2021-2022 FIRST® Tech Challenge

Forum Answered Questions - Remote
How To Use This Document

The FIRST Tech Challenge Official Q&A Forum is a place where teams can ask questions and receive official answers from game expert moderators. The official FIRST Tech Challenge Question & Answer Forum rulings take precedence over all information in the game manuals.

Moderators will answer team questions beginning each Monday, and close on Thursday at 12:00pm eastern time. The forum answered questions are then converted to PDF (this document) to be easily read by teams and volunteers. This takes place every week for the entire season, so teams should ensure to access the new forum printout each Thursday. Any rule clarifications or changes will apply to events happening that weekend.

For Remote Teams

Teams competing in remote gameplay must use the rules that apply when their specific event started. For example, if a team’s remote event starts on Monday, 11/29/2021, the team would use rules from that date and prior. New rules or clarifications that are posted after the window opens do not apply until the next competition. Make sure to check the date of the forum post.
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Traditional and Remote - General Robot Rules

Q102 Can a flexible thin strip protrude out of the 18" cube?

Q: Hello! In FRC rules allow a very thin and flexible strip of material, usually serving as visual guide for pilots, to protrude outside of the robot starting box. We wonder if this is also allowed in FTC? Ex: 1) thin 1" X 5" strip protruding horizontally out of the back to help driving more precisely toward a shipping hub, and indicate when it easily bends against the hub that we are close enough. 2) another strip protruding 45 degrees down to soften a cube falling out of the ejector. Thank you!

A: Prior to the start of the match all parts of the robot, including a visual guide, landing strip, etc., must fit within the 18" x 18" x 18" starting volume. Once the match begins, the robot may expand in any direction outside the starting volume.

(Asked by 20272 answer published at --)

Q105 Regarding Team numbers on bot

Q:
Our team numbers meet the minimum height requirement and are easily seen. However, they are "bacon" strips formed into numbers. We are told they can't be wavy and they need to be a certain width. We cannot find anything in either manual to support those requirements. Can you help us figure out where those requirements are or is there an update that can be released to the judges?

A:
There is no width requirement for the Team Numbers. The Rule RG04 states that the numbers must be at least 2.5" tall and be clearly visible by Field Personnel. Wavy numbers formed by "bacon", providing they meet these rules, are legal and really cool.

(Asked by 8743 answer published at --)

**Q72 <I07> Question about the wheel/tread test.**

Q:
According to <I07> ...place the Robot on top of a field tile and against an immovable surface (wall) and run the wheels at full power for 15 seconds. If there is any physical damage to the floor tile, the wheels will not be allowed. We have the GoBilda Outlaw Treads. Following the directions literally, our robot rides up the wall and turtles, causing no damage to the tile. If we hold the robot down, the treads cause damage. Are these Outlaw Treads FTC Legal by I07 or illegal?

A:
The tread test should be run with a stationary portion of the Robot pushing against the immovable surface (not the tread or wheel). The test must also be run with the Robot full weight it would be during a match. The intent is to simulate what would happen if a Robot loses control and the wheel/tread spin out on the field.

(Asked by 16617 answer published at --)

**Q73 2nd Control Hub in place of expansion Hub**

Q:
<RE08> states that teams are allowed to use 1 REV Control and No more than 1 REV Expansion Hub. Since REV Expansion Hubs are currently unavailable for purchase, and assuming it would work, can teams be allowed to connect a second REV Control Hub and use it as their allowable 1 Expansion Hub for attaching additional motors?

A:
No. No more than one REV Control hub may be used within a legal FTC robot

(Asked by 18597 answer published at --)

**Q37 Team Scoring Element size**

Q:
GM 1- 7.4 <TE02> lists the size constraints of the TSE. Does the TSE always need to fit within the min/max volumes, or can it temporarily expand or contract?

A:
The Team Shipping Element may be compressed or expanded when held by the Robot but it must expand or collapse to a legal size when put into play on the Barcode or when Capping. The TSE should be inspected with the TSE in the configuration as it will be used on the field.
Q32 What tires are legal?

Q:
The rule states "Wheels of any type, and the manufacturer provided wheel hub used to mount the wheel to an axle EXCEPT AndyMark® AM2256. Individual components of a legal wheel assembly can be used on the robot." Is this limited to the manufacturers listed at the top? Can we make custom wheels from COTS parts?

A:
Rule RG01 restricts the use of high traction wheels that may damage the playing field surface during game play. The two wheels listed are just examples of wheels that have demonstrated issues in the past and is not intended to be a comprehensive list. Teams may build their own custom wheels but they should realize that the restriction is on the tread part of the wheel that touches the tile and not on the wheel hub. Inspectors may require a test of wheels if it appears they will damage the field. The test involves placing the Robot on a tile and driving the Robot against a firm stop so that the wheels spin. If the wheels end up digging gouges in the tile, the teams will be asked to replace the wheels.

Q22 LED Lit Robot Numbers and Alliance Marker

Q:
Our team is looking at using an edge lit LASER etched Acrylic sign for our Robot Team Marker. We would like to have it change between red and blue to match our alliance. I understand we still need the removable alliance markers, but will the LED signs count as lenses? And would the edge lit acrylic be approved for the robot team markers? Thank you

A:
The LED signs do not count as lenses. Be aware that it is not sufficient to just change the color of the Team Marker, the rules require that the shape of the Team Marker is also changed. Per Rule RG05, a Team Marker must be a Red Square or a Blue Circle. Also, the Team Marker must be clearly visible to field personnel. Keep in mind that lighting conditions in different venues may make the LED sign easier or harder to see.

Q17 Is it legal to use gripper parts 3D printed from public files on Thingiverse?

Q:
We propose to 3D print and assemble parts for a gripper from stl files at https://www.thingiverse.com/thing:3342996 Any team could use this method. The finished assembly would have one degree of freedom in a mathematical sense, i.e. its state could be represented by a single number. It does, however, move three mechanically linked fingers in different directions from that one input. If not allowed, it would be helpful to know if a modification could make it legal. Thanks--

A:
Yes, 3D printed parts are legal per Rule RM01. The degree of freedom rule, RM02, only applies to Commercial Off The Shelf (COTS) parts that are purchased as a complete assembly.

(Asked by 6025 answer published at --)

Traditional and Remote - Commercial Off The Shelf Components

Q174 <RE13>c interpretation of user programmable microprocessors in LED interface modules

Q:
<RE13>c says COTS LED interface modules are allowed. We think the restriction of user programmable processors is to prevent teams using them to offload robot control tasks that the android controllers should be doing. The K-1000C is advertised as "programmable", but it's really just a way to configure the LED pattern on an SD card. That doesn't make the internal processor cable of running robot control code. Is this module allowed? https://www.amazon.com/dp/B06XJ1J915

A:
Yes. Be aware that LEDs that flash/change colors are subject to the potential limitations listed in the orange box in RE13.

(Asked by 6832 answer published at --)

Q160 are any uvc compatible cameras legal

Q:
Are any UVC compatible cameras legal

A:
Yes, per RE14.b

(Asked by 14382 answer published at --)

Q136 Logitech camera 3D printed housing

Q:
Looking to see if we can pull the circuit board and camera out of the Logitech camera factory case to create our own case for mounting the camera to the robot.

A:
Yes. We would recommend taking pictures of the process to share with robot inspectors

(Asked by 8899 answer published at --)
Q103 When testing for legality of GoBilda tank treads, will mitigation strategies matter?

Q:
Hello. To follow up the answer to question #72. When executing the tread test, will we be able apply mitigation strategies to avoid damage to foam tiles to pass the test? For example: 1) Is the test done while running our normal game OpMode? We could detect stationary spin out and automatically cut power to the drive. 2) Cover treads with removable material to increase slip not scratch or burn foam tiles. 3) Make sure holding the robot will result in drive motors stalling, thus avoid damage.

A:
Q1: Yes, the test should be run using the normal OpMode. A programming solution to prevent field damage is acceptable. Q2: Covering the treads with a material that prevents field damage is acceptable. Q3: Designing the robot so that the motors stall out before field damage is an acceptable solution. Teams should be aware that referees have the option of sending robots back for inspection if they see an sign of field damage.

(Asked by 20272 answer published at --)

Q87 Are Gobilda motors legal?

Q:
Are Gobilda 5203 motors (SKU 5203-2402-0019, link: https://www.gobilda.com/5203-series-yellow-jacket-planetary-gear-motor-19-2-1-ratio-24mm-length-8mm-rex-shaft-312-rpm-3-3-5v-encoder/) legal? It seems like they would not be per <RE10> but Gobilda sells an FTC kit.

A:
Yes, these planetary gear motors utilize the Modern Robotics motors which are legal per rule RE10.c.

(Asked by 18133 answer published at --)

Q81 Are Gobilda parts legal?

Q:
Hi, are parts from Gobilda (link to FTC kit: https://www.gobilda.com/master-ftc-kit-8mm-rex-shaft-2021-2022-season/) legal? Confused because they are not specified in RE01, RE03, RE09, and RE10.

A:
Mechanical and structural parts from robot construction kits such as Gobuilda, Tetrix, Vex, etc. are allowed per rule RM01 and RM02. Teams should be aware that there are some parts that may violate other rules such as the single degree of freedom rule in RM02. The electrical rules are more restrictive so if there is a specific part (motor, servo, motor controller) that you wish to use, please ask about this in a separate question.

(Asked by 18133 answer published at --)

Q71 Extent of Legal Modifications to Freight

Q:
My team is considering performing vision tracking of Freight (using TensorFlow or OpenCV), but I am concerned that the Game Manual does not provide any standards to how Freight can be legally modified by tournaments
beyond their COTS conditions. I completely understand that the pre-load Boxes will be modified with a black mark placed upon them (an X or similar as specified in the Game Manual), but is it legal for an event to put other markings, symbols, or modify freight in any other way?

A:
It is illegal to modify the game elements in a manner that affects gameplay except as specified in the Game Manuals or in the Field Setup Manuals. However, we understand that some field elements are marked to indicate ownership when shared between teams or for events and this is allowed. We recommend that any such markings be done as inconspicuously as possible (i.e. underneath or in a corner of a field or game element).

(Asked by 18151 answer published at --)

Q60 <DS03> Gamepad - Does it have to be "Microsoft" Original Equipment?

Q:
<DS03> Gamepad - Does it have to be "Microsoft" Original Equipment? or can we use a non-modified, non-OEM Xbox 360 Wired Controller that is 100% compatible to the Xbox 360 controller in Fit, Form and Function (same buttons, Joystick, D-Pad, etc) just not $80 vs. $20 (ex. Wired Controller for X-box 360, YAEYE Game Controller for X-box 360 with Dual-Vibration Turbo for Microsoft X-box 360/360 Slim and PC Windows 7,8,10 - Amazon $17.99)

A:
The only allowed Gamepads are those listed in DS03

(Asked by 8487 answer published at --)

Q56 Injora Dual Stage SHock absorbers

Q:
Are Injora Dual Stage shock absorbers legal to use? Based on rule RM05 Lubricant - Any COTS lubricant is allowed, if it does not contaminate the Playing Field, scoring elements or other Robots. However, rule RG01 f&g dictate that the robot may not contain any liquid or gel materials. These shocks are different from the GoBuilda Big Bore shocks because they do not contain oil, and they do not use compressed air, so the rules that applied to the GoBuilda shocks do not apply to the Injora shocks.

A:
According to the Injora website, the Dual Stage Shock Absorbers are designed to be used with oil. Therefore these are not legal COTS. Even without the oil, the action of the piston results in compressing air which also makes them illegal.

(Asked by 15755 answer published at --)

Q11 Are GoBilda Shocks legal parts?

Q:
We wonder if the GoBilda Big Bore Shock is a legal part of FTC? Here is the link to the item: https://www.gobilda.com/big-bore-shock-190mm-length-black-2-pack/

A:
No, shocks are not legal per Rules RG01.g and RG01.k.

(Asked by 18438 answer published at --)

Traditional and Remote - Raw and Post Processed Materials

Q64 Magnet in the TSE

Q: Are small magnets allowed to be incorporated into the TSE?

A: Yes, providing no other rules are violated.

(Asked by 6645 answer published at --)

Traditional and Remote - Miscellaneous Robot Electrical Parts and Materials

Q163 Is Voltmeter legal

Q: Is Voltmeter legal (to show battery level) in FTC? Example voltmeter is like this: https://www.amazon.com/gp/product/B00B689UGA. We have used it in the previous events. Want to get an official ruling if it is legal or not.

A: Yes. Be aware that this would need to be connected to one of the allowed light source connection points (i.e. an XT30 port from the Control/Expansion Hubs to get battery voltage)

(Asked by 12611 answer published at --)

Q164 Is the Rev Robotics Digital LED Indicator legal to use in FTC?

Q: Rev sells a simple one-light LED indicator (SKU REV-31-2010). It is "designed to directly interface with the DIO ports of the Expansion Hub or Control Hub." GM1 RE13.b says "Light-source control by compatible ports on the REV Expansion Hub or REV Control Hub is allowed" which suggests that this Rev LED is legal. This LED doesn't seem to need a separate power source (gets its power from DIO port) - RE13.d lists approved power sources, but does not mention the DIO port. Is this Rev LED legal?

A: Yes.
Q143 Slip Rings

Q:
Are slip rings considered mechanical devices with 1 degree of freedom and legal, or are they considered electronic devices and illegal as per RE15 and RE17? Basically, are slip rings legal?

A:
Yes. Care should be taken to make sure that the slip ring contacts are not exposed. Additionally, you should make sure that the current capacity specifications meet or exceed the ratings for the type of connections you are trying to manage.

Q128 Devices Allowed on a Digital I/O Port in Output Mode and A119

Q:
We would like to connect Digital Out ports to the [RST] Reset pin and the [DI] I2C Address Select pin on the Adafruit BNO085 Breakout (https://www.adafruit.com/product/4754). These pins (ports) are 3.3V logic thus compatible with the REV Digital Out ports.

A:
Yes.

Q125 Is a servo travel tuner legal to adjust the range of a servo, like the one goBuilda sells?

Q:
Is a servo travel tuner legal to adjust the range of a servo, like the one goBuilda sells?
https://www.gobilda.com/servo-travel-tuner/

A:
No. Used within a robot, this device would be considered "additional electronics" and would not be allowed per RE17

Q119 Devices Allowed on a Digital I/O Port in Output Mode

Q:
<RE12> says any compatible sensor can be connected to a Digital I/O port. Other than an LED, which is not a sensor, what type of devices can be connected to a Digital I/O port when in Output mode ("Digital Out")? For
example, suppose an allowed device is connected to some compatible port other than a Digital I/O port. Can a Digital Out port be connected to a compatible port on the allowed device to say enable/disable the device, reset the device, etc.?

A:
The question as worded is too vague and hypothetical to be able to provide an answer. Please ask again using a more specific usage.

(Asked by 9999 answer published at --)

Q111 Rule RE15.K substitute part

Q:
Rule RE15.K states "Electrically grounding the Control System electronics to the frame of the Robot is recommended and only permitted using a FIRST-approved, commercially manufactured Resistive Grounding Strap. The only Resistive Grounding Strap approved for use is the REV Robotics Resistive Grounding Strap (REV31-1269)." This part number has been out of stock for a couple of months. This is a simple 470 ohm resistor in series on a wire. Can we make our own since we can't otherwise get one?

A:
No. The only allowed chassis grounding option is via the part listed in the game manual.

(Asked by 7760 answer published at --)

Q113 About RE16 - Modifying Electronics rule

Q:
Would like to know if welding a wire to connect the wiper terminal of the servo's potentiometer and using this wire to retrieve the servo position via AD port is legal or not?

A:
No. This type of modification changes the functionality of the servo and falls into the range of disallowed modifications.

(Asked by 18225 answer published at --)

Q99 Pixy Cam power

Q:
Pixy Cams were allowed in the past. The camera needs 5 volts to operate and we ran it from the extra 5 volt ports on the Rev hub. This is no longer allowed (according to a forum answer). Would it be allowed to be plugged into the USB port on the Rev control hub for its power and the analog input at the same time? If not, as a replacement, we are considering this sensor: https://www.sparkfun.com/products/18642 Is it legal? It's a time of flight i2c sensor. Thank you!

A:
A Pixy Cam should be powered via a REV Logic Level Converter.

The time of flight sensor you listed would not be allowed as it utilizes a laser for its measurements.

(Asked by 6378 answer published at --)
Q78 Multiple USB Cameras on the Control Hub

Q:
The rule (<RE15> c. ii. i.) allows for an externally powered USB hub on a REV Expansion Hub powered from a commercial USB Battery Pack (or powered by the 5V aux power on an Expansion Hub or Control Hub). Would the use of an externally powered USB hub on a Control Hub - especially for powering multiple cameras - be allowed? I figured that <RE15> c. ii. probably wasn’t meant to only apply to the REV Expansion Hub, but I’d like clarification on this.

A:
The USB hub connection limits expressed in RE15.c.ii should be understood as applying to both REV Expansion Hubs and REV Control Hubs

(Asked by 18151 answer published at --)

Q76 Can a passive coil electromagnet be used?

Q:
Can a COTS passive electromagnet be used? Specifically an electromagnet is simply a coil of wire, and as such would seem to fall under the classification of a passive component <RE12c>. It would be powered either with a spare motor port or a SPARKmini. If a COTS electromagnet is not allowed, would a hand wound one be permitted? Current limits would be verified to be within the hub/spark allowed range. Note: We know this was initially answered under Q20 but wish clarification with <RE12c>.

A:
No. RE12.c does not allow passive electronics to be used other than in conjunction with sensors and then only as recommended by the sensor manufacturer.

(Asked by 10138 answer published at --)

Q58 Is Intel T265 allowed?

Q:

A:
Yes. Be aware the Intel has apparently retired the T265 in favor of newer models

(Asked by 12611 answer published at --)

Q48 Are strain/force/bend gauges allowable?

Q:
Are any of the following sensor scenarios allowable if solely powered from and read by an analog port on a control or expansion hub: 1) COTS strain/force/bend sensor (made from resistors) 2) COTS strain/force/bend sensor coupled with additional resistors 3) COTS strain gauge with a COTS amplifier to boost output from mV to V. (Team
expects the amp is prohibited as an active component in <RE12>, but as amplification is recommended and often sold with a strain gauges sensor were unsure.)

A: A COTS sensor and associated passive electronics (#2 as listed above) (as recommended by the manufacturer) would be allowed. You are correct that the additional amplifier would not be allowed. Additionally, a DIY strain/force sensor made from a collection of passive devices (#1 as listed above) would not be allowed.

(Asked by 8907 answer published at --)

Traditional and Remote - Motors and Servos

Q123 Are the linear servos from goBuilda legal?

Q: Are the linear servos from goBuilda legal? They can operate at 6VDC. https://www.gobilda.com/linear-servos/

A: Linear servos are legal for use as long as they are connector and voltage compatible with the available servo connection options (i.e. REV Expansion Hub, REV Control Hub, Servo Power Module)

(Asked by 10006 answer published at --)

Q75 Can FTC approved DC motors be used to drive fans on the robot?

Q: Are fans for the purpose of transportation allowed during the competition? The fans are enclosed within a plastic duct and will have fan shields to protect the field(RG01.a), eliminate risk of entanglement(RG01.b). The fans do not generate any vacuum(RG01.l) and are not closed(RG01.j) as the intake side is open to the air and the output side will be directly facing the ground and air continuously leaves the robot.

A: Yes, motors can be used to drive fans providing it is done in a safe manner and no other rules are violated. Any team using fans on their Robot should be aware that any Freight propelled by the air will be subject to the Control, Possession and Launching rules.

(Asked by 3470 answer published at --)

Q61 Is it legal to plug a motor into the 6v servo ports?

Q: Is it legal to use any COTS motor powered by the 6v servo ports on the rev hub? It would basically be identical to a Vex 393 motor or a servo in continuous mode, just without the gear reduction.

A:
No. Additionally, it would not work the way you are intending. The signaling that is sent to servos is not the same sort of signaling that is sent to motors.

The Vex 393 is only useable when connected to a Vex Motor Controller 29 (it converts the servo PWM signaling into motor control signals)

It is possible to control a DC motor through a servo port, but you need to utilize a REV SPARK Mini Motor Controller to accomplish the signal translation

(Asked by 8565 answer published at --)

**Q52 Is Rev UltraPlanetary Gearbox Kit & HD Hex Motor SKU: REV-41-1600 FTC Legal?**

**Q:**
We know from list of allowed FTC legal parts that REV HD HEX motors are legal...but are UltraPlanetary Gearbox Kit also legal? SKU: REV-41-1600 The REV UltraPlanetary Gearbox Kit is the entry point into using the REV UltraPlanetary System. The kit comes with UltraPlanetary Cartridges to support six different final gear reductions ranging from nominally 3:1 to 60:1 allowing for the right amount of torque for the application at hand.
https://www.revrobotics.com/rev-41-1600/

**A:**
Yes, per Rule RM02 single speed gearboxes are allowed.

(Asked by 11254 answer published at --)

**Q54 Is the Actuonix linear servo legal?**

**Q:**

**A:**
Yes, per Rule < RE12> linear actuators are allowed provided they are three wire and run on a maximum of 6 volts. This actuator meets those requirements.

(Asked by 7290 answer published at --)

**Q49 Can you use a DcMotor during initialization for inspection.**

**Q:**
Rule <RG02> states the expectations for using servos during the initialization of the robot for inspection. Nothing is mentioned concerning DcMotors. Can you use a DcMotor in a RUN_TO_POSITION mode to accomplish the same thing as the servo? Thanks!

**A:**
Yes. Make sure that the robot is appropriately labeled with the "Robot Moves on Initialization" warning sticker

(Asked by 14840 answer published at --)
Q45 2 DC motors share the same port

Q: We are using 6 DC motors, but the REV Expansion Hub is out of stock, May I connect 2 DC motors in the same port in the REV Control Hub? Thanks!

A: There is nothing in the robot electrical parts and materials rules that prohibits ganging motors together into a port. Make sure that the connection is appropriate in terms of wire gauge and insulation.

Be aware that the ganging process effectively halves the available stall current from the motor port.

Other options aside from an additional Expansion Hub would be to take advantage of the REV Spark Mini Motor Controller.

(Asked by 19487 answer published at --)

Traditional and Remote - Control System

Q92 Unavailability of REV Hubs and A86

Q: In A86 you state that teams are required to develop and compete with only 10 motion devices against teams that develop and compete with 20 motion devices. You further state that teams that develop with 20 motion devices will be required to compete with only 10 motion devices when one of their REV hubs fail. A86 appears to violate FIRST's and Raytheon's policies on Equity, Equality, Inclusion, and arguably Diversity. Please rephrase your answer and please take this seriously.

A: As mentioned in the answer to Q86, the only approved control options are listed in part 1 of the game manual. FIRST Tech Challenge does not make mid-season changes or additions to electronics for a few reasons. One, we must first evaluate the proposed electronics to ensure that it can work with all of the other components and control systems that we currently approve. There could be unintended consequences without proper vetting and testing of any new electronic that could put teams at a disadvantage. Likewise, it could pose the potential for some teams to have a competitive advantage which is something we have to think about when we are assessing new electronics.

Two, especially given the global supply chain issues the world is facing, we need to evaluate any proposed new vendors ability to deliver the electronics in volumes where all of our teams and community can access it. This process includes determining the costs to teams, as well as timelines of when the new component can be manufactured and made available for all teams.

I’d like to note that these decisions are solely made by FIRST Tech Challenge Headquarters staff, and not by our vendors or sponsors.

(Asked by 9999 answer published at --)

Q86 Unavailability of REV Hubs

Q:
Teams that are able to obtain two REV hubs can have 8 motors and 12 servos for a total of 20 motion devices on their bot. Teams that are unable to obtain more than one REV hub can have only 10 motion devices on their bot. COTS I2C PWM/Servo expansion boards can add 16 Servo ports to a REV hub. We request that teams be allowed to connect a PWM/Servo expansion board, such as a PCA9685 based board, to an I2C port of a REV hub so that all teams can have 20 motion devices on their bot.

A:
While we understand the frustration with supply delays, the only approved motor/servo control options are those that are listed in Part 1 of the Game Manual. There is no current plan to add any additional electronics to the list of approved devices.

(Asked by 9999 answer published at --)

Q59 RE01 - Power Button Cover

Q:
RE01 does not specify that the power button can or cannot be covered by a cover to prevent power on/off during competition play. Aside from the label required to the easily seen, may the power button have an open/close cover?

A:
No. RE01 requires that the power switch be "readily accessible and visible to field personnel". Covering the switch would hinder both access and visibility

(Asked by 18127 answer published at --)

Q43 Are all colors of Sony Dualshock controller allowed

Q:
This may seem a bit silly, but in Manual 1 the Sony DualShock 4 Wireless Controller for PS4 are listed as allowed, but then goes further to specify ASIN # B01LWVX2RG. This is specifically the black controller. Is this an intentional specification or are other colors allowed as well (eg. Red which is ASIN # B01MD19OI2 or Camo which is ASIN # B01MTKXP31)? Asking because availability and prices fluctuate and black is currently out of stock.

A:
Yes. Other colors of the same model gamepad are allowed

(Asked by 10138 answer published at --)

Traditional and Remote - Sensors

Q173 Tilt switch

Q:
Are ball bearing tilt switches used to maintain the level of a robot arm, legal for the FTC competition.

A:
Q172 Distance sensor

Q:
Since RevRobotics are out of stock on distance sensor, I have been able to find an I2C compatible distance sensor. So is the model HC-SR04 legal for use in FTC?

A:
Yes.

(Question by 20326, answer published at --)

Q148 Is the LED light on the REV color sensor v3 allowed?

Q:
please clarify, is the light sensor light source allowed? the answer 'yes' is ambiguous based on the question text.

A:
In the original question, Q144, the only question asked was in the title to the post, "Is the LED light on the REV color sensor v3 allowed?". The rest of the posting was explanatory text.

We are not sure what is ambiguous about the answer "Yes" to this question.

(Question by 7571, answer published at --)

Q161 Proximity distance sensor

Q:
we want to use a sharp GP2Y21-10 80cm infrared proximity distance sensor. is this legal

A:
Yes.

(Question by 14382, answer published at --)

Q165 Distance sensors

Q:
What distance sensors are allowed?

A:
We are not able to provide a Listing of legal distance sensors.

When choosing a distance sensor, be aware that sensors that use lasers as a measurement method violate RE13.a and are not allowed, with the exception of the REV 2m Distance Sensor.

(Question by 12390, answer published at --)
Q145 Are passive force sensor and resistor allow?

Q:
In the answer to Question Q48, questioner asked "2) COTS strain/force/bend sensor coupled with additional resistors." you answered "A COTS sensor and associated passive electronics (#2 as listed above) (as recommended by the manufacturer) would be allowed." We are trying out a passive pressure/force sensor (which is COTS). We will add one resistor for scaling. We will add a JST 4pin connector to connect to analog port. No other power source. No amplifier. Is this allow?

A:
Yes

(Asked by 13356 answer published at --)

Q144 Is the LED light on the REV color sensor v3 allowed?

Q:
Without using the LED, the color sensor v3 is not very useful as a color sensor. In the past, the team was told that the LED on the color sensor v3 was considered a focused light source and was not allowed.

A:
Yes

(Asked by 7571 answer published at --)

Q80 Is it legal to use a custom 3d printed base for the Rev through-bore encoder

Q:
We removed the stock base from the through bore encoders and 3d printed new ones to accommodate our design. Would this be allowed for FTC or is it considered modified electronics? An inspector at our first league meet wanted us to get this answered. We did not change anything electrical in the sensors and we didn't change the internal features of the housing design.

A:
Yes. If possible, it would help to have pictures of the disassembly and re-assembly steps to help the inspectors be confident that the housing is the only modification

(Asked by 8813 answer published at --)

Q69 Use of 12V to power sensor

Q:
Can we use the 12V off of the connector on the Rev Hub in order to power a sensor that then connects to a sensor port for output?

A:
No. RE12.a limits sensor connections. 12v power is not one of the allowed connection points.

(Asked by 7244 answer published at --)

**Q67 Power sensors with 5V Aux output**

**Q:**
Can we power 5V sensors using the 5V Aux Output on the Rev hub?

**A:**
No. RE12.a limits where sensors may be connected. The 5v AUX output is not listed as an allowed connection point

(Asked by 7244 answer published at --)

**Q29 Are Intel D455 and D435i cameras legal**

**Q:**
In the past, Intel T265 is considered legal for FTC. Now Intel is deprecating T265, replacing it with D455 and D435i. https://www.intelrealsense.com/depth-camera-d455/ and https://www.intelrealsense.com/depth-camera-d435i/. Want to confirm, are Intel D455 and D435i cameras legal?

**A:**
Due to the embedded IMU as an additional sensor (accessible via USB) the two cameras mentioned are not allowed

(Asked by 12611 answer published at --)

**Remote - End Game**

**Q98 Total ducks counted for End Game**

**Q:**
We are running a Remote Event. We are using the 10 allowed ducks for the game. One duck is used for the Carousel – Delivering. We are using the Team Scoring Element for the bar code setup. The rest of the 9 ducks are set for end game. We deliver the duck off the carousel during autonomous period for 10 points. Then we deliver the nine ducks during end game. Do we earn 6 points per duck delivered for all 10 ducks (1 duck from auto and 9 from end game - 60 points) at the end of the game?

**A:**
The Remote Event Playing Field Pre-Match setup is described in Game Manual Part 2 - Remote Events, Section 4.5.1.

1)d describes the locations of the ten (10) Ducks before the Drive Team sets up their Robot for a Match. One (1) Duck is placed on the Carousel, One (1) Duck is placed on each center Barcode for a total of two (2) Ducks on the Barcodes, the remaining seven (7) Ducks are placed outside the Playing Field in the Loading Dock.

A Drive Team that uses their Team Shipping Element on the Barcode places their Team Shipping Element on the center position of one of the Barcode areas. The Duck that was placed on the Barcode during Pre-Match setup is moved to the Loading Dock. The Duck and Team Shipping Element locations and quantities for this match are:
Carousel: 1 Duck
Barcode: 1 Duck
Barcode: 1 Team Shipping Element
Loading Dock: 8 Ducks

Since the Duck locations are different from the locations described in the question, the scenario is now:

Autonomous: One (1) Duck is Delivered for 10 points.

End Game: Eight (8) Ducks in the Loading Dock have the potential of earning 48 total points for Delivery (six (6) points each).

Total potential Delivery Score (Autonomous + End Game) = 10 + 48 = 58 points.

(Asked by 9930 answer published at --)

Remote - Field Setup

Q168 What is the correct quantity of cargo (white balls) for a remote event – 10 or 20?

Q:
GM2-Traditional 4.4-Freight says that for traditional events, freight consists of 20 Cargo (balls), 60 Boxes, and 20 Ducks. GM2-Remote 4.4-Freight says that for remote events, freight consists of 20 Cargo, 30 Boxes, and 10 Ducks – so box & duck quantities are halved (which makes sense since it’s a half-field), but the Cargo (balls) quantity is unchanged. The warehouse picture in GM2-Remote Appendix B shows 10 Cargo in the warehouse. Should there be 10 or 20 Cargo in the warehouse for Remote?

A:
The correct quantity of Cargo for a Remote Event is 10.

(Asked by 20153 answer published at --)