

2017 FRC Steamworks Robot Start up Information

Connecting to Robot

Three Types of connection

- WiFi

- Not at a competition

- Tethered

- Not at a competition
- In pits or on Practice Field at a competition

- FMS

- On Competition Field
- Some Practice Fields at Competitions

Connecting Via WiFi



- Make sure the firewall is turned off
- Select the network icon in the system tray
- Make sure WiFi is on (Airplane mode is off)
- Look for the network that matches the number on the label on the radio (e.g. 302). This may take some time as the radio takes a bit to start broadcasting after the robot is turned on.
- Connect to that network (select it and then select connect)

Connecting Tethered

- Make sure the firewall is off
- Plug Ethernet cable into the radio or into the roboRio. For the roboRio, remove the Ethernet cable connecting the radio to the roboRio (remember to replace this cable when you are done). The other end of the the Ethernet cable goes into the laptop jack.

Connecting to FMS

Plug Driver Station laptop into the Ethernet cable at the field.

Note: Make sure WiFi is turned off and the Firewall is off to avoid some network issues.

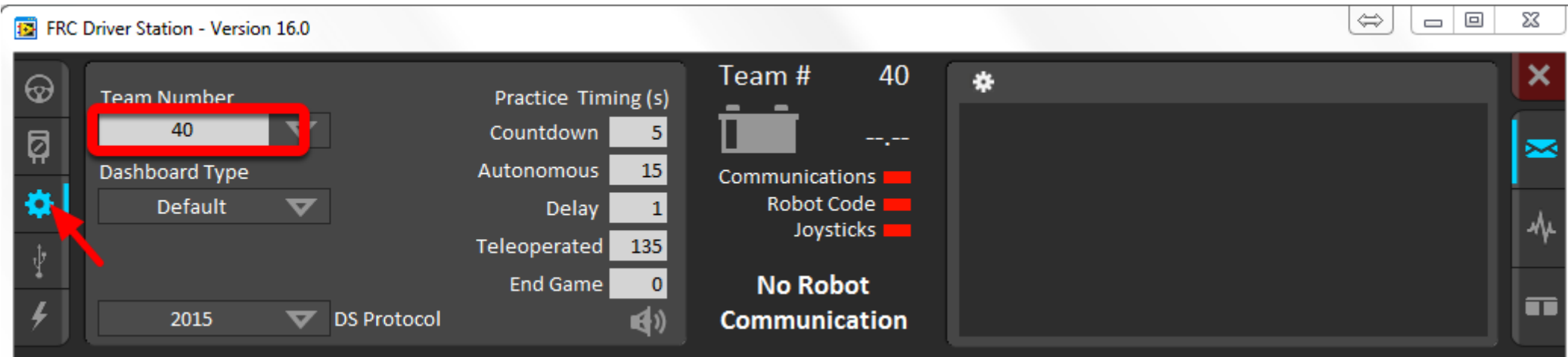
Starting the FRC Driver Station



- The FRC Driver Station can be launched by double-clicking the icon on the Desktop or by selecting Start->All Programs->FRC Driver Station.

Setting up the FRC Driver Station

- The DS must be set the team number to match the number on the radio in order to connect to your robot. In order to do this click the Setup tab then enter your team number in the team number box. Press return or click outside the box for the setting to take effect.



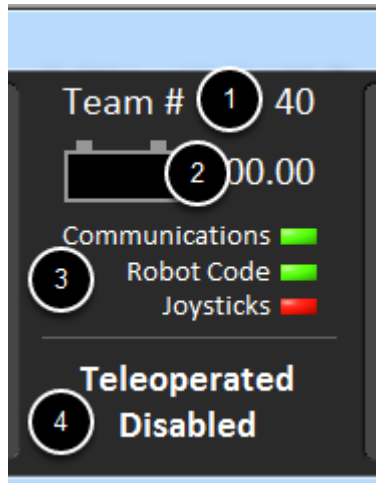
The **Status Pane** of the Driver Station is located in the center of the display and is always visible regardless of the tab selected. It displays a selection of critical information about the state of the DS and robot:

1)Team # - The Team number the DS is currently configured for. This should match your FRC team number, to change the number see the Setup Tab.

2)Battery Voltage - If the DS is connected and communicating with the roboRIO this displays current battery voltage as a number and with a small chart of voltage over time in the battery icon. The background of the numeric indicator will turn red when the roboRIO brownout is triggered. See RoboRIO Brownout and Understanding Current Draw for more information.

3)Major Status Indicators - These three indicators display major status items for the DS. The "Communications" indicates whether the DS is currently communicating with the FRC Network Communications Task on the roboRIO (this year it is split in half for the TCP and UDO communication). The "Robot Code" indicator shows whether the team Robot Code is currently running (determined by whether or not the Driver Station Task in the robot code is updating the battery voltage), The "Joysticks" indicator shows if at least one joystick is plugged in and recognized by the DS.

4)Status String - The Status String provides an overall status message indicating the state of the robot, some examples are "No Robot Communication", "No Robot Code", "Emergency Stopped", and "Teleoperated Enabled". When the roboRIO brownout is triggered this will display "Voltage Brownout".



The **Operations Tab** is used to control the mode of the robot and provide additional key status indicators while the robot is running.

1)Robot Mode - This section controls the Robot Mode. Practice Mode causes the robot to cycle through the same transitions as an FRC match after the Enable button is pressed (timing for practice mode can be found on the setup tab).

2)Enable/Disable - These controls enable and disable the robot. You can also use the key combination []\ (the 3 keys above the enter key on most keyboards) to enable the robot and the Enter key to Disable the robot. The Spacebar will Emergency Stop the Robot

3)Elapsed Time - Indicates the amount of time the robot has been enabled

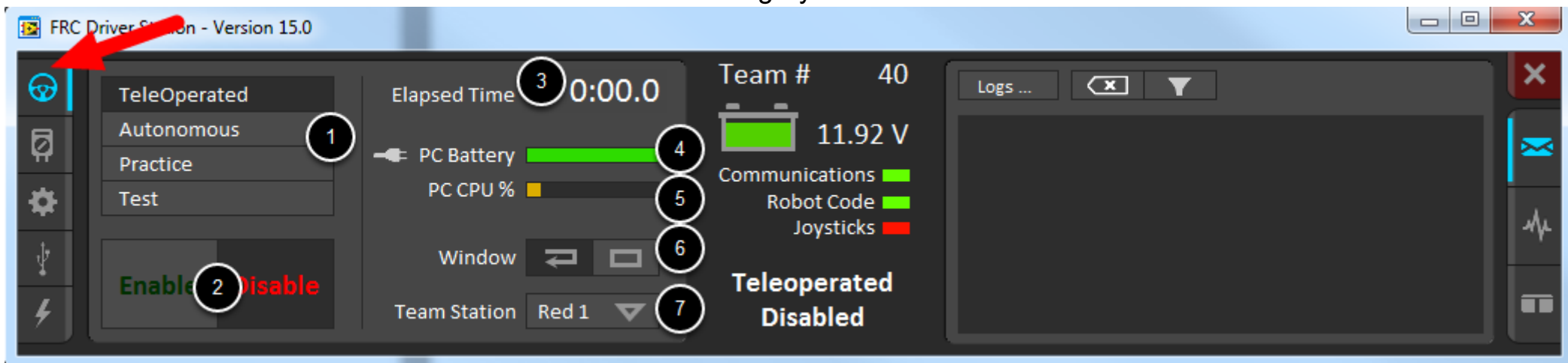
4)PC Battery - Indicates current state of DS PC battery and whether the PC is plugged in

5)PC CPU% - Indicates the CPU Utilization of the DS PC

6)Window Mode - When not on the Driver account on the Classmate allows the user to toggle between floating (arrow) and docked (rectangle)

7)Team Station - When not connected to FMS, sets the team station to transmit to the robot.

•Note: When connected to the Field Management System the controls in sections 1, and 2 will be replaced by the words FMS Connected and the control in Section 7 will be greyed out.



The **Diagnostics Tab** contains additional status indicators that teams can use to diagnose issues with their robot. This is mainly used for inspection and debugging:

1)DS Version - Indicates the Driver Station Version number

2)roboRIO Image Version - String indicating the version of the roboRIO Image

3)WPILib Version - String indicating the version of WPILib in use

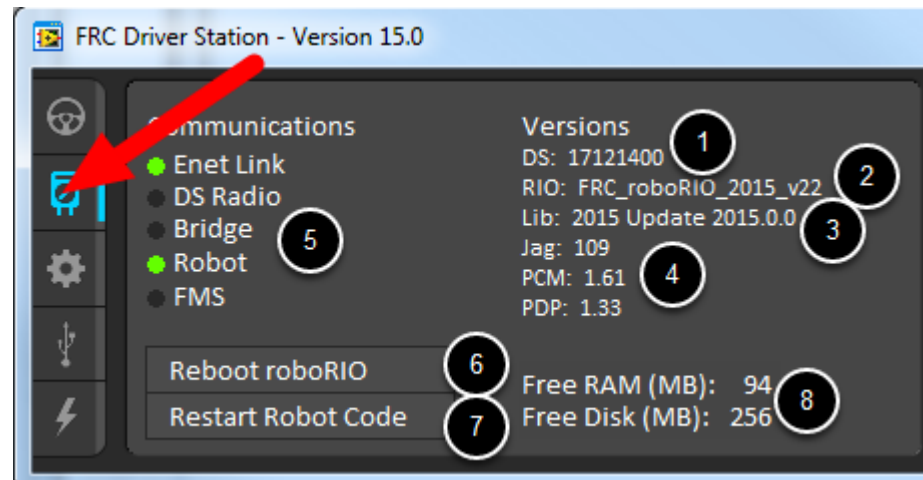
4)CAN Device Versions - String indicating the firmware version of devices connected to the CAN bus

5)Connection Indicators - Indicate connection status to various components. "Enet Link" indicates the computer has something connected to the ethernet port. "DS Radio" is a legacy indicator used to indicate the ping status to an external radio on the DS side at 10.XX.YY.4. "Bridge" indicates the ping status to the robot wireless bridge at 10.XX.YY.1. "Robot" indicates the ping status to the roboRIO using mDNS (with a fallback of a static 10.TE.AM.2 address). "FMS" indicates if the DS is receiving packets from FMS (this is NOT a ping indicator).

6)Reboot roboRIO - This button attempts to perform a remote reboot of the roboRIO (after clicking through a confirmation dialog)

7)Restart Robot Code - This button attempts to restart the code running on the robot (but not restart the OS)

8)Memory Stats - This section shows stats about the roboRIO memory



The **Setup Tab** contains a number of buttons teams can use to control the operation of the Driver Station:

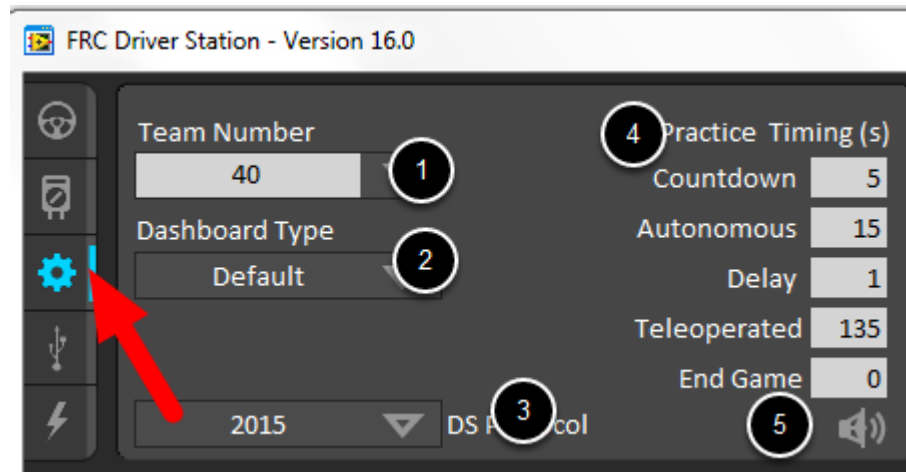
1)Team Number - Should contain your FRC Team Number. This controls the mDNS name that the DS expects the robot to be at. New: Shift clicking on the dropdown arrow will show all roboRIO names detected on the network for troubleshooting purposes.

2)Dashboard Type - Controls what Dashboard is launched by the Driver Station. Select C++,

3)DS Protocol – Use the default 2015 DS Protocol.

4)Practice Mode Timing - These boxes control the timing of each portion of the **practice mode** sequence. When the robot is enabled in practice mode the DS automatically proceeds through the modes indicated from top left down to bottom left then up to top right and down.

5)Audio Control - This button controls whether audio tones are sounded when the **Practice Mode** is used .



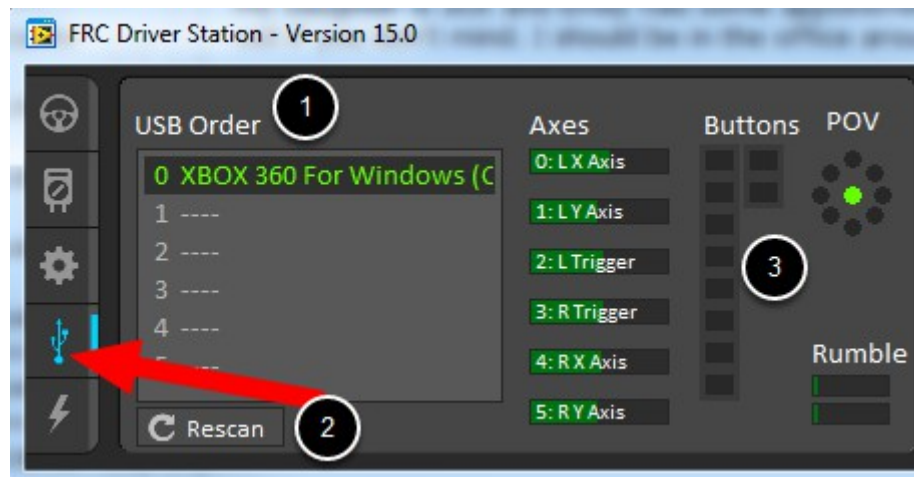
The **USB Devices tab** includes the information about the USB Devices connected to the DS

1)USB Setup List - This contains a list of all compatible USB devices connected to the DS. Pressing a button on a device will highlight the name in green and put 2 *s before the device name

2)Rescan - This button will force a Rescan of the USB devices. While the robot is disabled, the DS will automatically scan for new devices and add them to the list. To force a complete re-scan or to re-scan while the robot is Enabled (such as when connected to FMS during a match) press F1 or use this button.

3)Device indicators - These indicators show the current status of the Axes, buttons and POV of the joystick.

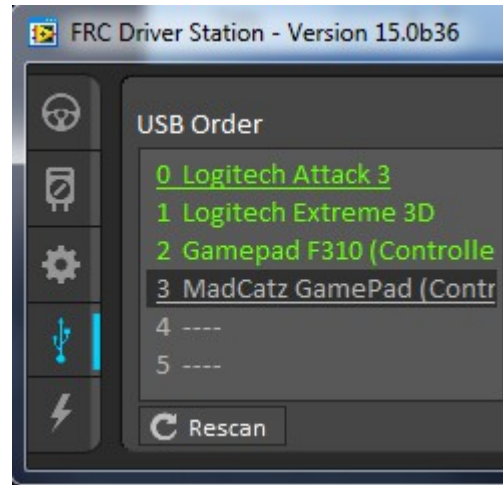
4)Rumble - For XInput devices (such as X-Box controllers) the Rumble control will appear. This can be used to test the rumble functionality of the device. The top bar is "Right Rumble" and the bottom bar is "Left Rumble". Clicking and holding anywhere along the bar will activate the rumble proportionally (left is no rumble = 0, right is full rumble = 1). This is a control only and will not indicate the Rumble value set in robot code.



Re-Arranging and Locking Devices

The Driver Station has the capability of "locking" a USB device into a specific slot. This is done automatically if the device is dragged to a new position and can also be triggered by double clicking on the device. "Locked" devices will show up with an underline under the device. A locked device will reserve it's slot even when the device is not connected to the computer (shown as grayed out and underlined). Devices can be unlocked (and unconnected devices removed) by double clicking on the entry.

Note: If you have two or more of the same device, they should maintain their position as long as all devices remain plugged into the computer in the same ports they were locked in. If you switch the ports of two identical devices the lock should follow the port, not the device. If you re-arrange the ports (take one device and plug it into a new port instead of swapping) the behavior is not determinate (the devices may swap slots). If you unplug one or more of the set of devices, the positions of the others may move, they should return to the proper locked slots when all devices are reconnected



Re-Arranging and Locking Devices

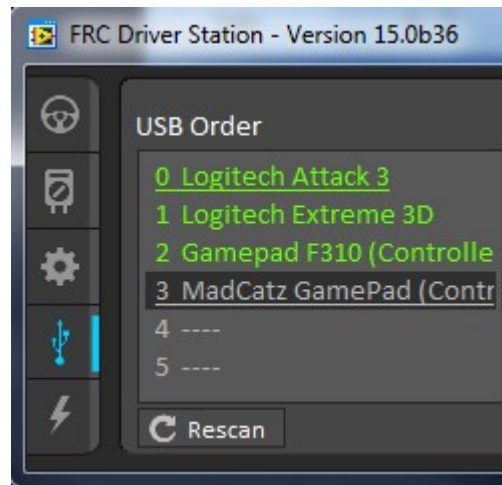
Example: The image shows 4 devices:

- A Locked "Logitech Attack 3" joystick. This device will stay in this position unless dragged somewhere else or unlocked
- An unlocked "Logitech Extreme 3D" joystick
- An unlocked "Gamepad F310 (Controller)" which is a Logitech F310 gamepad
- A Locked, but disconnected "MadCatz GamePad (Controller)" which is a MadCatz Xbox 360 Controller

In this example, unplugging the Logitech Extreme 3D joystick will result in the F310 Gamepad moving up to slot 1. Plugging in the MadCatz Gamepad (even if the devices in Slots 1 and 2 are removed and those slots are empty) will result in it occupying Slot 3.

Joystick Setup Best Practice

Note: When using the Re-Arranging and Locking feature described above, teams should take care to make sure devices behave as they expect when the DS is restarted, and when the DS computer is rebooted with the devices connected, after initial setup. XInput devices such as Xbox controller may enumerate differently when they are connected 1-at-a-time versus all at once.



Driver Station Keys

The following keys can be used to control Driver Station operation:

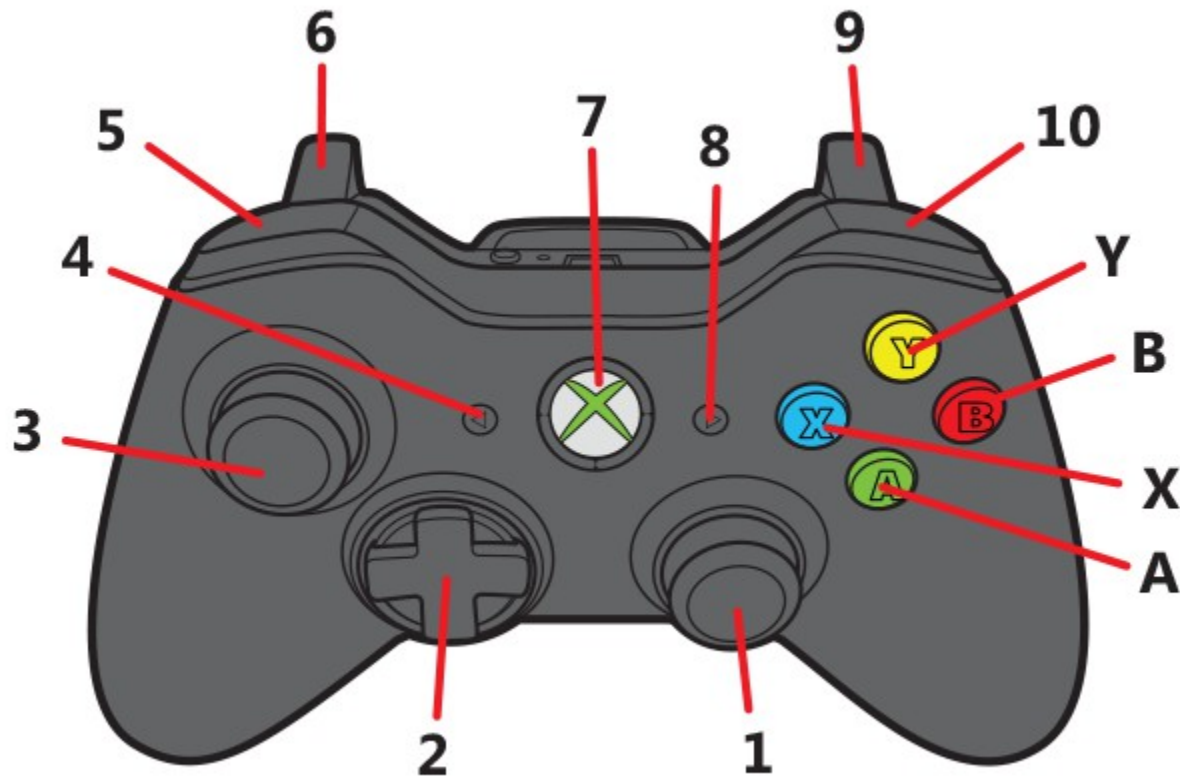
F1 - Force a Joystick refresh.

'[' + ']' + '\ - Enable the robot (the 3 keys above Enter on most keyboards)

Enter - Disable the Robot

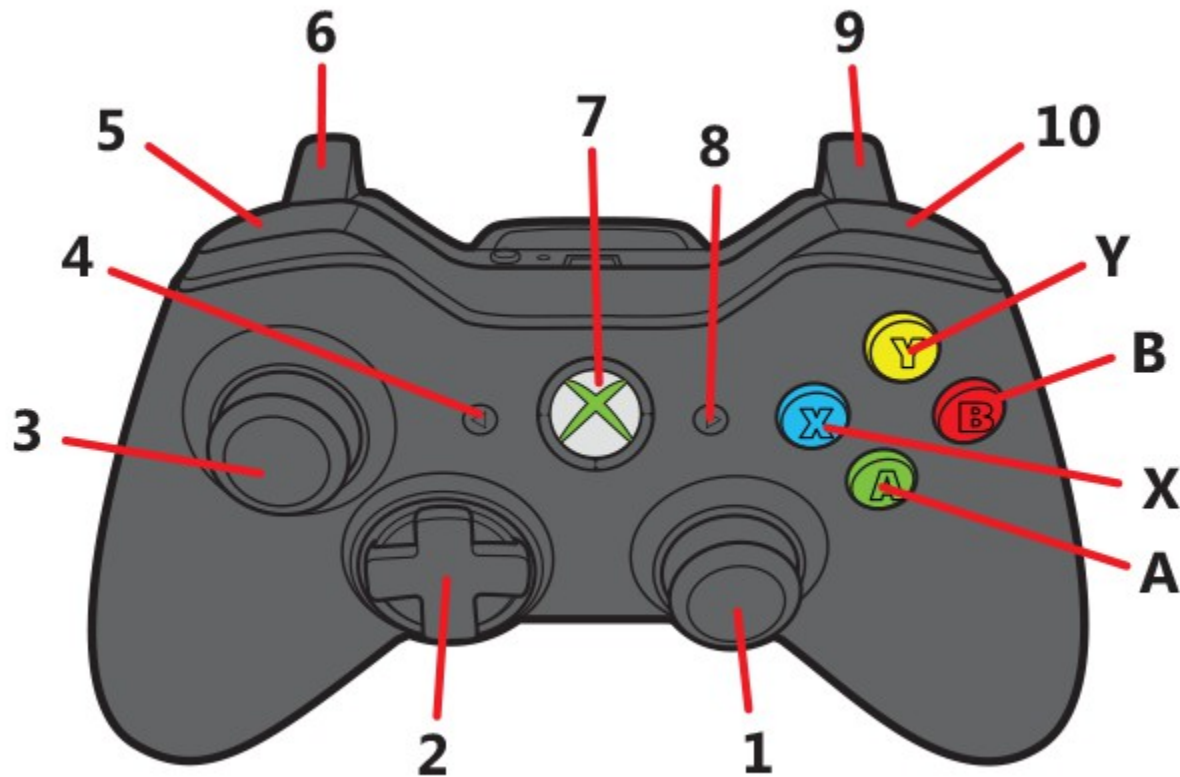
Space - Emergency Stop the robot. After an emergency stop is triggered the roboRIO will need to be rebooted before the robot can be enabled again. Note: This will E-Stop the robot regardless of if the Driver Station window has focus or not

Driver Controls (USB 0)



- (3) Left Joystick: Throttle forward/backward
- (1) Right Joystick: Turn Left/Right

Co-Pilot Controls (USB 1)



- A button: Start climber
- B button: bottom flap
- X button: lower flap
- (10) Right Bumper: Shoot
- (6) Left Trigger: intake
- (5) Left Bumper: reverse intake
- (3) Left Joystick: increase/decrease up/down shoot speed

Auton Selection

- Auton modes are displayed on the Dashboard
 - If they are not, switch to default Dashboard and back to the C++ Dashboard
 - If they still are not displayed, select the properties and make sure the robot number matches the robot being used.
- Select the auton mode desired (descriptive names). Be careful to some modes are alliance color specific.

Robot Alignment for Auton

All Auton Modes:

- Turn robot on after the robot is in position (as close to the start of the match as possible because gyro drift will cause the robot to not drive straight. If there is too much of a delay before the match, go back and power off and then back on the robot).
- Unless specified evenly distribute balls in the 3 shooters

Drive past Baseline

- Back of robot against the alliance wall outside the airship (robot will drive straight past the baseline)

Hang Gear on Center Peg

- Back of robot against the alliance wall
- Align line on “cow catcher” with the tape

Shoot+Cross Baseline

- Put front corner of the robot in the corner touching the back wall at the point where it hits the boiler wall angled so the center and far shooters are aligned with the boiler.
- Fill the outside 2 shooters with balls (closest to the back wall blocks balls)

Pause+Drive to Boiler+Shoot+Cross Baseline

- Place robot with its side against the alliance wall, front towards the boiler.
- Front corner 36 inches from the corner between the alliance wall and boiler wall
- Keeping back corner against the alliance wall, move the front corner 3.5 inches from the alliance wall.