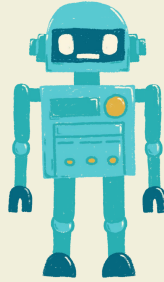


# How To Pass Inspection



Team 2486

# ▶ How To Pass Inspection





# Introduction

Your first inspection can be intimidating. Today, we're going to review how to get through, and pass, your first inspection.



**This  
Presentation  
gives an  
overview on  
inspection,  
however**



The best way to  
be prepared for  
any inspection is



to READ THE  
GAME MANUAL.



It should cover  
everything you  
need to know.



<input checked="" type="checkbox"/> ROBOT – Size	Rule #
ROBOT is presented at inspection with all MECHANISMS (including all COMPONENTS of each MECHANISM), configurations, and decorations used on the ROBOT.	I303
The ROBOT in all of its STARTING CONFIGURATIONS must fit within an 18" cube as it would start the MATCH.	R101
ROBOT may not expand or reach outside of a 20" x 42" horizontal boundary at any time during the MATCH (may be hardware or software limited).	R104

<input checked="" type="checkbox"/> ROBOT - SIGNS	Rule #
ROBOT has two ROBOT SIGNS that are located on opposite or adjacent sides of the ROBOT and visible to FIELD STAFF from at least 12 feet away and meet minimal size requirements.	R401
ROBOT SIGNS can indicate both ALLIANCE colors and meets markings requirements, unpowered.	R402
Team number is displayed on ROBOT SIGNS and meets number size requirements, unpowered.	R403

<input checked="" type="checkbox"/> ROBOT - Mechanical	Rule #
ROBOT does not contain any COMPONENTS that could harm people, damage the ARENA, or damage other ROBOTS. This includes sharp edges, protrusions, or hazards to the ARENA elements.	R201, R202
ROBOT does not contain devices that generate sound at a level sufficient to be a distraction.	R203.B
ROBOT does not contain materials that are hazardous (i.e., flammable materials/gasses, mercury switches, exposed untreated hazardous materials).	R203.D, E, G, H
ROBOT does not contain materials that would cause a delay of game if released (e.g., coffee beans).	R205
ROBOT does not contain any closed air or hydraulic devices (i.e., gas springs, compressors, vacuum generating devices). Air-filled pneumatic wheels are exempt from this rule.	R207
ROBOT does not contain prohibited COTS MECHANISMS (multi DoF, game task solving, ...).	R306, R307

<input checked="" type="checkbox"/> ROBOT - Electrical	Rule #
ROBOT does not contain more than 8 allowed motors and 12 allowed servos.	R503
Actuators are not modified except as explicitly allowed.	R504
Actuators are powered and controlled only from approved devices.	R505
No relays, electromagnets, electrical solenoid actuators, or related systems.	R506
Exactly 1 main battery pack of an approved type is on the ROBOT and it is properly connected to the main power switch, securely mounted.	R601, R606
Exactly 1 approved main power switch must control all power provided by the ROBOT battery pack and must be properly labeled. Secondary switches downstream are allowed if labeled "secondary."	R609
COTS USB batteries on the ROBOT remain isolated from the ROBOT power systems.	R602
Fuses must not be replaced with fuses of higher rating than allowed, no self-resetting fuses allowed.	R610, R615
If electronics are grounded to the ROBOT frame, the only approved methods are the REV or AndyMark resistive grounding strap and must be connected to a fully COTS XT30 COMPONENT.	R611
CUSTOM CIRCUITS cannot provide >5V regulated power and cannot alter critical power paths.	R613, R618
Voltage and current monitoring is okay, as long as the effect is inconsequential.	R615
Circuits are wired with the appropriately sized insulated copper wire (non-SIGNAL LEVEL wires).	R616
All non-SIGNAL LEVEL wiring is consistently color-coded with different colors used for the positive (red, yellow, white, brown, or black with white stripe) and negative/common (black, blue) wires.	
The ROBOT must be controlled via 1 ROBOT CONTROLLER (REV Control Hub via USB or RS485, or allowed Android device via USB). The ROBOT CONTROLLER must be visible for inspection.	R701, R704 R705, R711
Only allowed USB devices connected to USB (no LEDs, etc.), webcams can only be single-sensor.	R714, R715
Self-contained video recording devices, if used, must turn off or disable wireless communication.	R716



<input checked="" type="checkbox"/> FIELD – OPERATOR CONSOLE Rules	Rule #
The OPERATOR CONSOLE consists of only of one Android device ( <b>Circle</b> ): Motorola Moto G4 Play, Motorola Moto G5, Motorola G5 Plus, Motorola Moto E4, Motorola Moto E5, Motorola Moto E5 Play, or REV Driver Hub. If team is not from North America and has an alternate smartphone, circle here.	R901
The touch display screen of the DRIVER STATION device is accessible and visible to FIELD STAFF.	R902
No more than one (1) optional COTS USB external battery connected to the REV Driver Hub USB-C port, no more than one (1) USB hub connected to the smartphone Android Device.	R903
The OPERATOR CONSOLE consists of no more than two of the allowed gamepads.	R904
Does not contain more than 1 external USB hub.	R905 .A
Does not contain non-decorative electronics not otherwise required.	R905 .B
Does not exceed 3ft wide, 1ft deep and 2 ft tall (91.4cm by 30.5cm by 61.0 cm) excluding any items that are held or worn by the DRIVE TEAM during a MATCH.	R905 .C

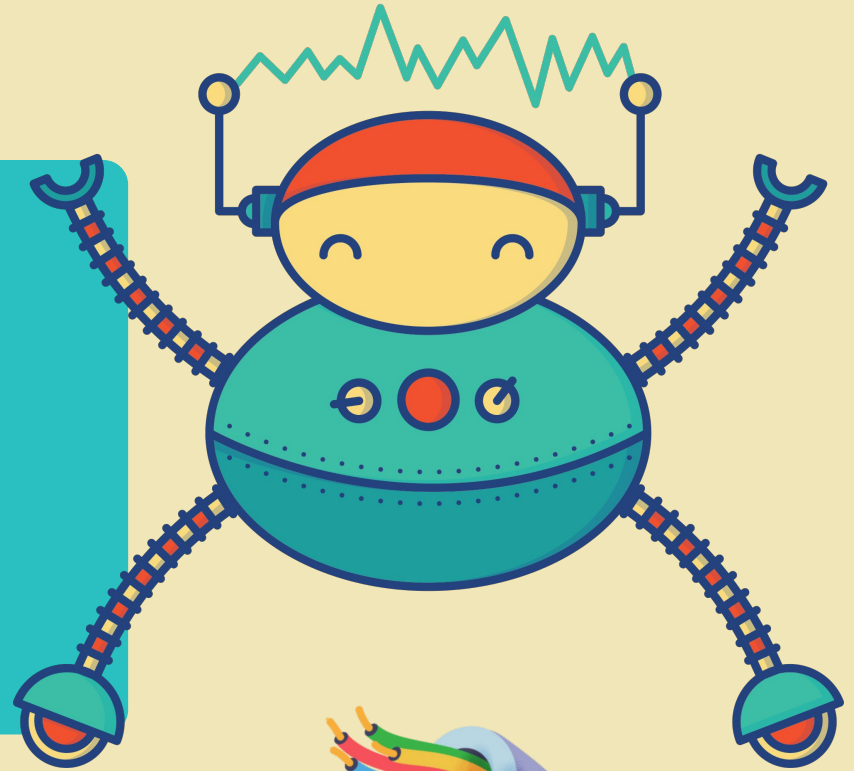
DS	RC	OPERATOR CONSOLE and ROBOT CONTROLLER Software Rules	Rule #
		Communication between the ROBOT CONTROLLER and DRIVER STATION is only through the official RC and DS applications over the ROBOT CONTROLLER Wi-Fi.	R706
		Android smartphone(s), REV Driver Hub, and REV Control Hub are named with the official team number followed by an optional -A (or other letter) and -DS or -RC as appropriate.	R707
		Android smartphones (if used) have airplane mode & Wi-Fi enabled, and Bluetooth disabled.	R718 .B, C
		All remembered Wi-Fi Direct Groups and Wi-Fi connections on Android devices (smartphones and REV Driver Hub) have been removed, only ROBOT CONTROLLER Wi-Fi remains.	R718 .D
N/A		ROBOT CONTROLLER Wi-Fi is set to the correct channel (if required by the competition).	R710
N/A		REV Control Hub (if used) has Wi-Fi turned on, Bluetooth is turned off, and the password is different than the factory default value of "password" as seen in ROBOT Self-Inspect	R718 .A, C

<input checked="" type="checkbox"/> FIELD – Power-On Operation	Rule #
ROBOT CONTROLLER device properly connects with the DRIVER STATION device.	N/A
ROBOT starts and stops when commanded by the DRIVER STATION device. Specifically, stop button must be able to immediately interrupt both AUTO and TELEOP OpModes.	G401, G406

<input checked="" type="checkbox"/> FIELD - General Notifications and Acknowledgements	Rule #
Team understands that they must promptly proceed to the ARENA for their scheduled MATCH time as indicated on the MATCH schedule. It is the team's responsibility to monitor for schedule changes.	G301
Team knows that they are responsible for attaching the correct ALLIANCE specific ROBOT SIGN on two sides of their ROBOT before they approach the ARENA.	G303
The team understands how to disable their ROBOT, if instructed to do so by a REFEREE.	G414
Team understands no programming is allowed in the ARENA, including MATCH queue areas.	R706
Team understands that troubleshooting or programming assistance from FIELD STAFF will be limited if team is not using at least the recommended minimum versions of SDK and device software.	R713



# Passing Hardware Inspection



## What is Hardware Inspection?



Hardware inspection is the inspection of all physical aspects of your robot. This encompasses:

- How your robot is built
- What your robot is built with
- How and with what your robot is wired

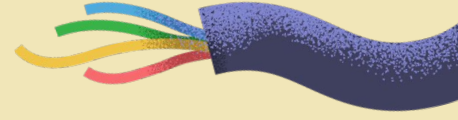




# What You'll Need for Hardware Inspection

- 
- 
- Robot
  - Driver controller
  - Battery
  - 2+ members

## General rules for Hardware Inspection

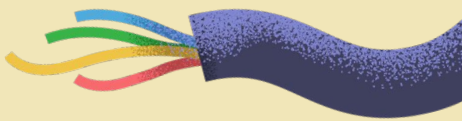


- Have your robot completely put together (don't come with 2+ separate pieces that will soon connect)
- Avoid Wire Spaghetti (dragging or lose wires)
- All tightened components should be tight.
- All wires should connect to electronics.
- Come with any questions you have, inspectors would love to answer them.



# Robot Sizing

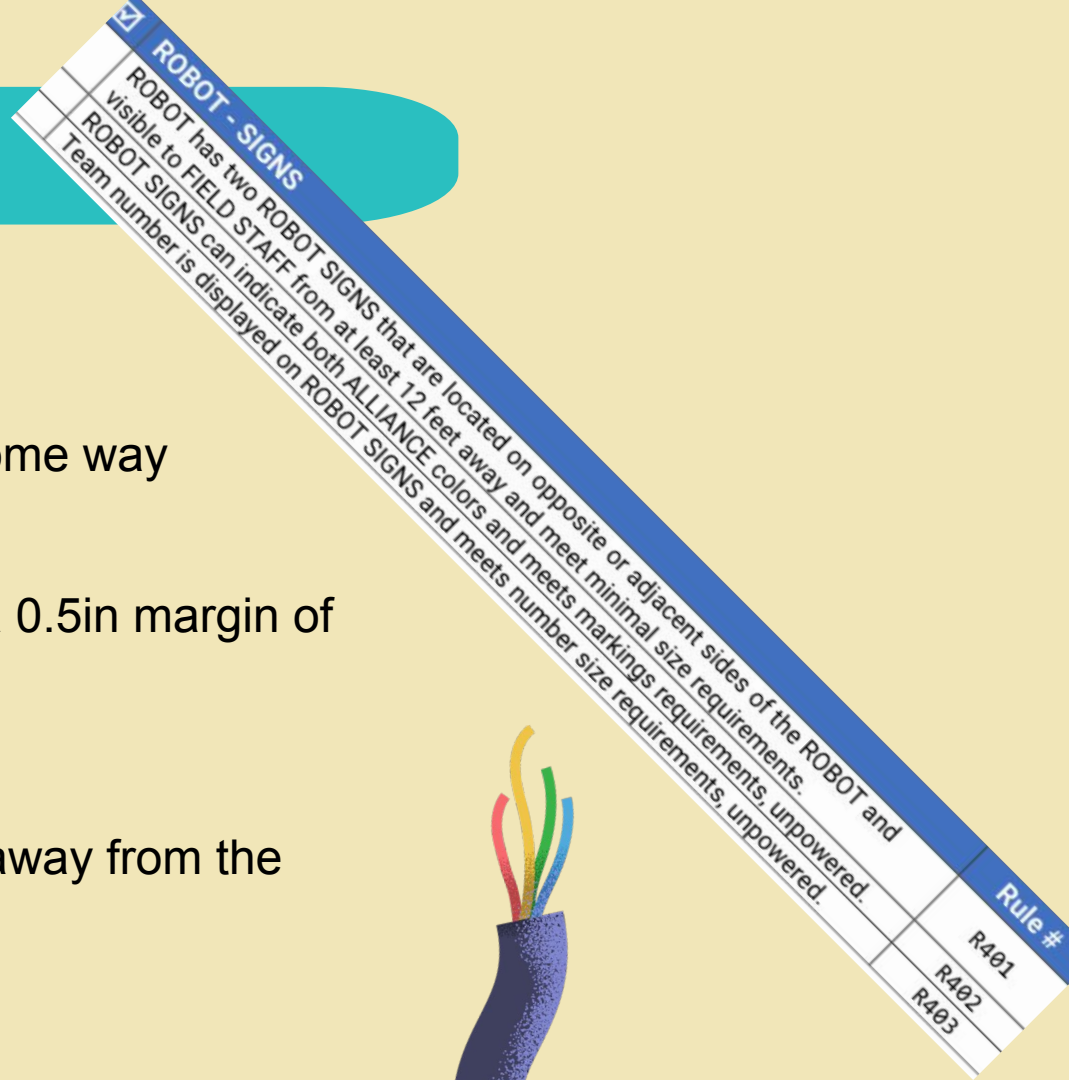
- Make Sure your Robot fits in an 18x18x18 cube.
- Show Inspectors your robot in its starting position.
- Robot May not expand outside a 20in by 42in horizontal boundary during a match
- Tell inspectors about any software limits.



ROBOT – Size		Rule #
<input checked="" type="checkbox"/>	ROBOT is presented at inspection with all MECHANISMS (including all COMPONENTS of each MECHANISM), configurations, and decorations used on the ROBOT.	I303
	The ROBOT in all of its STARTING CONFIGURATIONS must fit within an 18" cube as it would start the MATCH.	R101
	ROBOT may not expand or reach outside of a 20" x 42" horizontal boundary at any time during the MATCH (may be hardware or software limited).	R104

# SIGNS!!!

- Must include your team number
- Visible from 12ft away
- Must Mark your alliance color in some way
- Sign must be at least 2.5in tall
- Numbers must be 2.5 in tall (with a 0.5in margin of error)
- Signs must be at least 6.5 in long
- Numbers must be at least 0.25 in away from the edges of the sign
- Signs must be UNPOWERED



# Mechanical

- Always grind down corners that could be taken as sharp.
- Unless specified in the game manual, nothing should come out or apart in your robot.
- CHECK IF YOUR PARTS ARE LEGAL

ROBOT - Mechanical		Rule #
ROBOT does not contain any COMPONENTS that could harm people, damage the ARENA, or damage other ROBOTS. This includes sharp edges, protrusions, or hazards to the ARENA elements.		R201, R202
ROBOT does not contain materials that are hazardous (i.e., flammable materials/gasses, mercury).		R203, B
ROBOT does not contain untreated materials that would cause a delay of game if released (e.g., coffee beans).		R203, D, H
ROBOT does not contain materials that would cause a delay of game if released (e.g., coffee beans).		R205
ROBOT does not contain any closed air or hydraulic devices (e.g., gas springs, compressors, vacuum generating devices).		R207
ROBOT does not contain prohibited COTS MECHANISMS (multi DoF, game task solving...).		R306, R307

# Electrical

- Before you Modify a component, check if it's allowed.
- 8 motors, 12 servos
- Label your power switch
- CHECK IF ELECTRONICS ARE LEGAL

ROBOT - Electrical		Rule #
<input checked="" type="checkbox"/>	ROBOT does not contain more than 8 allowed motors and 12 allowed servos.	R503
	Actuators are not modified except as explicitly allowed.	R504
	No relays, electromagnets, electrical solenoid actuators, or related systems.	R505
	Exactly 1 main battery pack of an approved type is on the ROBOT and it is properly connected to the	R506
	main power switch, securely mounted.	R601, R606
	Exactly 1 approved main power switch must control all power provided by the ROBOT battery pack	R609
	and must be properly labeled. Secondary switches downstream are allowed if labeled "secondary."	R602
	COTS USB batteries on the ROBOT remain isolated from the ROBOT power systems.	R610, R615
	Fuses must not be replaced with fuses of higher rating than allowed, no self-resetting fuses allowed.	



- Color coded wires
- Properly Sized wires
- Copper wires
- 5V maximum
- Legally ground to your robot frame
- Only Use approved USB devices

	If electronics are grounded to the ROBOT frame, the only approved methods are the REV or AndyMark resistive grounding strap and must be connected to a fully COTS XT30 COMPONENT.	R611
	CUSTOM CIRCUITS cannot provide >5V regulated power and cannot alter critical power paths.	R613, R618
	Voltage and current monitoring is okay, as long as the effect is inconsequential.	R615
	Circuits are wired with the appropriately sized insulated copper wire (non-SIGNAL LEVEL wires).	R616
	All non-SIGNAL LEVEL wiring is consistently sized with white stripe) and negative/common (black, blue) wires.	R701, R702
	(red, yellow, white, brown, or black with white stripe) The ROBOT CONTROLLER (REV Control Hub via USB or RS485, or The ROBOT must be controlled via 1 ROBOT CONTROLLER must be visible for inspection.	
	The ROBOT must be controlled via 1 ROBOT CONTROLLER must be visible for inspection.	
	allowed Android device connected to USB (no LEDs, etc.), webcams can only be single-sensor.	
	Self-contained video recording devices, if used, must turn off or disable wireless communication.	



# **Passing Field Inspection**



# What to Bring to Field Inspection

- Your robot with a charged battery
- Charged driver station
- Controllers(no more than 2)
- 2 team members



# What is Field Inspection:

- Field inspection is basically software inspection
- We make sure your robot connects to your driver hub
- Make sure your driver hub works correctly
- Comes after hardware inspection

FIELD – OPERATOR CONSOLE Rules			Rule #
		The OPERATOR CONSOLE consists of only of one Android device ( <b>Circle</b> ): Motorola Moto G4 Play, Motorola Moto G5, Motorola G5 Plus, Motorola Moto E4, Motorola Moto E5, Motorola Moto E5 Play, or REV Driver Hub. If team is not from North America and has an alternate smartphone, circle here.	R901
		The touch display screen of the DRIVER STATION device is accessible and visible to FIELD STAFF.	R902
		No more than one (1) optional COTS USB external battery connected to the REV Driver Hub USB-C port, no more than one (1) USB hub connected to the smartphone Android Device.	R903
		The OPERATOR CONSOLE consists of no more than two of the allowed gamepads.	R904
		Does not contain more than 1 external USB hub.	R905 .A
		Does not contain non-decorative electronics not otherwise required.	R905 .B
		Does not exceed 3ft wide, 1ft deep and 2 ft tall (91.4cm by 30.5cm by 61.0 cm) excluding any items that are held or worn by the DRIVE TEAM during a MATCH.	R905 .C
DS	RC	OPERATOR CONSOLE and ROBOT CONTROLLER Software Rules	Rule #
		Communication between the ROBOT CONTROLLER and DRIVER STATION is only through the official RC and DS applications over the ROBOT CONTROLLER Wi-Fi.	R706
		Android smartphone(s), REV Driver Hub, and REV Control Hub are named with the official team number followed by an optional -A (or other letter) and -DS or -RC as appropriate.	R707
		Android smartphones (if used) have airplane mode & Wi-Fi enabled, and Bluetooth disabled.	R718 .B, C
		All remembered Wi-Fi Direct Groups and Wi-Fi connections on Android devices (smartphones and REV Driver Hub) have been removed, only ROBOT CONTROLLER Wi-Fi remains.	R718 .D
N/A		ROBOT CONTROLLER Wi-Fi is set to the correct channel (if required by the competition).	R710
N/A		REV Control Hub (if used) has Wi-Fi turned on, Bluetooth is turned off, and the password is different than the factory default value of "password" as seen in ROBOT Self-Inspect	R718 .A, C
FIELD – Power-On Operation			Rule #
		ROBOT CONTROLLER device properly connects with the DRIVER STATION device.	N/A
		ROBOT starts and stops when commanded by the DRIVER STATION device. Specifically, stop button must be able to immediately interrupt both AUTO and TELEOP OpModes.	G401, G406
FIELD - General Notifications and Acknowledgements			Rule #
		Team understands that they must promptly proceed to the ARENA for their scheduled MATCH time as indicated on the MATCH schedule. It is the team's responsibility to monitor for schedule changes.	G301
		Team knows that they are responsible for attaching the correct ALLIANCE specific ROBOT SIGN on two sides of their ROBOT before they approach the ARENA.	G303
		The team understands how to disable their ROBOT, if instructed to do so by a REFEREE.	G414
		Team understands no programming is allowed in the ARENA, including MATCH queue areas.	R706
		Team understands that troubleshooting or programming assistance from FIELD STAFF will be limited if team is not using at least the recommended minimum versions of SDK and device software.	R713

## Section 1: Hardware Inspection 2.0

☑	FIELD – OPERATOR CONSOLE Rules	Rule #
	The OPERATOR CONSOLE consists of only of one Android device ( <b>Circle</b> ): Motorola Moto G4 Play, Motorola Moto G5, Motorola G5 Plus, Motorola Moto E4, Motorola Moto E5, Motorola Moto E5 Play, or REV Driver Hub. If team is not from North America and has an alternate smartphone, circle here.	R901
	The touch display screen of the DRIVER STATION device is accessible and visible to FIELD STAFF.	R902
	No more than one (1) optional COTS USB external battery connected to the REV Driver Hub USB-C port, no more than one (1) USB hub connected to the smartphone Android Device.	R903
	The OPERATOR CONSOLE consists of no more than two of the allowed gamepads.	R904
	Does not contain more than 1 external USB hub.	R905 . A
	Does not contain non-decorative electronics not otherwise required.	R905 . B
	Does not exceed 3ft wide, 1ft deep and 2 ft tall (91.4cm by 30.5cm by 61.0 cm) excluding any items that are held or worn by the DRIVE TEAM during a MATCH.	R905 . C

- Have legal robot driver hub and controllers
- Don't hide driver hub from refs and FTA's
- Pass hardware inspection first







## Section 2: The Beautiful Self Inspect Page

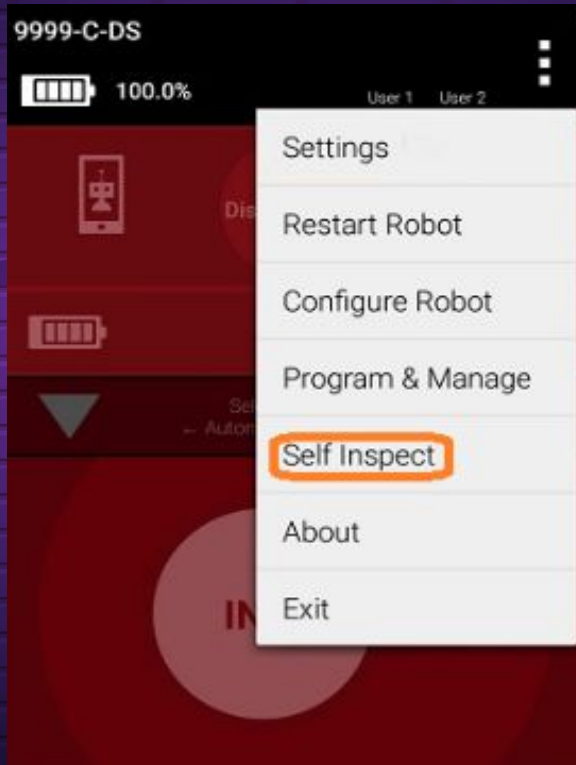


DS	RC	OPERATOR CONSOLE and ROBOT CONTROLLER Software Rules	Rule #
		Communication between the ROBOT CONTROLLER and DRIVER STATION is only through the official RC and DS applications over the ROBOT CONTROLLER Wi-Fi.	R706
		Android smartphone(s), REV Driver Hub, and REV Control Hub are named with the official team number followed by an optional -A (or other letter) and -DS or -RC as appropriate.	R707
		Android smartphones (if used) have airplane mode & Wi-Fi enabled, and Bluetooth disabled.	R718.B, C
		All remembered Wi-Fi Direct Groups and Wi-Fi connections on Android devices (smartphones and REV Driver Hub) have been removed, only ROBOT CONTROLLER Wi-Fi remains.	R718.D
N/A		ROBOT CONTROLLER Wi-Fi is set to the correct channel (if required by the competition).	R710
N/A		REV Control Hub (if used) has Wi-Fi turned on, Bluetooth is turned off, and the password is different than the factory default value of "password" as seen in ROBOT Self-Inspect	R718.A, C

- The inspectors will take a look at your driver hub's self inspect tab
- If it's all the green then you are good to go
- We will show you common mistakes and how to fix them
- Prepare your driver and control hub before comp so your self inspect page is all green

# Self Inspect Page

Robot Controller Inspection Report	
Manufacturer:	REV Robotics
Model:	Control Hub v1.0
Control Hub OS Version:	1.1.2 ✓
Android Version:	7.1.2 ✓
Hub Firmware:	[CH] 1.8.2 ✓
	[EH 2] 1.8.2 ✓
Battery Level:	100%
Bluetooth:	Disabled ✓
RC Password:	Not default ✓
Wi-Fi Enabled:	Yes ✓
Standard Wi-Fi Connected:	Yes ✓
Wi-Fi Access Point	9999-A-RC ✓
Apps Installed:	
Robot Controller:	7.0 ✓
Matches DS version:	Yes ✓
Driver Station:	Not installed ✓



Robot Controller Inspection Report	
Manufacturer:	motorola
Model:	Moto E (4)
Android Version:	7.1.1 ✓
Hub Firmware:	N/A !
Battery Level:	100%
Airplane Mode:	Disabled ✓
Bluetooth:	Enabled !
Wi-Fi Enabled:	Yes ✓
Standard Wi-Fi Connected:	Yes !
Wi-Fi Direct Name:	1001-D-RC ✓
Apps Installed:	
Robot Controller:	10.2.0 ✓
Match es DS ver- sion:	No, the DS version is 10.1 ⚠
Driver Station:	Not installed ✓



## Section 3: Driving Time!!!



<input checked="" type="checkbox"/>	FIELD – Power-On Operation	Rule #
	ROBOT CONTROLLER device properly connects with the DRIVER STATION device.	N/A
	ROBOT starts and stops when commanded by the DRIVER STATION device. Specifically, stop button must be able to immediately interrupt both AUTO and TELEOP OpModes.	G401, G406

- Now you get to drive your robot around in front of the inspectors
- The point of this is to make sure your robot doesn't move around when disabled
- If it does move around we will help you look through your code to find the problem



## ✖ Section 4: The Verbal Contract Thing ✖

☑	FIELD - General Notifications and Acknowledgements	Rule #
	Team understands that they must promptly proceed to the ARENA for their scheduled MATCH time as indicated on the MATCH schedule. It is the team's responsibility to monitor for schedule changes.	G301
	Team knows that they are responsible for attaching the correct ALLIANCE specific ROBOT SIGN on two sides of their ROBOT before they approach the ARENA.	G303
	The team understands how to disable their ROBOT, if instructed to do so by a REFEREE.	G414
	Team understands no programming is allowed in the ARENA, including MATCH queue areas.	R706
	Team understands that troubleshooting or programming assistance from FIELD STAFF will be limited if team is not using at least the recommended minimum versions of SDK and device software.	R713

- The inspectors will ask you if understand this list of statements
- If you say no to any item then the inspectors will not check it off and you will have to do that part of the inspection again

**Remember,  
volunteers  
are there to  
help you**



If anything goes wrong during your inspection, the inspector will do everything within their power to make sure you compete

# Thank you For watching!

## Questions?



**Slideshow:**



**Contact info:**

**Coaches:**

- **Christine Sapio**
- **Dave Thompson**

**Emails:**

- **[Csapio@firstpartners.org](mailto:Csapio@firstpartners.org)**
- **[dthompson@firstpartner.org](mailto:dthompson@firstpartner.org)**

