

Volume

1

GROUP 6



BarrelBeast

GROUP 6

User Manual

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TRON LAB • Link Building
Camperdown, NSW 2027

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IMPORTANT INFORMATION

Thank you for choosing BarrelBeast. Read this guide for important safety, health and regulatory information for the BarrelBeast racing system you have purchased. This document contains important information for controlling and caring for the BarrelBeast console and mobile robot unit.

Safety Guidelines

If used improperly, the BarrelBeast devices have the potential to increase risk of injury, or death or damage to the console or robot. To avoid these hazards, ensure that damaged parts are replaced by Group 6, observe all warnings which display on the console screen and observe the following guidelines:

- Do not attempt to remove or modify any components on the console or robot.
- Do not expose the controller or robot to high heat, liquid or dust. Do not operate the console or robot near water.
- If either the robot or controller are behaving abnormally such as producing unusual sounds, smells or heat, immediately turn both off at their power switches.
- Keep in a well-ventilated area.
- Do not place metallic items near or on the robot or console as they can interfere with the component operation.
- Clean the surface of the robot and console with a dry cloth.
- Do not place the controller or robot on rough, unstable or unlevel surfaces.
- Do not place objects on the controller or robot.

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- Once finished with device, turn power off and store in a well-ventilated area where it does not have potential to cause people to trip over the device or cause injury.

NOTE: The robots use rechargeable Lithium Iron Phosphate (LiFePO₄) batteries as a power source. These batteries are capable of discharging a peak current of 168 A which has the potential to vaporize thin conductors and cause projectile injuries or burns. The LiFePO₄ batteries therefore must never be left unattended when charging. For more information, visit https://www.skyrc.com/e430_Charger.

Health

- If at any time you feel sick or dizzy while operating the robot, stop using the device immediately.
- Take care when carrying the controller or robot, being careful not to drop either, as, when dropped, these devices have the potential to cause injury or be damaged.
- Avoid prolonged use of the devices.
- Do not touch or lift the controller or robot if heat is radiating from either.

Product Specifications

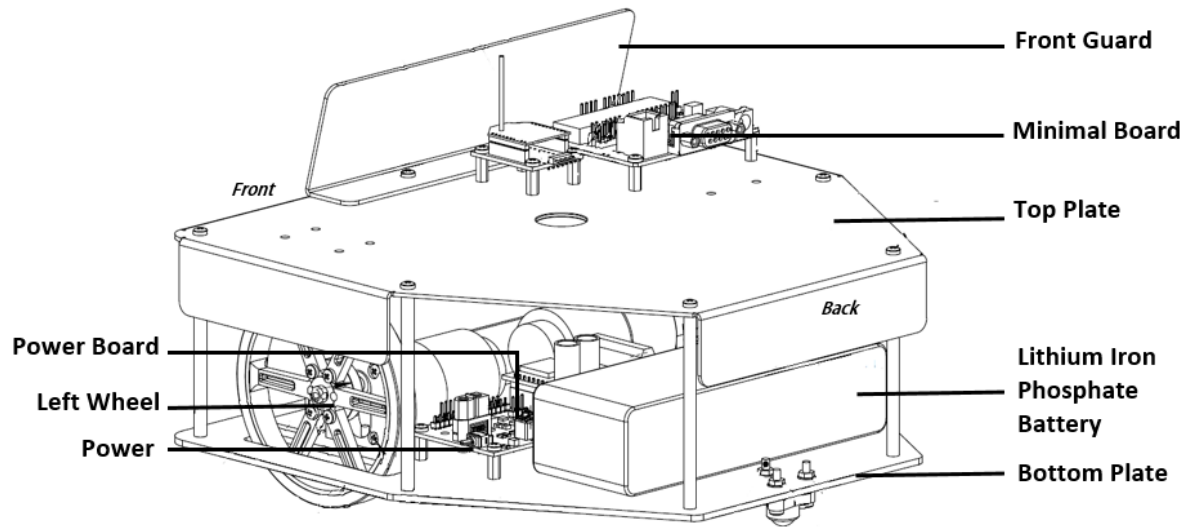
Console Power Requirements	
Console Electrical current consumption (approx..)	
Console Dimensions and Mass (approx..)	
Robot Power Requirements	
Robot Electrical current consumption (approx..)	
Robot Dimensions and Mass (approx..)	
Signal Format	Radio (XBee)
Operating temperature	5°C - 35°C

PRODUCT OVERVIEW

The Console



The Mobile Robot Unit



GETTING STARTED

After reading and following the safety precautions outlined in Chapter 1, you are now ready to play!

Turning on the Console

To turn on the console, push the power switch in the center of the console forwards (away from you).

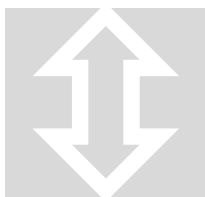
Connecting to the Robot

To turn the robot on, push the power switch located on the power board forwards (away from you). The console should automatically connect to the robot.

If the robot does not respond to the console commands, turn both the controller and the robot off for 5 minutes and turn them on again.

Navigating the Console Menus

When the console is powered on, a welcome message will be displayed on the screen before progressing to a menu. This menu consists of different user modes to choose between.

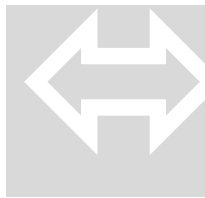


Moving through Menu Levels

With the right joystick, you are able to scroll up and down through the menu items. Pulling the right joystick downwards (towards you) will show the next menu item. Pushing the right joystick upwards (away from you) will show the previous menu item.

The initial menu consists of the following options:

- The first option, **configuration**, allows you to set the maximum speed the mobile robot unit can travel at.
- The second option, **manual mode**, allows you to drive the robot using the two joysticks on the console. The left joystick controls the speed the robot is travelling at while the right joystick controls the direction of the robot.
- The third option, **assist mode**, allows you to drive the robot with the two joysticks on the console until a barrel is detected. When a barrel is detected, the mobile robot unit will automatically enter into a circular path of motion around the barrel until the user presses down the pushbutton of the right joystick to exit out of the circular path. The user will then return to manual operation until another barrel is detected and so forth.



Entering into a Menu Item

With the right joystick, you are also able to scroll left and right. When you have reached the desired menu item, push the right joystick right to select the menu item or enter into its sub-menu. Pushing the right joystick left will show the previous menu.

Setting Maximum Speed

1. Using the right joystick, navigate to the **configuration** menu item on the initial menu.
2. To enter the **configuration** menu item, push the right joystick in the right direction. This will take you the configuration sub-menu.
3. Using the right joystick, navigate to the **set speed** menu item on the configuration sub-menu and push the right joystick in the right direction once again.
4. In the current submenu, you are able to set the maximum speed that the robot can travel at. The maximum speed able to be set is _____. The minimum speed able to be set is _____. Select the speed by pushing the right joystick upwards and downwards where there are blank character boxes indicated with underscores ('_').
 - Pushing the joystick upwards will increment the values from 0-9.
 - Pushing the joystick downwards will decrement the values.

There are three blank characters. When you are satisfied with number you have set, move on to the next blank character by pushing the joystick right. For example, to set a speed of 60 RPM, set the first value to '0', the second value to '6' and the last value to '0'. When you are satisfied with all three values you have set, press down the **right joystick pushbutton**. This will set the new maximum robot speed and return you to the previous menu.

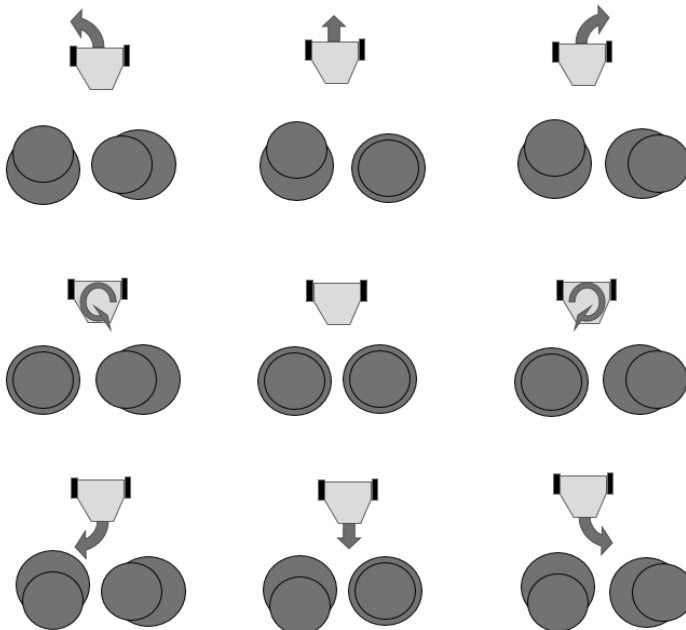
Operating the Robot in Manual Mode

To enter into this mode, navigate to the **manual mode** menu item in the opening menu and press down the right pushbutton. The menu items will disappear on the screen and you will now be able to drive the robot with the console.

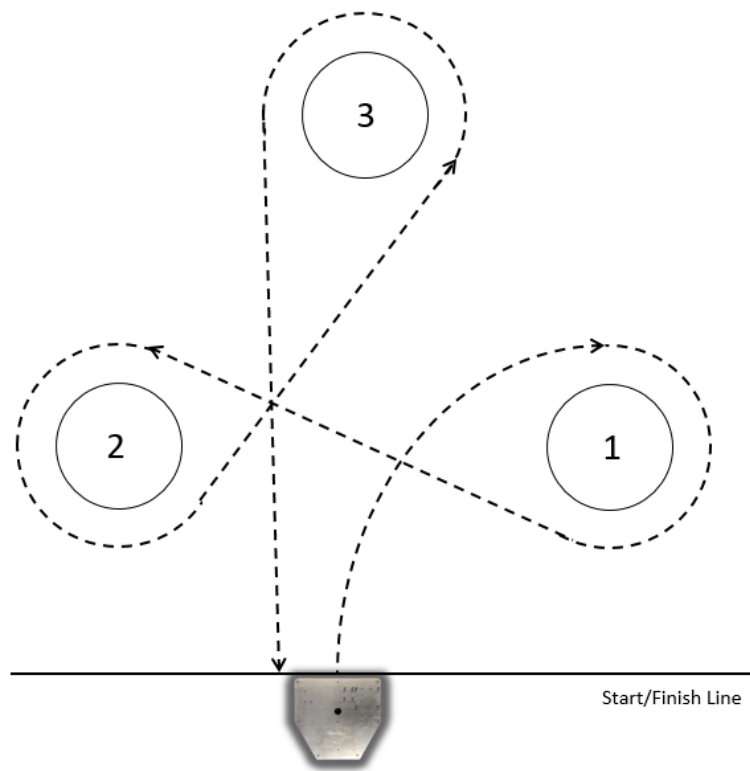
In manual mode, you are able to control the robot using the two joysticks on the console on the left and right side. The left joystick controls the speed and forwards/backwards motion of the robot while the right joystick controls the rotation of the robot.

- Pushing the left joystick forwards will result in the robot travelling forwards.
- Pushing the left joystick forwards while the right joystick is pushed to the right will result in the robot arcing forwards to the right.
- To rotate on the spot, keep the left joystick centred and push the right joystick left (anticlockwise rotation) or right (clockwise rotation).

See diagram of joystick positions and resultant robot motion below.



Below is an example barrel course*.

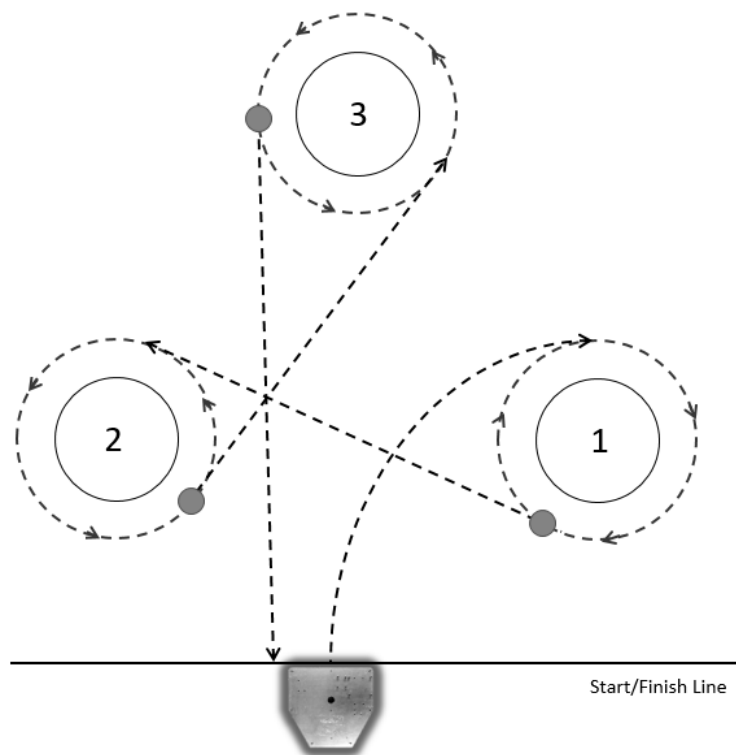


*Please note the number of barrels that appear in the diagram are purely for demonstrative purposes. The BarrelBeast system has been designed to be capable of racing around courses of different barrel quantities.

Operating the Robot in Assist Mode

To enter into this mode, navigate to the **assist mode** menu item in the opening menu and press down the right pushbutton. The menu items will disappear on the screen and you will now be able to drive the robot with the console.

In assist mode, sensors located on the robot are used to detect if the mobile robot unit is in close-range of the barrels. The sensors will detect which side that the barrel appears on - as soon as the barrel detected, the robot will automatically enter into a circular path around the barrel maintaining an 8cm distance between detected barrel edge and mobile robot. To get out of this loop and regain manual control, press down the **right joystick pushbutton**. See diagram below*.



In this example, there are 3 barrels in the race course. The user has pressed down the pushbutton at points represented by grey circles on the circular paths around the barrels to regain control and travel linearly to the next barrel.

*Please note the number of barrels that appear in the diagram are purely for demonstrative purposes. The BarrelBeast system has been designed to be capable of racing around courses of different barrel quantities.

Switching Between Modes

When the controller is initially turned on, you are able to choose between modes, **manual** and **assist**, by selecting either option in the initial configuration menu.

To **switch modes** whilst you are driving the robot, press down on the **button below the right joystick** on the console.

- When you are driving the robot in **manual mode**, clicking this button will switch the control to **assist mode**.
- When you are driving the robot in **assist mode**, clicking this button will switch the control to **manual mode**.



Regaining Console Menu Control

When you have finished racing or testing the robot in manual or assist mode, press down on the **button below the left joystick** on the console. This is used to ensure the motors are powered off and will allow you to regain control of the console screen so you can once again scroll between menus.

- Please note, when operating the robot normally please only select this button once the joysticks are in their central positions. This button, however, can also be used as an **emergency stop**.

If you sense the robot may be harmed or may be harmful to others while it is mobile, please press this button to stop its motion.



Finishing the Race

Once you are done racing or testing out your robot, remember to turn both the console and robot off. When it is safe to turn the robot off, push the power switch located on the power board in a direction towards the back of the robot. To turn off the console, push the power switch in the center of the console towards the back of the console (towards you).

Charging the Robot

For instructions and important information regarding charging the robot's rechargeable Lithium Iron Phosphate (LiFePO₄) battery with the provided SkyRC e430 LiFe Battery Charger, please refer to https://www.skyrc.com/e430_Charger.

Further Information

Regulations

Regulatory Information:

- For indoor use only
- Not intended for use in machinery, medical or industrial applications
- Any changes or modifications not expressly approved by Group 6 could void the user's authority to operate this device
- No serviceable parts included
- This device is rated as a commercial product for operation at 5°C - 35°C
- Group 6 is not responsible for any harm that may come to the user during barrel racing or testing of the product

Customer Support

For answers to common questions, troubleshooting steps and BarrelBeast support contact information, visit <https://mtrx3700.galetora.com/>.