Control System Startup Guide

Control System Startup Guide

This guide will show you how to set-up and configure your robot. The examples here assume you have built a simple robot with two drive motors.

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1 Required Materials

Control Hub REV-31-1595	Slim Battery REV-31-1302	Amazon Fire Tablet
USB Game Pad REV-31-1159	Micro USB Hub REV-31-1426	

Optional Additional Materials needed to [Connect the Expansion Hub](#):
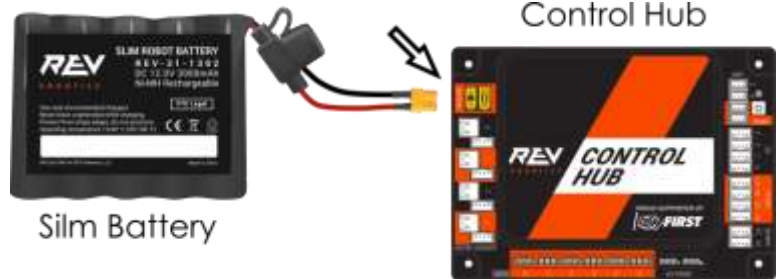
- Expansion Hub (REV-31-1153)
- XT30 Extension Cable
- Communication Cable (RS-485)

2 Driver Station and Control Hub Paring

When you first receive your kit, you will have to pair (link) your Driver Station (Amazon Fire Table) to your Control Hub. This procedure only needs to be performed once for each set of hardware. If you exchange (replace) your tablet or Control Hub, this procedure will need to be repeated. See Section 2, ELECTRICAL COMPONENTS, of the Building Guide, on the FIRST Global website for more information.

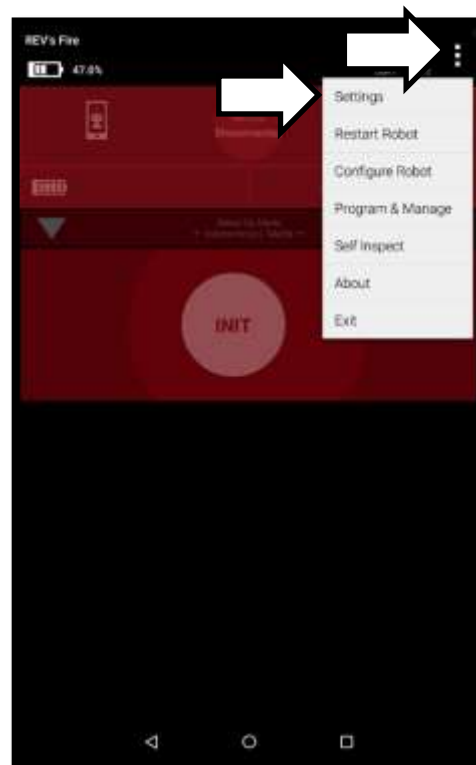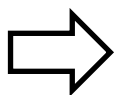| **Pairing the Driver Staion with the Control Hub** |
|---|
| 1. Power on the Control Hub, by plugging the 12V Slim Battery into the orange XT30 connector labeled "BATTERY" on the Control Hub. |
| 2. The Control Hub is ready to pair with the Kindle Fire when the LED turns green. Note: the light blinks blue every ~5 seconds to indicate that the control hub is healthy. |
| 3. Power on the Kindle Fire by holding down the top right button. |

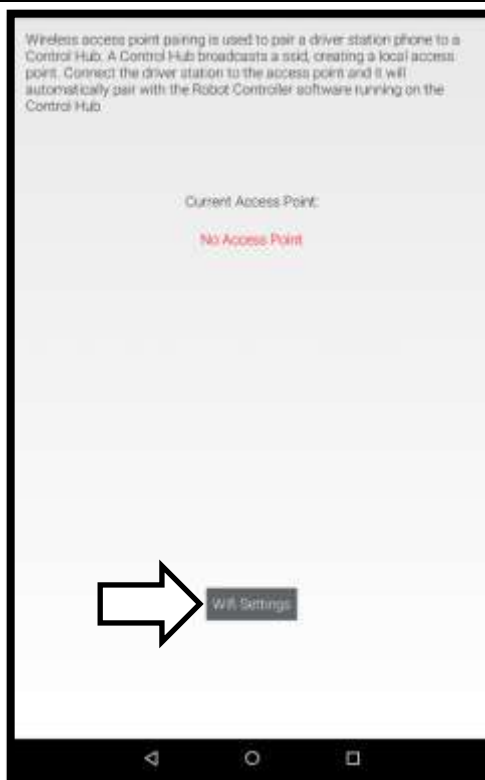4. Open the FG Driver Station application from the Kindle HOME Screen.

5. On the Driver Station page, open the menu from the top right corner, then select "Settings".
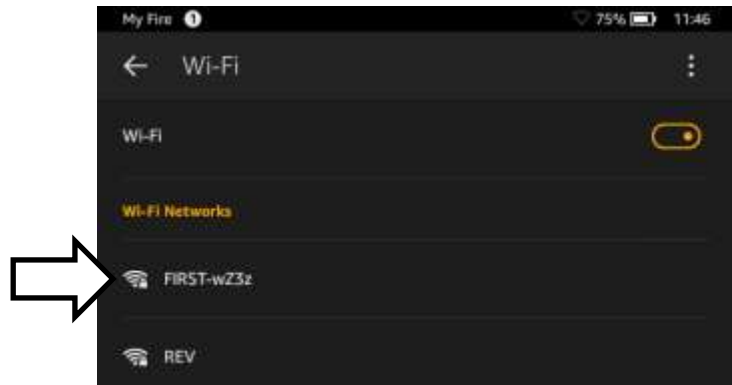
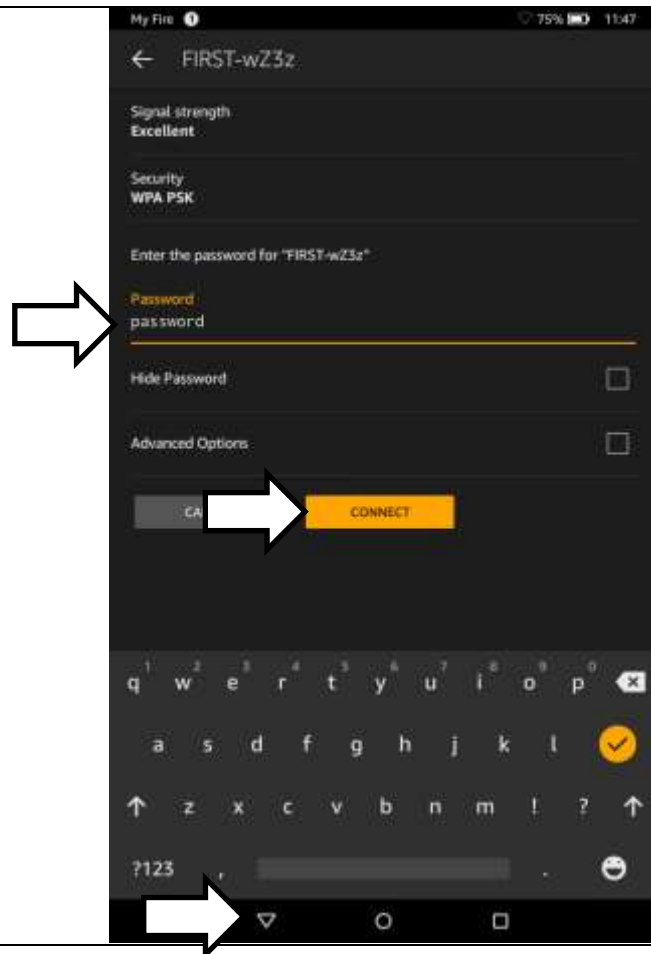6. Select, "Pair with Robot Controller".

7. Select "Wifi Settings"

8. Select the name of the Wifi network that matches the name of the network printed on your control hub. This should start with "FIRST-".

9. Enter the password to the Wifi network in the password field. This defaults to "password". Press "CONNECT".
10. After pressing connect, press the back arrow at the bottom of the display until you return to the main driver station screen.

11. After a couple of seconds, the Driver Station page will indicate the network name, a ping time, and battery voltage.
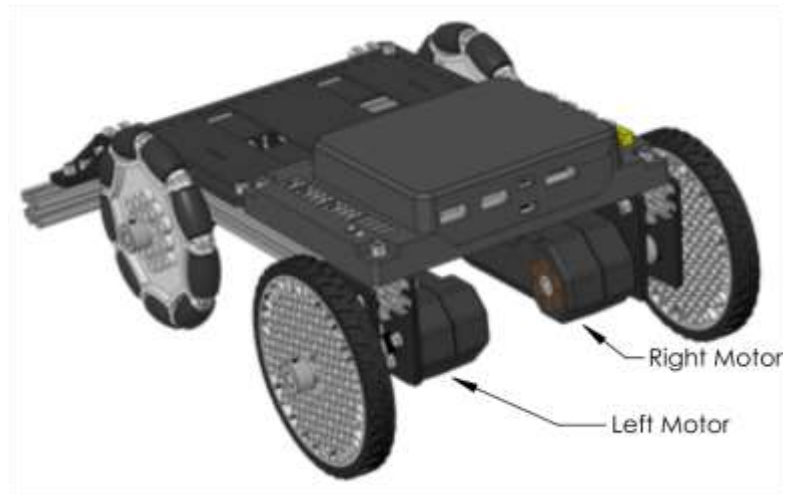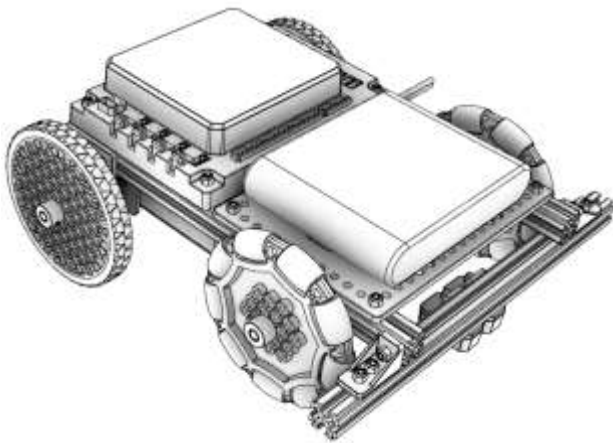

Your Driver Station is now paired with your Control Hub!

3 Configure Your Robot

When you build your robot, you will need to configure it before you can program it. This will allow you to give your sensors and actuators meaningful names that you can reference while programming.

For this example we will use the robot we built in the "Practice-Bot Build Walkthrough" video located on the FIRST Global website. This robot has two motors that we will now configure.
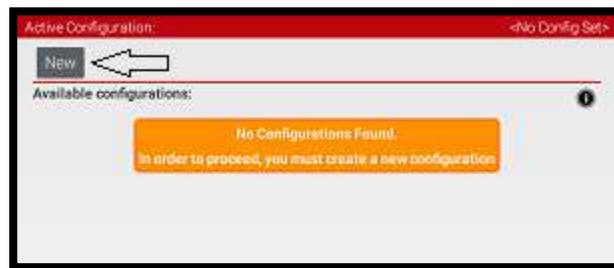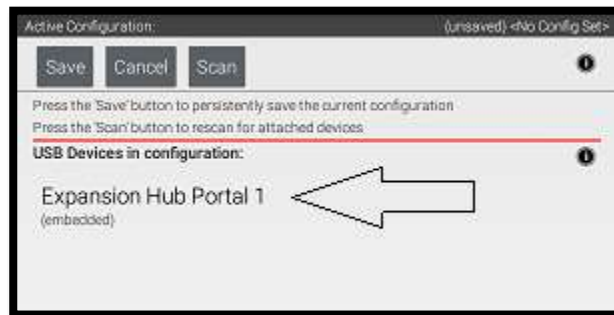

Right Motor

Left Motor

Configureing Your Robot for the First Time

1. Select the menu on the Driver Station page. Then select "Configure Robot".

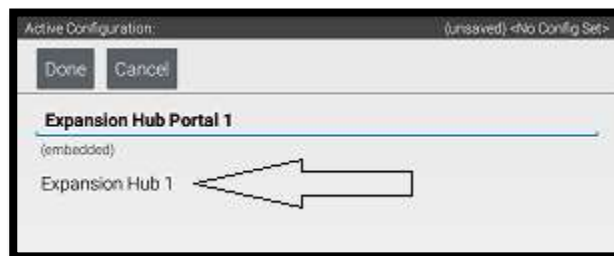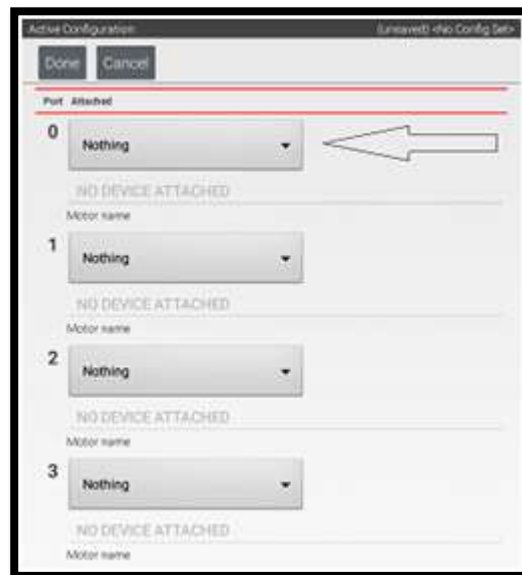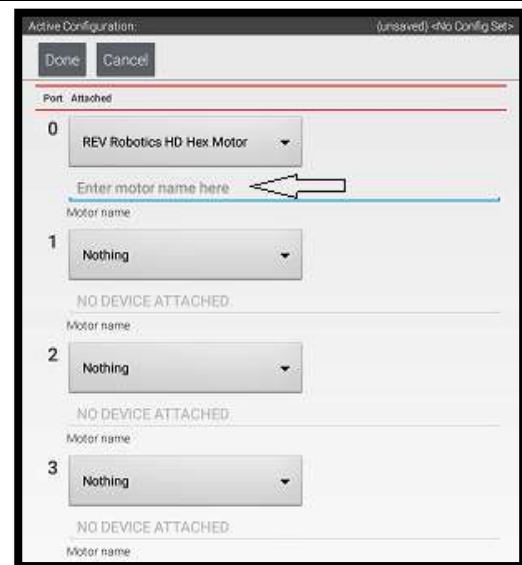|	
2. Select "New" in the top left hand corner.	
3. Select "Expansion Hub Portal 1".	
4. Select "Expansion Hub 1".	
5. Select "Motors".	

6. Select the Drop Down menu for "Port 0" then select "Rev Robotics Core Hex Motor".
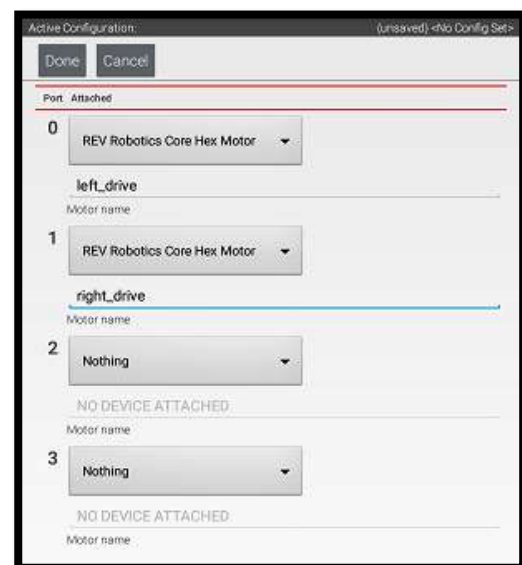
7. Press "Enter motor name here" and name the motor "left_drive".

   This is the name that you will use when you are programming your robot to control this motor. Always give things descriptive names so that you can remember what they do when you are programming.
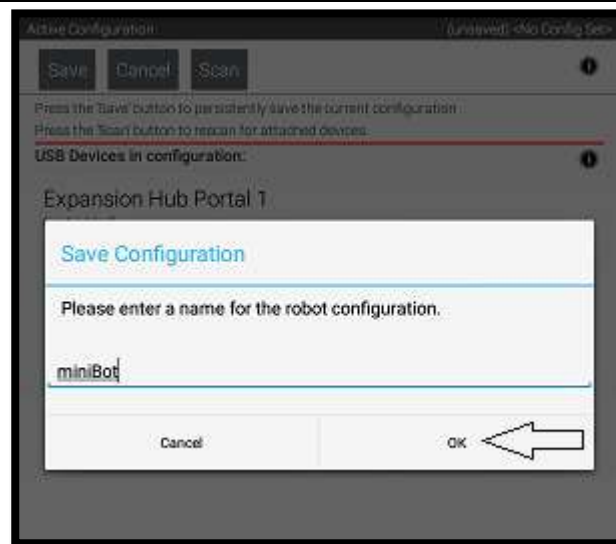
8. Repeat the process for "Port 1" and name the motor "right_drive".

9. Press the "Done" button (at the top left corner of the page) 3 times.

10. Press "Save".

11. Enter "miniBot" as your configuration name, then select "OK".

12. You now have an active configuration called "miniBot". Press the Android back button to return to the Driver Station page.

4 Program Your Robot

There are multiple ways to program your robot. This section will show you how to use the Blocks programming interface on the tablet to program a simple "Op Mode". An "Op Mode" is how you tell your robot to perform certain actions, given certain inputs.

For more information on other programming methods, see the FIRST Global website http://first.global

Getting Started Programming Your Robot
1. Select "Program & Manage" from the Driver Station Menu.

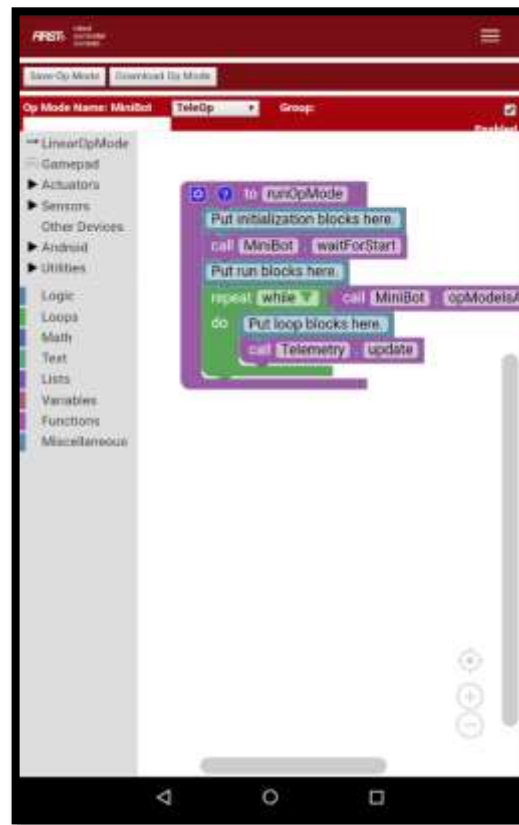2. Select the menu button in the top right. Then select "Blocks".

3. Select "Create New Op Mode".

4. Name the Op Mode "MiniBot" and select OK.

5. Your screen should look like the following.

6. Now watch the video from the FIRST Global site called "Software Tool Overview". This will show you how to program your Mini Bot so you can drive it using your game controller.

7. Your program should look like this when you are finished.
8. Now that you have completed programming, press the "Save Op Mode" button. Now press the "Exit" button at the top of the display.

Micro USB

9. Plug your game controller into the micro USB slot on the Amazon Fire Table.

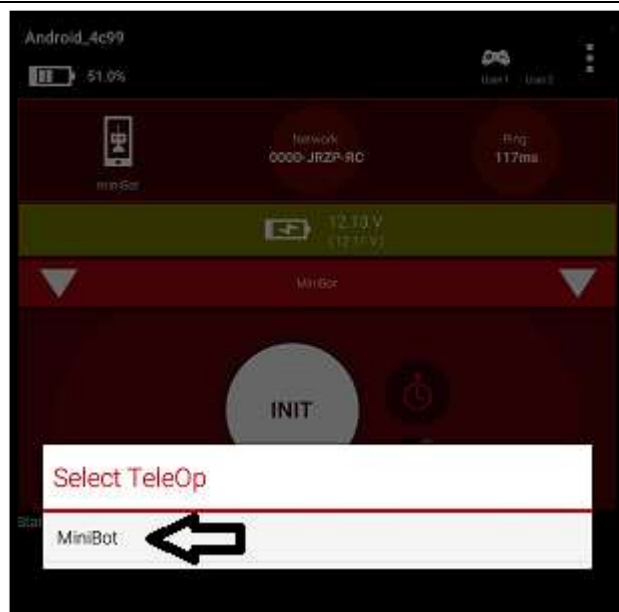10. On the game controller hold "START" and press "A" to pair the controller with the Driver Station.

11. A game controller icon will appear for "User 1" in the top right of the screen.

12. Select the "TeleOp" drop down menu.

13. Select the "MiniBot" Op Mode.

14. Select "INIT" to initialize your Op Mode.

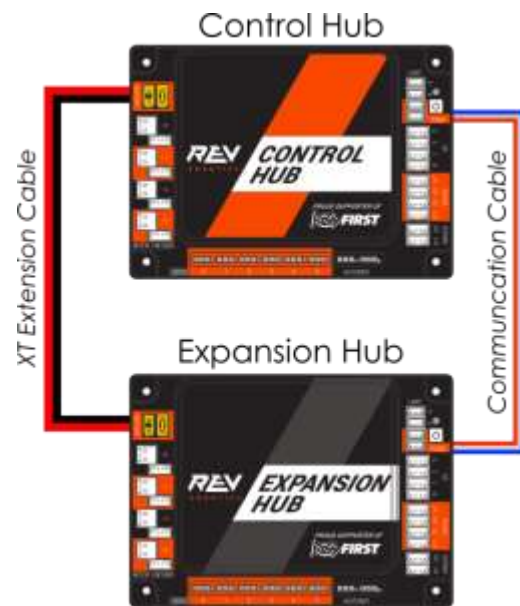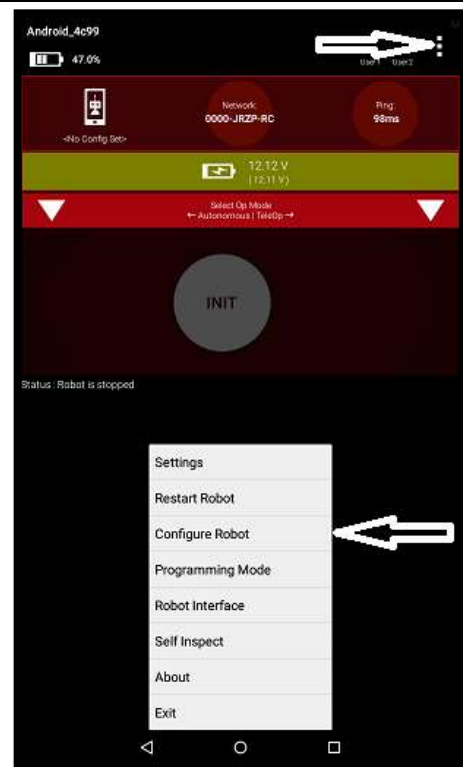|	
15. Select play to start your Op Mode.	
16. Now you can drive your Mini Bot using the left and right sticks on your game pad!	
17. Select Stop when you are done.	

5 Connect the Expansion Hub

If you want to use more than 4 motors or 6 servos, you will need to add the expansion hub to your robot. The Expansion Hub has almost all the same ports as the Control Hub but doesn't have any wireless capability. Every robot must use the Control Hub to pair with the driver station tablet, but not all robots will need to use an Expansion Hub.

Adding an Expansion Hub to your Robot

1. Use the battery extension cable to connect power between the Control Hub and the Expansion Hub.

2. Use the RS485 cable and a 3-pin JST PH connector, to connect the RS485 port on the Control Hub to the Expansion Hub.
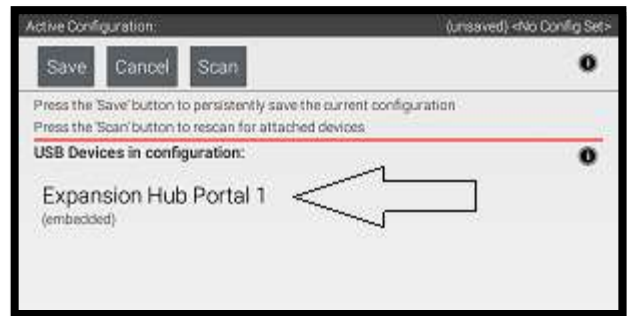
3. From the Driver Station choose "Configure Robot"

4. Select "New" in the top left hand corner.	
5. Select "Expansion Hub Portal 1"	
6. Now you have 2 Hubs to choose from. Configure and program as necessary. Please see the "Configure your robot" section of this document for an overview of configuration.	

6 Switching WiFi Channels

The Control Hub can utilize either the 2.4 GHz or 5 GHz WiFi band. By default the Control Hub is set to a channel on the 2.4 GHz band. REV Robotics advises that during competition teams utilize a 5 GHz channel for robot communication. The following steps will show how to switch the Control Hub to a 5 GHz channel.
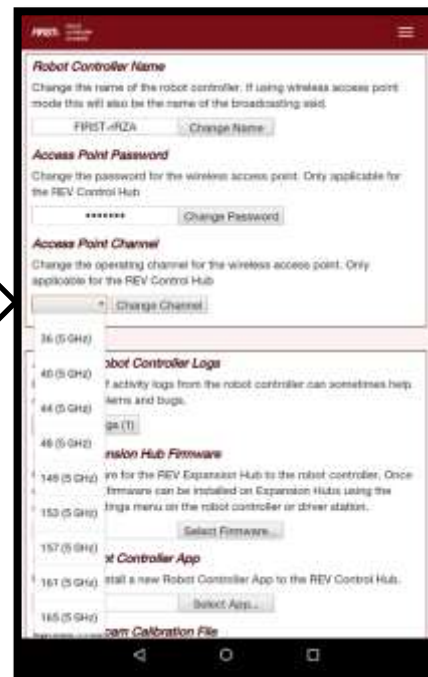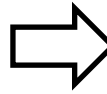
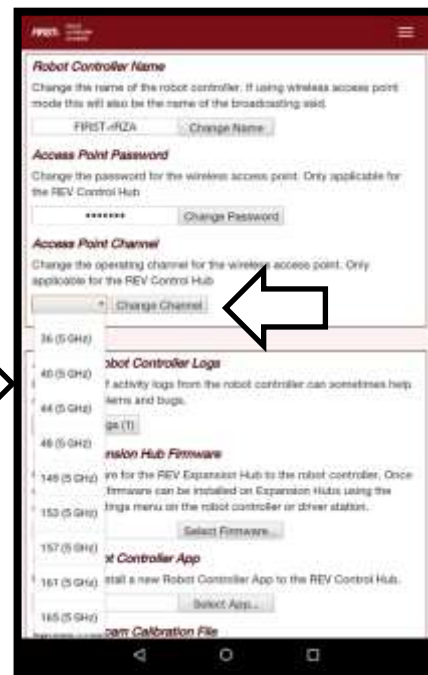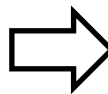| Changing WiFi Channel on your Robot |
|---|
| 1. Press the triple dots in the upper right. Then select "Program & Manage" from the Driver Station Menu. |
| 2. Select the menu button in the top right. Then select "Manage". |

3. Select the drop down menu under "Access Point Channel".

4. Select a 5 GHz channel noted in the () next to the channel number. Then select the "Change Channel" button next to the drop down.
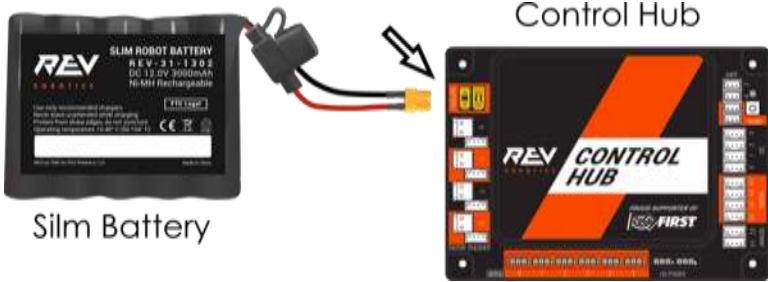

5. At the main screen, confirm the channel is changed under "Network".

7 Factory Reset

The Control Hub can reset to factory settings. This will replace the reset the password and SSID name while keeping the Robot Controller application installed on the Control Hub.

Factory Reset Procedure	
1. Press and hold the button on the front of the Control Hub.	
2. While pressing the button, power on the Control Hub.	Silm Battery Control Hub
3. Release button when Control Hub LED flashes PINK. When Control Hub flashes BLUE then GREEN it has completed the reset and is ready to connect.	

8 Additional Resources

1. [Building Guide](#), Section 2 ELECTRICAL COMPONENTS is useful for part definitions
2. [Instructional videos](#) are all useful. This document references the "Practice-Bot Build Walkthrough" and the "Software Tool Overview" videos.