4 m).
Large patches of uncut grass remain after RoboMower has completed mowing.	- Power Pack is not fully charged for operation.	- Connect the Power Supply to the mower and keep it connected until the 'Ready – Keep Charging' message displays in the LCD screen.
	- 'Work Time' not sufficient for zone size.	- Increase 'Work Time' under 'User Preferences' OR set 'Work Time' to 'MAX'
	- Power Pack nearing natural end of life	- Replace Power Pack and follow maintenance instructions in manual.
	- Grass is extremely overgrown or very wet.	- Raise cutting height. Always mow the grass frequently enough to prevent over growth. Refrain from cutting wet grass.
	- Power Pack capacity is damaged from poor maintenance.	- Replace Power Pack and follow maintenance instructions in manual.
The bumper does not activate when striking an obstacle.	- The obstacle is less than 6 inches (15 cm) in height, is not rigid enough or is positioned at an angle relative to the ground preventing square contact with the outermost surface of the bumper.	- Remove the obstacle - Setup a wire around the obstacle (refer to section 1.8) - Exclude it from the cutting area with the perimeter wire.
The RoboMower gets stuck frequently when traveling over less than optimal terrain.	Low ground clearance.	Raise ground clearance to the uppermost position.
	Cutting height too low.	Raise cutting height
	Terrain needs landscaping repairs.	Fill in all holes, cover or exclude all exposed roots etc in order to smooth the terrain

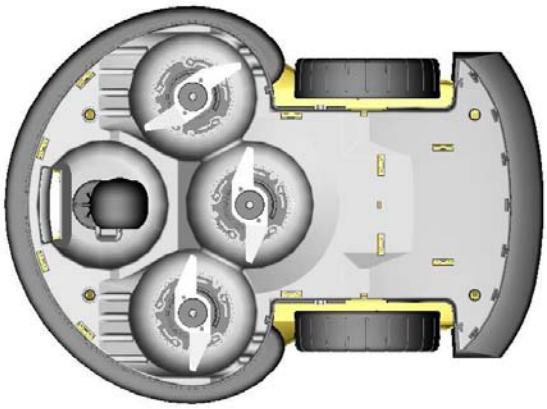
Problem Encountered	Probable Cause/Event	Corrective/User Action
RoboMower does not complete the edge	Obstacle along path	Watch the full operation of edge and confirm no obstacles are present
	Peculiar geometry of perimeter	RL500 & RL550, start edge from the opposite side of the lawn. Contact your service provider if this does not correct the situation.
		On RL800 & RL850, perform '***Learn Edge'*** function
Operating lamp not flashing when blades are in operation.	Faulty bulb.	Replace operating lamp bulb.
LCD display is in a foreign language.	The language setting was changed or not correctly set.	Remove the Manual Controller and follow the sequence listed; 1. Press '***C'*** button 2. Press *'GO'* button twice 3. Press '***Down'*** ⇓ arrow key twice 4. Press '***GO'*** button once 5. Using the arrow, scroll to the correct language 6. Press '***GO'*** to confirm this selection

Chapter 7
Specifications

Top



Bottom



Dimensions
89cm l x 66.5cm w x 31.5cm h (35” x 26” x 12.5”)

Weight
22.6kg (50lb.) Unit + 12.6kg (28lb.) Power Pack

Noise level
< 85 db (A)

Mowing Width
3 Blades and a total cutting width of 53cm (21”)
Cuts 1.5cm outside the wheels

Mowing Height
6 settings at the front and 2 at the rear
High Cut Blade: 44-81mm (1.75”-3.25”)
Low Cut Blade: 26-63mm (1”-2.5”)

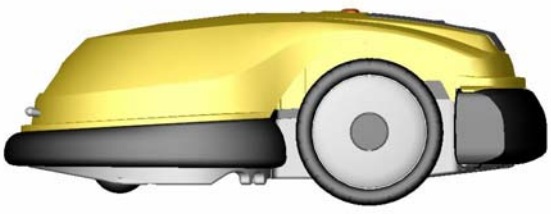
Blade Motor RPM
5800 RPM

Equivalent Mowing Power*
5 HP gas walk mulching mower

Front

Rear

Side



Theft Guard Code
Fill in the four-digit code you have selected for the Theft Guard system as a safe record in the event you forget the code selected.

_____ _____ _____ _____

Robomow Serial Number

_____

* Side by side comparison

Chapter 8
Maintenance and Storage

Recommended Maintenance Schedule

Maintenance Service Interval	Maintenance Procedure
Each Use	▪ Check and remove grass clippings and dirt from the mowing deck if necessary, particularly when mowing wet and damp grass (refer to section 8.1) ▪ Charge the power pack after every use.
50 Hours	▪ Remove Power Pack and check any damage on the blades (refer to section 8.2)
150 – 200 Hours	▪ Replace the blades; replace them more frequently if the edges dull in rough or sandy conditions (see Figure 8.2). Remember to restart the automatic blades replacement reminder after every time the blades have been replaced (refer to section 8.2).

8.1 Mowing Deck

The underside of the mowing deck needs to be inspected, and cleaned if necessary, between operations. The RoboMower is a dedicated mulching mower and may accumulate clippings under the mowing deck, particularly when mowing wet and damp grass. Figure 8.2

WARNING!

Serious injury can occur. Always remove Power Pack before lifting mower. Blades are very sharp and can cause severe cuts or lacerations. Always wear heavy work gloves when working with and around the blades. Never use a damaged or broken blade. Use only sharp blades.

Most grass accumulation can be removed using a small wooden stick or similar object. Carefully scrape the collected grass debris from under the mowing deck. If necessary, remove the blades to gain better access to the mowing chambers in order to clean them. Do not place the mower upside down, damage to the Manual Controller can occur. Instead, lean the mower against another surface to gain access to the mowing deck area.

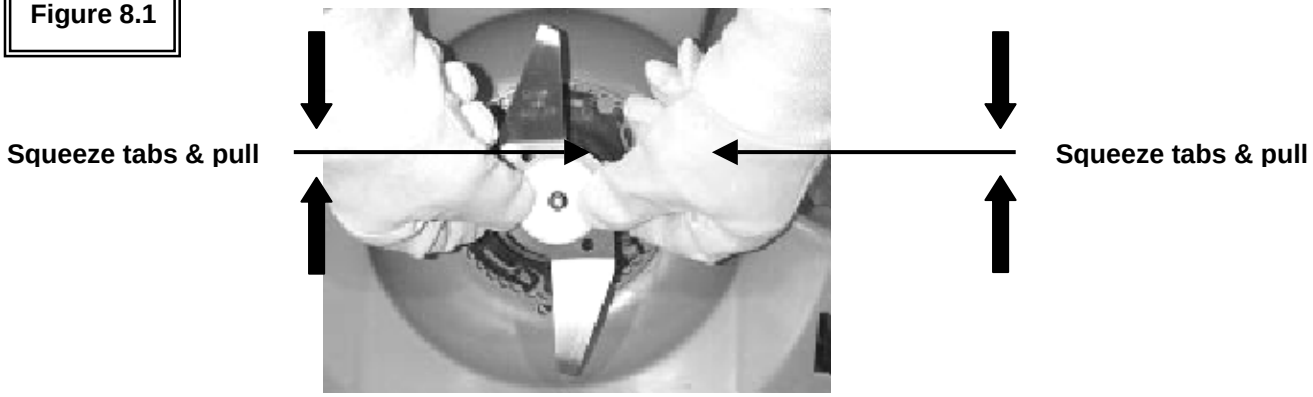
NEVER use a water hose or other type of liquid sprayer to clean the underside of the mower. Component damage can occur. Use only a damp or wet cloth to wipe the surface clean after scraping.

8.2 Blades

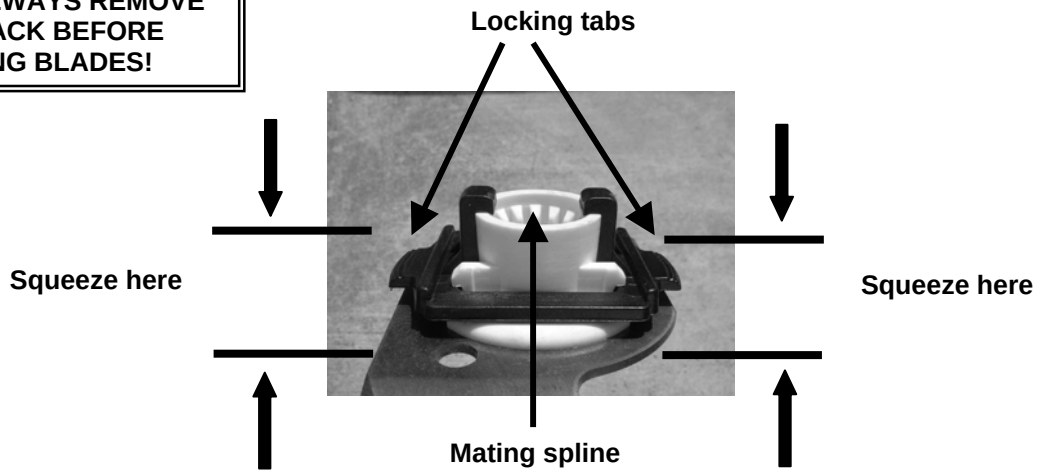
The cutting blades of the RoboMower should be examined for damage between operations. Replace any damaged blade found. Only use sharp blades. Replace blades at least once per season, more often if they have been severely dulled. It is recommended to replace all three blades for best performance. Machine sharpening is not recommended, as a good balance cannot be achieved after machine sharpening. See Figure 9.1.
RoboMower has an automatic reminder to replace the blades after every 200 hours of operation. **'Replace blades – every 200 hours'** message appears and pressing the GO button will clear the message and enables the operation of RoboMower.

Whenever replacing the blades, it is recommended to restart the counter of the blades replacement reminder by choosing the **'Blades replaced'** option under the '**User Preferences'** menu and press the GO button again to clear the reminder.

Figure 8.1



CAUTION! ALWAYS REMOVE POWER PACK BEFORE SERVICING BLADES!



To remove blades, squeeze locking tabs on each side of blade retainer, then pull blade assembly off, away from mower. When reinstalling the blade, line up the mating splines and push until a firm click is heard, indicating a proper seating of the blade onto the shaft**.**

Figure 8.2

Using a wooden stick or similar object, clean accumulated grass from these areas of the mowing deck. Remove blades if necessary for better access.

8.3 Outer Housing

Use only a damp cloth and a dry brush to clean the outer surfaces of the RoboMower. A light detergent can be used in a water solution, and then soaking and wringing dry the cloth for cleaning. Never use harsh or abrasive cleaning solutions. Never spray with a garden hose or other type of liquid spray hose.

8.4 Power Pack

Always follow the maintenance and charging instructions found in Chapter 5 for the Power Pack.

8.5 Disposing of the Old Battery Pack

Important! Do not place used batteries in your household trash. The battery must be collected, recycled, or disposed of in an environmentally sound manner. Return the old battery pack to an approved sealed lead (acid) battery recycler.

8.6 Splicing the Perimeter Wire

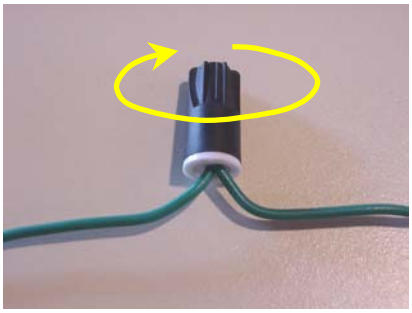
If the Perimeter Wire needs to be spliced: Use the connectors supplied in the box, as shown in figure 8.3. It is waterproof and gives a reliable electrical connection.

1

Strip 1.5 cm (0.5 inch) of each wire ends together

2

Twist the stripped ends together



3

Screw the silicone filled wire nut on the twisted ends. Make sure it is tight.

Figure 8.3

Important Information!

Twisted cables, or a screw terminal, insulated with insulation tape is not a satisfactory splice. Soil moisture will cause the conductors to oxidize and after a while result in broken circuit.

8.7 Winter Storage

Power Pack

Fully charge the Power Pack till 'Ready keep charging' is displayed and store it separately from the RoboMower off the ground i.e. on a wooden shelf in a dry location and a cool place not colder than -4ºF (-20 ºC). A fully charged Power Pack may be stored for up to 3 months before recharging it, if stored in a cool, dry place. Charge the Power Pack before using the RoboMower for the first time of the season.

RoboMower

Remove the Power Pack from the RoboMower and clean the RoboMower (refer to sections 8.1 and 8.3). Store the RoboMower in a clean and dry place and cover it to keep it clean and protected. Confirm the RoboMower is standing on its wheels and the area around the bumpers is free.
Important! Do not store the RoboMower on its bumpers or with anything pressing on the bumpers.
Check the condition of the blades; if necessary, replace the blades (refer to section 8.2).

Perimeter Switch

Disconnect the Perimeter Switch, remove the batteries and to store it in a dry place.

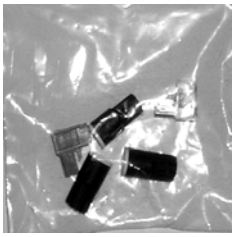
Chapter 9
Accessories

Perimeter Switch
Convenience of having a switch for each zone and not moving one switch from zone to zone.

Peg Pack (50)
For larger lawns and additional zones.

Perimeter Wire
For larger lawns and additional zones.

Power Pack
Convenience of increasing capacity with a second battery.



Connector Kit
Includes two Perimeter Switch connectors for additional zones and three silicon filled wire nuts for repairing or splicing the perimeter wire.

External Charger
Recharges the primary or additional Power Pack outside of the mower.

Blade Set
Keep a spare blade set on hand. Sharp blades are important for safety and good cutting performance.

Friendly Robotics RL Series Limited Warranty

Friendly Robotics warrants to the original purchaser that the RL series 'Product' is free from defects in materials and workmanship when used under normal residential* purposes for a period of 24 months, 12 months for the batteries, beginning from the date of purchase. Product accessories, including replacement batteries, are warranted for a period of ninety days from the date of purchase. This warranty provides for the cost of parts and labor to repair covered defects when performed by an authorized Friendly Robotics service and warranty facility. A valid proof of purchase is required for warranty repairs.

The limited warranty does not cover transportation costs of any kind. The owner bears all responsibility for transportation costs to an authorized Friendly Robotics service and warranty facility.

*Normal residential purposes is defined as use of the product on the same lot as your primary home. Use at more than one location is considered commercial use, and this warranty would not apply.

Items and Conditions Not Covered

This express warranty does not cover the following:

- Cost of regular maintenance service parts or procedures, such as blades or blade sharpening.
- Any product or part that has been altered, misused, abused or requires replacement or repair due to accidents or lack of proper maintenance.
- Normal wear and tear, including fading of paint or plastic parts.
- Cost of installation or reinstallation, removal of installation or any costs or damages associated with improper installation or use of product.
- Any product that has been opened, repaired, modified or altered by anyone other than a Friendly Robotics authorized repair facility.
- Repairs necessary due to improper battery care and/or improper charging process such as charging in wet conditions, electrical supply irregularities, or failure to properly prepare the mower or battery prior to any period of non-use.
- Repairs necessary due to water damage, other than incidental rain exposure, repairs due to lighting or other acts of God.

Instructions for Obtaining Warranty Service

Should you feel your Friendly Robotics product contains a defect in materials or workmanship, contact the retailer who sold you the product.

Owner Responsibilities

You must maintain and care for your Friendly Robotics product by following the maintenance and care procedures described in the owner/operator manual. Routine maintenance, whether performed by a service provider or by you, is at your expense.

General Conditions

Repair by an authorized Friendly Robotics service and warranty repair facility is your sole remedy under this warranty. There is no other express or implied warranty. All implied warranties of merchantability and fitness for use are limited to the duration of this express warranty. Friendly Robotics is not liable for indirect, incidental or consequential damages in connection with the use of the Friendly Robotics Product covered by this warranty, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty. Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusion and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

www.friendlyrobotics.com