



## FRC Q&A

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### Game Manual - Introduction

#### Q765

**Q.**If a robot crosses the sally port or drawn bridge, from the opponent's courtyard into the neutral zone, but uses a device to catch the door before it completely swings closed, and reverses back through the defense, would that action still weaken the defense and earn the alliance points? And would that be a legal action? Thank you :)

**A.**Please see [Q505].

### A Message from the Woodie Flowers Award Recipients

Not Available

### Introduction

Not Available

### Description (of FIRST STRONGHOLD)

Not Available

### Manual Conventions

Not Available

### Team Updates

#### Q677

**Q.**Where was I when Team Updates 1 & 2 were released? I have updates 3 & 4.

**A.**They were released on 1/12/16 and 1/15/16. You can find the complete update package [here](#).

### Question and Answer System (meta!)

Not Available

### Game Manual - Arena

#### Q848

**Q.**Drawings GE-16185, 6, 7, and 8 all appear to be missing from the package. All are called out on GE-160002-01

**A.**Sorry for the omission! We will work on posting an updated drawing package with the missing drawings as soon as we can. In the meantime: GE-16185 is the assembly of GE-16143 and GE-16184 using the matching screw holes, GE-16186 is GE-16142 assembled with GE-16183, GE-16187 is GE-16144 assembled with GE-16181 in one orientation (attach cleat to one side of the plastic to make the left corner) and GE-16188 is GE-16144 assembled with GE-16181 in the other orientation (cleat attached to other side of plastic to make the right corner).

#### Q593

**Q.**Are teams allowed to include a wired video camera connected to their drivers station on their team standard to improve visibility? Can teams include LEDs on their standard?

**A.**Any wired connection from the Team STANDARD to the OPERATOR CONSOLE would violate rule T9 because the STANDARD would not meet the Team Standard Specification (specifically the volume requirements). The OPERATOR CONSOLE does not include the Team STANDARD. There are no rules preventing Teams from

## Zones & Markings

### Q843

**Q.**Could you please confirm between the field drawings and the field CAD which is consistent with the intended construction?

**A.**The Field Drawings are the ultimate authority in dimensions and assembly. If you note a discrepancy, please email [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org) with detail. Thank you!

### Q827

**Q.**There is a discrepancy in the portcullis (PC) door to base edge. Field drawings GE16159 indicates PC uprights centered on base. GE16195 indicates door centered on uprights=> PC door is centered on base. Team drawings TE16157 shows 7.75" wide PC frame 8.13" from base edge. TE16157-02 indicates door centered between 2x4 frame => PC door centered on base. The Field CAD PC door (neutral zone side) to base edge of 9.86". Court yard door side to base edge 12.06". Please confirm which is correct.

**A.**Please see [Q573] regarding Team Drawings.

### Q801

**Q.**Does anyone know the full dimensions of the courtyard? The game manual does not specify the full dimensions of the courtyard.

**A.**Dimensions are detailed in field drawings. The [Field Assembly](#) package has overall field dimensions, and any dimensions not explicitly called out can be derived as needed.

### Q714

**Q.**The alignment line. It is described as 2" green gaffers tape. Is that olive green or Florescent green?

**A.**"Green" shalt be the color thou shalt seek, and the color of the tape shalt be "Green." "Olive" shalt thou not use, nor either use thou "Florescent," excepting that thou then proceed to use "Green." "Purple" is right out. Once the color "Green," being the correct color, be reached, then rollest thou thy "Green" Gaff Tape across thou COURTYARD. <http://www.protapes.com/products/pro-gaff/color/green>

## Field

### Q865

**Q.**On the update for the game manual posted on 2/19/16, there is mention of a 10th defense but it is no where in the actual manual under section 2.2.2.1. Does anyone know what this is or where we can find out more information about it?

**A.**If you download the Team Update and watch the video, you will see it shows a dragon breathing fire on a robot as the '10th Defense'. This was an attempt to inject some humor in the Team Update during a stressful time for teams. There is no actual 10th defense. We're sorry if this actually added to your stress, instead of relieving it!

### Q612

**Q.**Team drawings show defense ramps 10 inches but real field is almost 12. Also at NH kickoff I measured the width of stone wall 5.5 but team and real field drawings show 4.5. My photos also show the width wider than tall. Are corrections for dimensions needed?

**A.**Yes, corrections were needed. The correct width of the Rock Wall is 5.25 in. Thank you for your question, and please accept our apologies for the error. The affected [drawing packages](#) have been updated, and more information can be found in [this blog post](#) and [Team Update 04](#).

## Guardrail

Not Available

## Outer Works (General)

### Q867

**Q.** Everyone is all upset about the announcement of the supposed "10th Defense"... Some people are saying it's a big prank, some think it's real. I must ask, is the "10th Defense" an actual thing, or is it a hoax? If it is real, how can we get information about it? -Thank you and sorry for the inconvenience.

**A.** Please see the answer to [Q865].

#### **Q866**

**Q.** Re: TU12 Are we allowed to use a dragon that was fabricated before kickoff as a practice defense? We have had many since 1999 but some teams are in Week 6 of their build and probably have not built a dragon yet. How are we supposed to be securing our dragons with regards to the platforms on the outer works? Should we follow the drawing in the manual, the drawing in the field drawings, the game animation, the field tour video, or some sort of unknown constellation? Thank you for your time.

**A.** No, dragons aren't FABRICATED, they're hatched. The REAL question is, "What's the airspeed velocity of an unladen dragon spitting fire?", and the only allowed answer is still, "African or European?". Also, please see [Q865].

#### **Q580**

**Q.** The Field Drawings for the DEFENSE RAMP (GE-16011) specifies the material used as "1/4" CLEAR POLYCARBONATE, SANDED ONE SIDE". Is the ramp assembled such that the sanded side of the polycarbonate is facing upwards or downwards? If the sanded side is facing upwards, could you please provide further information about the grit and/or texture of the sanded side, to allow for an accurate reproduction of the defense ramp?

**A.** See [Q518]. GE-16013 will be updated to specify that the marred side is installed down.

#### **Q573**

**Q.** There is a discrepancy in the the length of the ramp for the Team Defense Platform. Section 2, page 10 of the Game manual diagram shows ramps at 1 ft long and 13.5 degrees, while the CAD Team Defense Platform drawing has a 10 inch ramp onto a 75.5 degree bevel resulting in a 14.5 degree angle. We're very interested in our angle of attack and clearance on the platforms, so clarification would be perfection.

**A.** To mitigate the risk incurred by teams, we reduced the number of dangerous bevel cuts in the Team Versions of the field components. The Team Versions are designed to provide close replicas of the FIELD, but occasionally dimensions may vary slightly in order to ease construction. Remember that the Game Manual contains nominal dimensions, and the Official Field Drawings are the ultimate arbiter of Field Dimensions.

#### **Q518**

**Q.** Some sections of the polycarbonate are roughed up for texture/grip. How is this done and how can teams reproduce this accurately?

**A.** The surface is marred to the point that it has a frosted appearance, so that the lights dissipate more evenly. The marred side faces the carpet, so we don't expect it to affect ROBOTS. Given that, our vendor uses a Makita #BO5041 Random Orbital Sander with 120 grit sandpaper. They remove the protective sheeting from one side of the panel, and then begin sanding from one end in a circular motion until all of the gloss is removed from the panel. They take care to keep the sander in motion for five (5) minutes per panel to ensure a consistent finish.

#### **Q515**

**Q.** Section 2.2.2.1 specifies that the Shields are 4 ft. deep, but as the ramps of the defense platforms are on an angle, the total platform depth is less than 4 ft. Is this dimension incorrect or do the shields stick out a little? Also, the angle of the platform ramps given does not match the height and length given. Which dimension is correct?

**A.** a. The Shields are 4 ft. deep, and yes they do stick out beyond the ramps slightly (3/8 in.) b. Keep in mind that the dimensions in the manual are nominal. If that angle is of critical importance to your robot design, you should consult the drawings for more information. Keep in mind, that angle is the result of an assembly of components. It will likely vary slightly from ramp to ramp.

## Portcullis

### Q653

**Q.**Is there a Part Number from Vulcan Springs for GE-16209? We have contacted them with no luck at finding a spring that is similar to the drawing. McMaster Carr P/N: 9293K13 is the closest thing we can find that is a Commercial Off The Shelf part, but does not meet the specification in GE-16209

**A.**The springs in question are a custom part from Vulcan Spring (P/N J25S65FR), produced specifically for *FIRST STRONGHOLD*'s Portcullis. These will be sold by Vulcan Spring in a limited quantity. Please contact Vulcan Spring and reference the above part number if you are interested.

## Cheval de Frise

### Q888

**Q.**Followup similar to Q777 & Q757. The Portcullis orientation seems to be inconsistent between the Field Drawings, the manual and field youtube videos. Per GE-16148 it appears the Polycarbonate face of the portcullis is located on the Neutral Zone side. However in the field youtube videos (<https://www.youtube.com/watch?v=f67tl7OLAjo>) the polycarbonate face appears to be on the courtyard side. Can you please clarify which side of the field that the polycarbonate face is on?

**A.**The Game Manual and Official Field Drawings depict the correct orientation.

### Q777

**Q.**Follow up to Q757. We have just noticed that 2016 Game Manual Figures 2-5 and 2-7 show the Cheval de Frise oriented as Up-Down-Up-Down. This is inconsistent with Game Manual Figure 2-1 and FE-00039 in the 2016 Field Assembly document that shows Down-Up-Down-Up. Do Figures 2-5 and 2-7 need to be changed?

**A.**Good catch! Figures 2-5 and 2-7 will be updated in *Team Update 09* to show the correct platform orientation.

### Q757

**Q.**According to FE-00039 in the 2016 Field Assembly document and 2016 Game Manual Figure 2-1, the Cheval de Frise is positioned so the panels are oriented "Down-Up-Down-Up" when viewed left-right. However, on the field shown in the *FIRST STRONGHOLD* Game Reveal and Field Tour videos posted on the FRCTeamsGlobal YouTube Channel the panels are oriented "Up-Down-Up-Down." Can you confirm that the orientation shown in the Field Assembly document and Game Manual is correct?

**A.**Confirmed. The Field Drawing and Game Manual display the correct orientation.

### Q670

**Q.**What part should we use for the pipe clamp?

**A.**Sorry for any confusion the differences between the Team Drawings and the Field Drawings have caused. Dimensions for the pipe clamp, hole location, and "Heavy Duty Steel Clamp, 1-7/8" ID" is called out in GE-16178. While there are PVC and other plastic solutions available at your local hardware store, the part that we will use is McMaster-Carr Part Number - 3039T18 or equivalent.

## Moat

Not Available

## Low Bar

### Q787

**Q.**The only description I can find for the material used for the low bar's black flap is "Cordura." "Cordura" is a brand name that refers to many different fabrics - polyesters, nylons, wool, cottons, etc. What specific fabric is being used for the low bar?

**A.**Thank you for your question. Please refer to drawing GE-16155 that specifies the type of Cordura fabric.

## Ramparts

Not Available

## Drawbridge

### Q519

**Q.**What springs are used for the Drawbridge? Can you please provide the specs so that we can find it locally?

**A.**Drawing Documentation will be updated in *Team Update 02* with the information listed below: 1 - Screen Door Spring, 16-3/8" Long - McMaster-Carr 9629K7 1 - Extension Screen Door Spring, 15"-18 1/2" - McMaster-Carr 1474A11 4 - Oval Threaded Connector, 3/16" Diameter - McMaster-Carr 8947T25

## Sally Port

### Q877

**Q.**How far will the Sally Port door on an official field open (ie., will it open past 90 degrees). We cannot see any discernible hard stop on the provided field drawings but wanted to double check

**A.**There is no hard stop, however note that the adjacent SHIELD will limit the travel of the door.

### Q854

**Q.**The official field drawing of the Sally Port (GE-16035) shows 1/4 bolts attaching the door panel to the reinforcing structure. These bolts protrude 1/2" beyond the nut and are right in the middle of the robot bumper zone. While this may have been intended as an additional challenge, we are concerned many teams practicing with the flat-faced plywood SD depicted in the team version drawings will be ripped apart when driving through for the first time at competition. Will these bolts be shortened?

**A.**Thank you for pointing this out. The bolts used on the assemblies are 2.25 in. long and sit flush with the nut, and the drawing will be corrected as soon as possible.

### Q680

**Q.**Is there a gap between the unhinged side of the sally port door and its frame?

**A.**Thanks for the question. There is not a gap between the Sally Port Door (GE-16034) and Sally Port Frame 2 (GE-16037). In the CAD model the Sally Port Door is mated parallel to the front of the defense, which does create a small gap (.325 in.). In reality, there is nothing preventing the damper (GE-16032) from closing the door completely.

### Q579

**Q.**Is there any clearance near the bottom of the sally port?

**A.**For questions about construction of the FIELD, please see the Playing Field Details on [this page](#).

## Rock Wall

### Q778

**Q.**Game Manual Figure 2-15: Rock Wall Dimensions still shows the previous 4.5" depth. For clarity, can this figure be updated to reflect the new 5.25" depth?

**A.**Good catch! Figure 2-15 will be updated in *Team Update 09* to show the correct depth dimension to match drawing GE-16081-01.

### Q516

**Q.**Is the Rock Wall steel or aluminum? In the game manual it describes the Rock Wall as a steel wall, but in the "Field Components" document (page 148) the material is listed as aluminum.

**A.**GE-16081-01 (The Rock Wall) is a steel sheet metal part. The material note in GE-16081-01 will be corrected in *Team Update 02*.

## Rough Terrain

## Castles (General)

### Q712

**Q.**Just a nit - in section 2.2.3.1 "Castle Wall" under "Tower", it says "each CASTLE has a TOWER between HUMAN STATIONS two (2) and three (3)." According to figure 2-23. the numbering order puts the tower between humans stations 1 and 2.

**A.**Thank you - this error will be corrected in *Team Update 06*.

## Human Player Station

### Q783

**Q.**Can a "vertically challenged" driver (senior HS girl 4' 11"), use a single-step stepstool as an aid in the castle and/or spy box.

**A.**DRIVE TEAMS may bring to the ARENA any "special clothing and/or equipment required due to a disability", per T26-1-E. If you bring special equipment and it's not obvious that you require it because of a disability, you can expect to be asked about it. However, we won't be setting guidelines on what it means to require special equipment due to a disability. That judgement will be made on a case-by-case basis at events.

## Tower & Batter

### Q732

**Q.**The game field drawings do not specify how the batter ramp HDPE plastic ((GE-16124, 16143 & 16144) is attached to the plywood ramps (GE-16137, 16139, 16140 and 16141). Also the length dimension of the plywood ramps (43.88") do not match the dimensions of the HDPE plastic (48"). Can you please clarify this? Please note that Drawing GE-16139 is missing from the PDF drawing package.

**A.**The assembly drawing will be modified and documented in *Team Update 07* to include the information that the HDPE pieces are attached using hook and loop tape. The HDPE pieces are longer so that they extend beyond the bottom of the ramp to meet the carpet. Thank you for pointing out that omission! We will add that to the drawing package and document in *Team Update 07*.

### Q635

**Q.**In the field drawings, there are dividers on the batter. These dividers do not touch the castle. I want to know what the distance of the dividers at the point where they are closest. Can you tell me this distance?

**A.**The purpose of this Q&A system is to help clarify rules and other documentation concerns, so providing a dimension such as the one you ask about would be outside of scope. However, the dimension you ask about can be derived from the current drawings. If you need additional help with this, you may want to try reaching out to other teams, we're sure they would be very willing to lend a hand.

### Q608

**Q.**I see in the official field drawings the width of the bar is listed as 20.5", which gives a front opening of 17.5" once you subtract the diameter of the sides. The game manual lists the opening as 1ft 9in, which would make the width of the bar 21" with a 18" front opening. What is the correct total width of the bar?

**A.**The Game Manual contains nominal dimensions, and the Official Field Drawings are the ultimate arbiter of Field Dimensions. The nominal dimension in Figure 2-33 will be updated to match the dimension in GE-16006.

## High & Low Goals

### Q911

**Q.**Hi - just a note that while Figure 2-29 in the latest available Game Manual (updated 23-Feb) has been updated to reflect the correct vision target height of 12in, the text in the "GOAL" paragraph immediately preceding the figure still references the incorrect height of 1ft 2in.

**A.** Thank you! Yes, this will be fixed in *Team Update 14*.

#### Q842

**Q.** When watching the FRC Field Tour videos, we noticed that there was chain behind the high goals. But, when we checked the 2016 field drawings and assembly, there was no chain specified. Could you please specify what, if any, chain is being used?

**A.** Drawing GE-16235 specifies the type, length and location of chain within the Tower Roof Assembly. That drawing can be found in the [2016 Field Components](#) drawing package.

#### Q731

**Q.** The game field drawings do not show the attachment of the reflective tape for the High goal assembly. The game manual shows 2" reflective tape on three sides of each goal. Drawing GE-16067 shows a derived dimension of 1.75" between the bottom of the goal and the bottom of the polycarbonate sheet. If the tape is 2" thick is the excess cut off or attached to something else?

**A.** Thank you for the question. The extra 1/4" of tape is folded over the bottom edge of the GOAL opening such that 1.75 in. is visible. *Team Update 07* will add this information to *Section 2.2.3.1, GOALS*.

#### Q723

**Q.** Fig 2-29 in the Game Manual depicts the vision targets as 1 ft 2 in tall. The Autodesk CAD model shows the vision target height as 12". The WPILib documentation for Vision Processing also contains this conflict: the section on "Target Info and Retroreflection" repeats Figure 2-29 from the manual, while the "Identifying and Processing the Targets - Aspect Ratio" section states that the targets are 12" tall. The official field drawings do not indicate the vision target dimensions. Please clarify.

**A.** Figure 2-29 in the Game Manual is incorrect and will be updated in *Team Update 07*. The correct vision target height is 12 in. Thank you for your observation.

#### Q535

**Q.** Can you add retro-reflective material to the Low Goals? It would be helpful for scoring the Low Goal in Autonomous.

**A.** This forum is designed to answer questions about the rules themselves. We're happy to consider suggestions, but please send them to [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org).

## Boulders

#### Q706

**Q.** What should be the diameter of the Boulder? I know that the game manual says it should be 10 inches but our team measured it and we got around 9.75 inches for the diameter and not 10 inches.

**A.** The BOULDERS have a nominal diameter, as specified by the manufacturer, of 10 in. The tolerance is not defined and assumed to be rather generous for a toy ball, so actual BOULDER dimensions may (and do!) vary.

#### Q697

**Q.** Will there be any information on the rings that are mentioned in 2.3 that the boulders rest in "prior to the start of a match"? How large are they? What material are they made of? Are they fixed to the carpet?

**A.** Yes, please accept our apologies for this omission. *Team Update 06* will add their specifications in *Section 2.3*.

#### Q639

**Q.** How frequently will boulders be replaced at regionals? Will there be new balls during elimination matches, and if so will that be the same at division finals? What about Einstein? We are noticing visible wear on our boulder issued at Kickoff, and the surface of the boulder has become less shiny and slick. This may affect how robots interact with the boulders.

**A.** There isn't a prescribed replacement schedule for BOULDERS, such as every so many MATCHES or prior to Playoff MATCHES or subdivision finals at FIRST Championship. They'll be replaced as the FIELD STEWARDS determine they're damaged. Per *Section 3.2*, damaged BOULDERS will not be replaced until the next FIELD reset period. DRIVE TEAMS should alert the FIELD STEWARDS to any damaged BOULDERS prior to the start of the MATCH. Surface wear is not considered damage, so teams are encouraged to anticipate and design for variations.

## Field Management System

### Q954

**Q.** We had a match at the Bayou Regional (qual 73) where we scored two boulders in the high goal. We did not get credit for the two high goals. When it was addressed to the FTA and Head Ref through a student in the question box, in the allotted time, we were told that they could not reproduce a field fault and that no human was responsible for ensuring that boulders were scored correctly. Is there not a system in place to ensure that boulders are scored correctly by the field?

**A.** We're sorry you had this experience, but this forum is dedicated to answering specific questions about rules. Please send an email about this, with full details, to [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org), and you can be sure we will get back to you.

### Q782

**Q.** R64 says diagnostic lights visible to arena personnel - during match or before/after match?

**A.** The diagnostic lights on the Wireless Bridge must be visible before the MATCH and in the ROBOT'S STARTING CONFIGURATION. It's strongly recommended that the lights be unobscured during the MATCH in case FIELD STEWARDS need to troubleshoot issues after the MATCH has started.

### Q773

**Q.** May we use TCP 1181 in addition to TCP 1180 to send a second camera image to the Operator console (Dashboard)?

**A.** No, you are only allowed to use the ports/protocols specified in R60.

## Game Manual - Game

### Q950

**Q.** If our robot is able to scale above the low goal, then after the robots are disabled the motors can't hold the weight and the robot drops below the low goal will we be credited with a scale. If the answer is no, how long must the robot hang above the low goal to be awarded credit?

**A.** Per Section 3.3.1: "The final assessment of ROBOTS having SCALED or CHALLENGED the TOWER is made five (5) seconds after the ARENA timer displays zero (0), or when all ROBOTS have come to rest following the conclusion of the MATCH, whichever happens first." If a ROBOT is "dropping" or "slipping" it has not yet come to rest.

### Q916

**Q.** According to the definition of CAPTURE, the state of a TOWER if, at the end of the MATCH, it is WEAKENED, and it is surrounded such that each of the three (3) opponent ROBOTS has SCALED or CHALLENGED a unique face of the TOWER. If an ALLIANCE robot is not on the field at the beginning of a match, and a tower meets the definition of WEAKENED, can two CHALLENGING and/or SCALING robots complete a CAPTURE?

**A.** No, a CAPTURE requires all three (3) opponent ROBOTS. It's in an ALLIANCE'S best interest to help ensure all Teams on the ALLIANCE are ready to play in a MATCH, or a CAPTURE cannot be accomplished

### Q908

**Q.** Would field faults be considered one of the special circumstances for G10?

**A.** Yes, an ARENA fault may be a special exception for G10. Please remember that even in these circumstances tethering is still prohibited without express permission by the FTA or a REFEREE.

### Q875

**Q.** Can drivers wear stilts like painters where or stand on a bench?

**A.**We believe that the answer to [Q872] applies to stilts as well. If we're mistaken, please rephrase your question and resubmit. Thank you.

#### **Q784**

**Q.**Could you please clarify the intended interplay between G11 and G21. If a blue robot is attempting to score(or return from scoring) and a defending red robot forces blue into red's secret passage will a foul be assessed, and if so, to who? Is this dependent on the amount of forcing that the red robot does, i.e. actively pushing blue vs merely blocking blue from exiting the area between the batter divider and secret passage.

**A.**As discussed in [Q721] and [Q542], G11 will not be called if a ROBOT is, in the judgement of the Referee, attempting to play the game. If the contact is such that it was solely to cause the opponent to violate a given rule, G11 will be called.

#### **Q721**

**Q.**If a red robot breaks down in the blue secret passage, effectively preventing boulders from being fed through both low embrasures and a blue robot attempts to push the red robot away repeatedly, but is clearly not able to do so, what happens? Does the red robot repeatedly get called for technical fouls? Does the blue robot eventually get called for trying to draw a foul? Etc.?

**A.**We will not rule definitively on hypothetical scenarios in this forum as many factors may play into rulings in individual situations. Generally a Team will not be called for G11 (attempting to draw a foul) if they are, in the judgement of the Referee, attempting to play the game, however futilely. There is no exemption from penalties for ROBOTS which have become immobile or DISABLED.

#### **Q676**

**Q.**Per Team Update 05, the wording of G12-1 has changed. What constitutes as using a BOULDER to "ease...the challenge associated with other field elements, e.g. DEFENSES"? If my robot uses a boulder in its possession to push down on top of a Cheval de Frise segment, or to open the Sally Port or Drawbridge, is that considered "easing" the challenge? Does it make a difference if my robot could not otherwise traverse that DEFENSE?

**A.**Good Question! No, using a BOULDER as an extension of your ROBOT (e.g. using a BOULDER to push on the Sally Port Door) would not be considered "easing ... the challenge." Example violations of G12-1 would include using the BOULDER to prop open the Sally Port (to ease the challenge) or placing BOULDERS within the Moat to make it more difficult for ROBOTS to CROSS it (to amplify the challenge).

#### **Q661**

**Q.**Q613 and Q610 don't specify one robot being able to open the defense from the opposing alliance courtyard, our question is specific to opening the defense from the opposite side and then holding it open. "Can a defense be opened from the courtyard side for an alliance partner in the neutral zone to enter? I.E. pushing the drawbridge down from the courtyard for alliance partners to come in from the neutral zone?"

**A.**Thank you for the clarification in your question. The answers to [Q613] and [Q610] still apply, with the added clarification that it does not matter which direction a DEFENSE is being opened from nor does it matter the direction of travel.

#### **Q654**

**Q.**Can we use kinect during Auto/Teleop ?

**A.**There are no rules prohibiting the use in general of a Kinect on your ROBOT or as part of your OPERATOR CONSOLE. However, please see G14 prohibiting DRIVE TEAMS from directly or indirectly interacting with ROBOTS or OPERATOR CONSOLES during AUTO. In the context of your question, G14 prevents DRIVE TEAMS from signaling a Kinect during AUTO, but does not prohibit a Kinect being used in a way during AUTO that does not entail signaling from DRIVE TEAMS.

#### **Q648**

**Q.**Can a defense be opened from the courtyard side for an alliance partner in the neutral zone to enter? I.E. pushing the drawbridge down from the courtyard for alliance partners to come in from the neutral zone?

**A.**This question is similar to [Q613] and [Q610]. We believe the answers to those questions should answer this one as well.

### Q584

**Q.**When scaling the tower and the robot is located on the batter, if you have legs that extend downward to a distance 24" below the bumper is that extension (that is not a part of the robot's normal configuration) a violation of R22.

**A.**Please see the answer to [Q522]. If this does not answer your question, please rephrase and ask again.

### Q566

**Q.**In regards to the Q504 answer. Consider scenario where robot gets a hook and cable onto the rung. The hook and cable are at this time above the base of the robot, within 15" perimeter. While winching in hook the robot orientation changes such that it looks to be driving up the wall, with the cable/hook now in front of robot, outside the 15" perimeter. The answer to Q504 would make this action illegal. While not commenting on the specific design itself, please verify this is intent of ruling.

**A.**The answer to [Q504] is accurate. *Team Update 02* will add additional graphics to help clarify this situation.

## Match Play

### Q924

**Q.**There appears to be a conflict in regard to the BATTER and its association. The glossary states the BATTER to be a part of the TOWER, which is a part of the CASTLE WALL, which borders, but is excluded from the COURTYARD. Figure 2-22 and 2-2 both support this by excluding it from the COURTYARD. But in order to scale without violating G17 the robot must be fully contained in the COURTYARD but the RUNG is not in the COURTYARD. Would this make it impossible to scale? BATTER & TOWER in COURTYARD?

**A.**In *Section 2.2* the FIELD is defined as the "... carpeted area, bound by and including the inward-facing surfaces of the GUARDRAILS and two (2) CASTLES." The important part of this is the "inward-facing surfaces." This is also applied to the TOWER (as part of the CASTLE WALL). The TOWER includes all "inward-facing surfaces" of the TOWER and the BATTER, but does not include the air space above the BATTER. The air space above the BATTER is technically part of the COURTYARD, not the TOWER. Figure 2-2 and 2-22 only represent the field in two dimensions, not the three dimensions of the actual field.

### Q764

**Q.**Can a robot retrieve boulders from the opponents Secret Passage and immediately score on the Tower as long as they entered and exited the Secret Passage through the CourtYard?

**A.**There is no rule preventing retrieval of a BOULDER from the opponent's SECRET PASSAGE, however in order to launch the BOULDER, the ROBOT must be in contact with (and only in contact with) carpet in its opponent's COURTYARD (per G39).

### Q763

**Q.**Spy bots are allowed to have a boulder loaded at the beginning of the game. Can they use the boulder to score on the Tower during autonomous since the boulder did not come from the Neutral Zone? If the spy bot was able to cross a defense during autonomous, would it be considered a crossing since they went from the Courtyard to the Neutral Zone? If considered a crossing, would the defense be weakened?

**A.**Yes, the BOULDER may be scored. No ROBOT has caused the BOULDER to CROSS into the COURTYARD since it started the MATCH in the COURTYARD, so G40 is not relevant. A spy bot may CROSS the OUTER WORKS, however, in order for it to CROSS, the ROBOT must meet the requirements outlined in *Section 3.1.3* (i.e. moving from the COURTYARD to the NEUTRAL ZONE is not CROSSING the OUTER WORKS).

## Drive Team

### Q828

**Q.**Pursuant to G21-1, G24, G38, G39 or any other rule, is a defending Robot(in there own court yard or the neutral zone) placing a boulder on an opponent's robot, disabling it from acquiring another boulder without violating the control rule a violation?

**A.**While this strategy is "outside the box," it's inconsistent with the intended spirit of *FIRST* and *FIRST STRONGHOLD* and is not allowed. *Team Update 11* will update G24 to include this behavior.

### Q820

**Q.**According to update 10: G35 A ROBOT shall be operated solely by the DRIVERS and/or HUMAN

PLAYERS of that Team, and/or an ALLIANCE partner within the SPY BOX. Does this mean that a robot can be operated by someone in the spy box? What type of operation is allowed?

**A.** Yes, that means a ROBOT can be operated by an ALLIANCE partner within the ALLIANCE'S SPY BOX. The manual was recently updated to clarify this in response to [Q803]. We can't, though, list what types of operation are permitted in this forum, as this Q&A is only for clarifying rules. If you have a method of operation you are considering, and after reading the manual, are unsure if it is legal, please resubmit, referencing specific rules.

#### Q771

**Q.** Wouldn't a periscope be allowed under T26-1.F because it is used for tracking strategy ie where are the Boulders and robots?

**A.** T26-1 permits such devices per F. iv. "to plan or track strategy for the purposes of communication of that strategy to other ALLIANCE members." A periscope does not meet this or any other element of T26-1 and is thus not permitted.

#### Q753

**Q.** Can the driver/operator or coach use a very tall periscope device to gain a better view of the field in Teleop?

**A.** Such a device is not listed in T26-1 and thus not permitted.

#### Q730

**Q.** Can the Driver and/or Operator roam about the Castle during Teleop with a handheld control device connected to the Operator Console via a long electrical cable?

**A.** No, per T11 and the associated Blue Box: "The OPERATOR CONSOLE must be used in the PLAYER STATION to which the Team is assigned, as indicated on the Team sign." and "if an operator is located more than approximately ½ PLAYER STATION width away from their own PLAYER STATION, that would be considered a violation of T11."

#### Q694

**Q.** The age range for a member on the drive team is 14-18 years old. If we have a student that turned 14 after the start of the school year but before 12/1/15, would they be eligible to be on the drive team this year?

**A.** Per Section 3.1.1, DRIVERS and HUMAN PLAYERS must be 'pre-college students', so someone who is currently 14, or even younger, would certainly fit the bill. There is no actual requirement that students even be in High School. While the program is designed for High School students, younger folks have participated successfully.

#### Q689

**Q.** Is the drive team allowed to operate anywhere within their castle during Teleop?

**A.** Yes and No, per T11: "The OPERATOR CONSOLE must be used in the PLAYER STATION to which the Team is assigned, as indicated on the Team sign." However, nothing prevents the DRIVE TEAM Members themselves from moving about the CASTLE, as long as they're not taking elements of the OPERATOR CONSOLE with them.

#### Q660

**Q.** Can a team's drive coach be within the drive team zone and still be outside the castle?

**A.** Per G37, the COACH can't contact anything outside the the CASTLE during the MATCH without penalty. So, if you are asking if a COACH can lean outside the CASTLE, without touching anything outside it, the answer is yes. Otherwise, no.

#### Q574

**Q.** Can a human player kick a ball through the openings in the castle wall?

**A.** G33 does not dictate the manner in which a DRIVER or HUMAN PLAYER may enter BOULDERS through the EMBRASURE.

**Q524**

**Q.**Reading rule G29, it seems that human players may use electronic communication devices that are NOT capable of communicating with anybody outside the castle?

**A.**Correct,as long as all other rules are followed. However, please take careful note of *Section 5.5.9* as it will be amended in *Team Update 02* and described in [Q523].

**Q523**

**Q.**My understanding when reading G29 is that the Human Player Spy may use non-electronic communication devices to communicate with the members of the drive team in the castle. Is this correct? If so, are there limitations other than those that might violate another part of the rules?

**A.**Correct, the SPY may employ non-powered signalling devices to communicate with their ALLIANCE. As you noted, the device must comply with all other rules, including the language in *Section 5.5.9* which will be updated to match in *Team Update 02*.

**Match Timing****Q961**

**Q.**In scaling the tower, does the robot have to remain suspended above the line after the match timer goes off (and the robot is therefore powered down) in order to receive points?

**A.**Please see [Q950].

**Defenses and the Outer Works****Q958**

**Q.**At our latest event, our Human Player bowled a BOULDER over the DEFENSE in position 2. We verified ahead of time with the head ref that it was legal since [G40] refers to ROBOTS. Is it legal for a ROBOT to hold a DEFENSE in a strategically-advantageous position (e.g. hold Drawbridge down) in order to facilitate this Human Player strategy? What if multiple BOULDERS go through and THEN the robot CROSSES the defense?

**A.**G40-1 only governs interactions with the Low Bar regarding the manipulation of DEFENSES for the purposes of allowing a DRIVE TEAM member to transfer BOULDERS into their opponent's COURTYARD. If during this process (a DRIVE TEAM member transferring BOULDERS into their opponent's COURTYARD), however, the BOULDER makes contact with an ALLIANCE ROBOT along the way, G40 or G41 is then enforced; G40 if the ROBOT makes contact with a BOULDER outside the OUTER WORKS, and G41 if the ROBOT makes contact with a BOULDER inside the OUTER WORKS.

**Q862**

**Q.**If a red robot is crossing a blue outerworks defense as an offensive move, at the same time as that defense is being defended by a blue robot in the blue courtyard, and the result is the red robot driving over the top of the blue robot, would this be illegal within the rules as they exist, specifically where rules G11, G24, and G43 are concerned? Would the outcome of this situation be different if the blue robot were inadvertently damaged?

**A.**We will not rule definitively on hypothetical scenarios as many factors may play into rulings in individual situations. Generally a ROBOT blocking another ROBOT'S movement is not at risk of a G11 violation. If a REFEREE interprets one ROBOT driving on another ROBOT as a strategic effort, and not merely the result of circumstance, the ROBOT driving on the other ROBOT will likely be issued a violation for G24. If the traversing ROBOT'S BUMPERS are still within the OUTER WORKS, and the defending ROBOT interferes with the traversing ROBOT (as described in the Blue Box of G43), the defending ROBOT has violated G43.

**Q667**

**Q.**Some additional clarification on the answer to Q528: Could a robot on the Courtyard side of a low bar defense protrude a mechanism (like a collector) under the low bar flap to retrieve a bolder bowled/kicked from the player station embrasure and cross it into the courtyard without ever crossing into the neutral zone? The robot would be in control of the bolder for part but not all of the crossing in this way and would only be able to cross one bolder at a time.

**A.**The scenario proposed is very similar to the one in [Q603]. As noted there, the ROBOT "completes the action of the BOULDER moving from the NEUTRAL ZONE to the COURTYARD and is thus considered to be the one to have caused it", if the ROBOT does not complete a CROSSING, then G40 has been violated.

#### **Q643**

**Q.**During auto, if a robot were to cross from the neutral zone through a defense and into the courtyard, they receive 10 points. If that robot were to back out the way it came, back over the defense and into the neutral zone then cross the defense again to go back to the courtyard, do they receive 20 points and knock out the defense?

**A.**No. Per *Section 3.1.3*, "Once a ROBOT CROSSES a DEFENSE in AUTO, any additional REACHES or CROSSES by that ROBOT during the AUTO period will not decrease DEFENSE STRENGTH nor contribute points to the ALLIANCE." You can only get credit for one of those during AUTO.

#### **Q627**

**Q.**During AUTO, a ROBOT begins a legal CROSSING of a DEFENSE but does not complete the CROSSING by the end of AUTO because it is not fully contained in the opponent's COURTYARD. At the start of TELEOP, the ROBOT continues the act of CROSSING and ends up fully contained within the opponent's COURTYARD. Since, according to 3.1.3, the DEFENSE was not CROSSED in AUTO, is finishing the action (moving from the DEFENSE to the opponent's COURTYARD) considered CROSSING during TELEOP?

**A.**Since the definition of CROSSING would not be met until TELEOP, yes.

#### **Q613**

**Q.**If one Alliance member works to open the drawbridge and holds it open, can more than one robot of the same alliance pass through, meeting the requirements described in Para. 3.1.3 and get credit for CROSSING the DEFENSE?

**A.**The only requirements for the DEFENSE to be considered CROSSED are outlined in *Section 3.1.3*, there is nothing that would explicitly prevent multiple ROBOTS from passing through a DEFENSE being manipulated by an ALLIANCE member.

#### **Q610**

**Q.**Dear FIRST, We have a couple questions regarding the FRC STRONGHOLD game that we would like to have answered. 1.) Can we drive into our secret passage to pick up balls from our teams return? 2.) Can one robot hold open the Sally Port defense open for the other two robots in our alliance consecutively? Thanks so much! Sincerely, Team 5918 Cristo Rey Kansas City High School

**A.1:** Yes, you can. G20 restricts the ways in which your opponent can enter your SECRET PASSAGE, but not how you may enter your own SECRET PASSAGE. 2: Yes, you can hold open the Sally Port for other ROBOTS. Welcome to the FIRST Robotics Competition, and thanks for asking your question!

#### **Q536**

**Q.**In theory, you can cross multiple Defenses, and score them all once you enter the opponent's courtyard. Suggestion: 3.1.3 definition of cross, add to first bullet point: "opponent" before DEFENSE, and to the end of the last bullet point "before contacting another DEFENSE". Similar change to Cross in Definitions.

**A.**Hello again, FRC Team 2202. Please see information we posted under Q535.

#### **Q528**

**Q.**Is this permitted: Robot lifts up the flap of the LOW BAR defense, then the HP then launches a boulder out of the embrasure with enough force that the boulder goes over the secret passage berm and through the open LOW BAR defense?

**A.**Thank you for asking this good question. As currently written, this action is legal. However, it conflicts with the intended game play whereby BOULDERS are brought to COURTYARDS by ROBOTS, and therefor *Team Update 02* will introduce a rule that prohibits this option for getting BOULDERS into the opponent's COURTYARD.

**Q527**

**Q.**Can two robots transit the Sally Port, Portcullis, and Drawbridge without closing between the transits?

**A.**Please see [Q526]. If that does not answer your question, please restate and resubmit.

**Q526**

**Q.**Can one robot hold open a defense (the Sally Port, Portcullis, and Drawbridge) and allow two other robots to come through without closing the defense between them?

**A.**Yes. The definition of **CROSSED** in *Section 3.1.3* neither requires **DEFENSES** to be reset to their original positions, nor does it require **ROBOTS** to deal with **DEFENSES** on their own.

**Q505**

**Q.**If a **ROBOT** moves from the opponent's **COURTYARD** through the opponent's **OUTER WORKS** and is completely in the **NEUTRAL ZONE** but is still in contact a **DEFENSE**, for how long does the **ROBOT** need to be free of the **DEFENSE** before attempting to traverse the **OUTER WORKS** again? For example, if a **ROBOT** were to push the Sally Port or Drawbridge away momentarily before traversing again, would this result in a **CROSSED DEFENSE**? PS: Section 4 in the 1/13/16 Game Manual seems to be Section 4 from the Admin Manual

**A.**Per the Blue Box in *Section 3.1.3*, it is the responsibility of the **DRIVE TEAM** to make clear to the **REFEREE** that they have satisfied all requirements of **CROSSING** a **DEFENSE**. If it is not clear to the **REFEREE** whether or not the **ROBOT** was initially free of contact with the **DEFENSE** prior to the **CROSSING** attempt, **REFEREES** are instructed to not award credit. It is in the **DRIVE TEAM'S** best interest to make it abundantly clear that the **ROBOT** is initially free of contact with the **DEFENSE** prior to **CROSSING**.

## The Tower

**Q913**

**Q.**Is it legal to shoot a projectile from the robot to the bar of the tower during the last 20 sec of the match to aid in climbing?

**A.**There are no specific rules against this, assuming the projectile remains attached to the **ROBOT** in some way, but a **ROBOT** designed to launch hard-edged projectiles (such as hooks) will invite close scrutiny by Inspectors to ensure it is safe per G1.

**Q691**

**Q.**Can a robot scale the tower vertically (in parallel to the tower) if he is not violating rule G18?

**A.**There are no rules that explicitly govern the orientation of a **ROBOT** as it **SCALES** the **TOWER**. As you have noted, your **ROBOT** would need to comply with G18 (along with all other rules such as G19-1) while completing the **SCALE**.

**Q611**

**Q.**can the tower be scaled if it has not been weakened

**A.**A **ROBOT** that has **SCALED** the **TOWER** will be awarded points, regardless of the **WEAKENED** state of the **TOWER**.

**Q589**

**Q.**Will teams who **SCALE** the **TOWER** by strategically but safely violating G18 and/or G19-1 be awarded points for **SCALING** the **TOWER**?

**A.**Each rule and scoring condition is evaluated independently, unless specifically noted in the Game Rules. However, please note that per *Section 5.5.4*, the Head **REFEREE** may assign **CARDS** "In addition to rule violations explicitly listed...as a result of egregious or repeated **ROBOT** or Team member behavior."

**Q567**

**Q.**If an alliance Weakens a **TOWER** (0 health) and then incurs a tech foul, bringing the **TOWER** to 1

health, is the TOWER still considered WEAKENED, or does another boulder need to be scored for the Alliance to be able to CAPTURE the TOWER? The Game Manual does not address this potentially regional-influencing situation, as a team could potentially lose 1 Ranking Point (Capturing Points) or 25 points in Playoff Matches. Reference (3.1.4 THE TOWER)

**A.** Per **Section 3.1.4**: "A TOWER is WEAKENED if the TOWER'S STRENGTH is at or below zero (0)." If you earn a TECH FOUL and the STRENGTH is increased from zero(0) to one (1), the TOWER is no longer WEAKENED. If the TOWER'S STRENGTH is -1 (negative 1) and a TECH FOUL is assigned, the STRENGTH is increased to zero (0). In this case, the TOWER would remain WEAKENED.

#### Q559

**Q.** Is it a legitimate scale if your robot is supported by the batter and is touching the bar as long as the lower edge of the bumper is above the mortar?

**A.** Please see **Section 3.1.4** for the requirements to have SCALED the TOWER. The requirements for SCALING do not have a support requirement. While the mortar line exists to assist REFEREES, SCALING is measured in reference to the openings of the Low GOAL, not the mortar. Also, please keep in mind the BUMPER ZONE requirements in R22.

#### Q557

**Q.** How much contact is allowed between the robot and the Tower while scaling? (example: scraping, bumping, rubbing)

**A.** There's no rules that limit the contact between a ROBOT and the TOWER while SCALING. That being said, the ROBOT must not cause FIELD Damage (per G12) and please review the last Blue Box in *Section 3.1.4* regarding the GOAL openings.

## Match Logistics

#### Q941

**Q.** Perhaps I missed an update but I seem to remember reading that the defense would only decrease in strength if the robot "controlled" the boulder while crossing the defense. Has this been changed?

**A.** The definition of CROSSING (as described in *Section 3.13*) and the associated scoring criteria for a CROSSING (as described in *Section 3.3*) have never contained a requirement regarding a BOULDER.

#### Q939

**Q.** Is it permissible for a team's Safety Captain (identified with Safety Captain badge) to assist with carrying a robot on and off the field?

**A.** Only members of the DRIVE TEAM are permitted in the ARENA for a MATCH, and the Safety Captain may be one of those four individuals. If your Safety Captain is not one of the four individuals on the DRIVE TEAM, they are not allowed in the ARENA (G31).

#### Q899

**Q.** Team 3930 has a no-lift policy. Rather than lifting our robot, we use Johnson bars to lift our robot onto our cart. This year's robot has rhino-tracks, rather than wheels, so we cannot roll our robot on or off the playing field. Can we roll a small cart 30 x 19 x 4 inches under our robot, while on the field, to move the robot on to and off of the field?

**A.** While there's no rule explicitly prohibiting carts or other aids on the FIELD for ROBOT setup, the FIELD is congested and bulky items or additional trip hazards may be subject to T1. Please consult with your HEAD REFEREE, FTA, and FIELD Supervisor at the event so they can determine if the implementation is a safety hazard for other Teams and FIELD STEWARDS.

#### Q841

**Q.** How does the Placement of the Defenses go during Match Play (i.e Do the defenses get placed first then the robots are allowed to set up or do the robots get set first then the chosen defenses get placed.)

**A.** There's no prescribed protocol for which elements are staged on the FIELD first: ROBOTS or DEFENSES. This procedure is left to the discretion of the FIELD STEWARDS based on safety, space, and efficiency of what needs to get done. Meanwhile, in case your question is really about when you find out what the DEFENSES are, per *Section 5.5.10.2*, Step 2, teams receive a list of the DEFENSES before they move to the FIELD. DEFENSES for the upcoming match, along with their positions, will also be displayed

on the audience screen.

### Q790

**Q.**Section 3.2 says a robot may be pre-loaded with a Boulder at the start of a match. Does this apply to a spy-bot placed in the Courtyard? There seems to be no restriction in the rules to prevent this - but that would seem to run counter to the flow of the game (where Boulders must be transported through the defenses before they can be scored in a goal).

**A.**We believe [Q563] and [Q763] both answer your question. If not, please rephrase and resubmit.

### Q582

**Q.**Can the surface of the tower surrounding the goal opening be use as support during a scale?

**A.**There are no rules prohibiting contacting or pushing against the TOWER faces, however please be mindful of G12.

### Q537

**Q.**A robot might "control" a Boulder while it is resting on the carpet, but fully within the frame perimeter. In 3.2.A, can you change "fully supported" to "fully supported or fully contained".

**A.**Please see [Q535].

## Scoring

### Q630

**Q.**Sorry my previous wording was convoluted. In the simplest form of question, if a ROBOT just (for example) scissor lifted itself to the SCALING RUNG, and kept the scissor lift on the BATTER at the end of the MATCH, would that count as SCALING? It is touching the BATTER and touching the SCALING RUNG and could have its BUMPERS above the LOW GOAL. But this seems against the spirit of the challenge of SCALING.

**A.**Please See R22, paying special attention to Example B in the blue box. We can't rule on specific designs, but if you were to take your ROBOT, with the scissor lift extended, and place it on the flat floor as indicated in the blue box, would your BUMPERS still be in the BUMPER ZONE (that is, between 4" and 12" above the floor)? If not, then you would be violating R22, which would lead to a violation of G19-1, and your ROBOT would be DISABLED.

### Q605

**Q.**As per Table 3-1, points are awarded for CROSSING an UNDAMAGED DEFENSE. The glossary only defines a DAMAGED DEFENSE, where the DEFENSE's strength is zero (0). Does CROSSING a DEFENSE with strength one (1), which is therefore not fully UNDAMAGED (as it is not the starting strength of two (2) ), result in points awarded to the team?

**A.**Yes. An UNDAMAGED DEFENSE is a DEFENSE that does not meet the specific definition of DAMAGED. You get points for two CROSSINGS per DEFENSE.

### Q581

**Q.**If the ROBOT has bumpers that are within 4-12" of the virtual plane of a robot resting normally on the floor, yet the robot has to be ~2' above floor to SCALE to TOWER, then any mechanism that protrudes below the virtual plane of the wheels and contacting the BATTER would seem to violate R22 (as is shown in the blue box beneath R22 examples A and B). G18 seems to show examples (in blue box) of how the virtual planes transpose with a robot off the floor.

**A.**We want to be helpful, but don't know what your actual question is. Can you rephrase and ask again please?

### Q564

**Q.**3.1.4 The Tower, says in one part, "A ROBOT has SCALED or CHALLENGED a unique face of the TOWER if it is the only ROBOT in contact with the attached RUNG and/or associated third of the BATTER below (i.e. a ROBOT may extend over the divider into the space of another face as long as it is not in contact with the RUNG or BATTER in front of that face)." Can the ROBOT be in contact with the BATTER when SCALING? Does a ROBOT that is credited with SCALING still have to meet BUMPER ZONE rules?

**A.** Yes, a ROBOT may be in contact with the BATTER and also meet the criteria for having SCALED the TOWER. Yes, G19-1 (and consequently R22) apply at all times during the MATCH.

## Point Values

### Q722

**Q.** Is it possible for one robot to score points for both CROSSING (10 points) and REACHING (2 points) the OUTER WORKS during the autonomous period for a total of 12 points?

**A.** No. *Section 3.3* states "points are earned by ROBOTS that REACH or CROSS a DEFENSE" (Emphasis added). So, you can't get both for CROSSING a single DEFENSE. Also, per *Section 3.13*: "Once a ROBOT CROSSES a DEFENSE in AUTO, any additional REACHES or CROSSES by that ROBOT during the AUTO period will not decrease DEFENSE STRENGTH nor contribute points to the ALLIANCE." So, you can't get additional REACH points by CROSSING one DEFENSE then REACHING another.

### Q641

**Q.** A SCALE is "an act performed by a ROBOT, such that at the conclusion of the MATCH, it is fully supported by the TOWER..." However, 3.3.1 states "The final assessment of ROBOTS having SCALED... the TOWER is made five seconds after the ARENA timer displays zero..." Does this mean an assessment made at the end of the match is overruled by one made 5 seconds after "the conclusion of the MATCH", or it must meet the qualifications of a SCALE at "the conclusion of the MATCH" and 5 seconds later?

**A.** The goal is to have your ROBOT meet the SCALED criteria by the time the TELEOP timer reaches zero. If ROBOTS are at rest at that point, that is the point at which the SCALE will be assessed. However, if ROBOTS are still moving at and after the TELEOP time reaches 0, there is a 5-second window for them to come to rest. Per *Section 3.3.1*, which you've referenced helpfully, "The final assessment of ROBOTS having SCALED or CHALLENGED the TOWER is made five (5) seconds after the ARENA timer displays zero (0), or when all ROBOTS have come to rest following the conclusion of the MATCH, *whichever happens first*."

### Q539

**Q.** Does the Boulder have to exit into the Corral during Autonomous in order to be considered scored during Autonomous? For example, the Boulder is shot with 2 seconds remaining in Autonomous and enters the High Goal. For whatever reason, it takes 5 seconds (3 seconds after the end of Autonomous) to exit into the Corral. There is a 5 second Final Assessment period for Teleop. Is there a similar assessment period for Autonomous?

**A.** Good question. A BOULDER does not need to exit into the CORRAL in AUTO to be considered scored in AUTO (or be scored in the MATCH in case it gets to the CORRAL shortly after the end of the MATCH). The system is designed such that, in a majority of cases, BOULDERS are credited in the period in which they enter a GOAL (assuming they do not bounce out). In the rare occasion when an official sees an AUTO SCORED BOULDER pass through the sensors after the sensors have transitioned to TELEOP, the score will be adjusted at the end of the MATCH. *Section 3.1.4* will be updated in *Team Update 03* to state this explicitly.

### Q538

**Q.** I am curious how the following would be scored: Boulder enters High Goal, but exits the Castle through the Low Goal, and not into the Corral. The High Goal sensor would detect the Boulder, but the Corral sensor would not.

**A.** This submission incorrectly represents the functionality of the FIELD. A BOULDER is scored in a GOAL if it passes through the opening of that GOAL and exits into the CORRAL. The internal elements of the TOWER function such that High GOAL BOULDERS are assessed independently of Low GOAL BOULDERS.

### Q534

**Q.** Can the same robot score more than once on the same defense during auto mode?

**A.** *Section 3.1.3* states that "Once a ROBOT CROSSES a DEFENSE in AUTO, any additional REACHES or CROSSES by that ROBOT during the AUTO period will not decrease DEFENSE STRENGTH nor contribute points to the ALLIANCE." Therefore, a single ROBOT can only score one CROSS or one REACH (but not both) during the AUTO period.

# Penalty Assignment

Not Available

## Game Rules

### Q658

**Q.** does an alliance have to defeat the tower in order to get the points for scaling the tower or sitting on the batter

**A.** We believe the answer to [Q611] answers your question.

## Safety

### Q897

**Q.** Is it a violation of G4 for a HUMAN PLAYER to have a body part briefly enter the polycarbonate tunnel that leads to the EMBRASURE? The body part would not come close to passing through the EMBRASURE into the FIELD, but would momentarily protrude up to a few inches into the tunnel.

**A.** The poly-carbonate tunnel is not, by definition, a component of the EMBRASURE - it is merely a structure designed to help prevent ROBOT to HUMAN PLAYER contact (per *Section 2.2.3.1*) and thus is not subject to G4. However, body parts deep in the tunnel and near ROBOT parts in close proximity to the EMBRASURE are safety concerns and likely subject to T1.

### Q549

**Q.** Can a human player insert his hand into the Brattice and throw a boulder upwards in accordance with the exception stated in G4 - "momentary encroachment through the hole in the human player station behind the brattice while placing a boulder into that hole"?

**A.** No, "popping" the BOULDER upwards out of the BRATTICE is not "momentary encroachment."

## Pre-Match and Post-Match

### Q747

**Q.** [G7-E-i] tells us that robots that start in the MID ZONE must start "breaking the plane of the AUTO LINE". Must the robot FRAME PERIMETER break the AUTO LINE plane, or may bumpers be what breaks the plane? In addition, if any portion of the robot is within the volume above the 2" wide gaffers tape that defines the auto line, is that considered breaking the plane (rather than the robot needing to break the plane of both edges of the gaffers tape)?

**A.** You're right that it's not always explicit as to whether BUMPERS are part of the ROBOT for various rules, our apologies for that! We will fix that in *Team Update 08*. In reference to G7, the term ROBOT is used inclusive of the ROBOT'S BUMPERS. G7-E-i refers to breaking the planes defined by either edge of the AUTO LINE with any part of the ROBOT (including BUMPERS). In other words, if any portion of the ROBOT is within the volume above the AUTO LINE, G7-E-i has been satisfied.

### Q565

**Q.** Can you carry your robot onto the field meeting the perimeter and height requirements. Then once on the field lower an arm that would fall within the 15 inch requirement prior to game play? In previous seasons other teams seemed to add attachments to their robot once it was carried onto the field.

**A.** No, per G7-D "When placed on the FIELD for a MATCH, each ROBOT must be: ...D. confined to its STARTING CONFIGURATION". This means the ROBOT must stay in the STARTING CONFIGURATION until the MATCH has begun. Previous year's rules do not apply to *FIRST STRONGHOLD*.

## General Rules

### Q948

**Q.** Are teams allowed to suction cup to the driver station glass? We have been informed that this is a G12 violation but so would be attaching to the driver station Velcro and the Ethernet clip. Also a drive team member grabbing the shelf would also be a G12 violation since apparently G12 applies to more than robots, who knew?

**A.** No, Teams are not allowed to attach to the FIELD. The PLAYER STATION hook-and-loop, Ethernet

cable, and power outlet exceptions, as you've noted in your question, will be included in G12 as of [Team Update 17](#).

#### Q851

**Q.** Are teams allowed to mount approximately a ten foot pole with a wired camera on top to their individual driver station and get a bird's eye view of the match for driver use during the match?

**A.** Updated 3-17: We apologize for the adjustment. A maximum height for the OPERATOR CONSOLE has been implemented in [Team Update 16](#).

#### Q812

**Q.** G29 states that electronic devices may not be used that are CAPABLE of receiving or sending signals OUTSIDE of the castle. q524 of Q&A asks whether powered communication devices may be used, and first said as long as its within the rules of g29 its okay. So would a wired communication headset system between the drivers of the members INSIDE castle be legal?. rule t11 states tether attached to the operator console may not extend more 1/2 station. But this system wont be attached to the op console

**A.** No, such devices are not listed in T26-1 and thus not permitted in the CASTLE.

#### Q810

**Q.** Is G19 violated if when climbing the tower a hook is separated from the arm that placed it on the rail but is still attached to the robot by a cable?

**A.** An element attached to the ROBOT has not been detached from the ROBOT and thus G19 doesn't apply.

#### Q794

**Q.** When the robot is hang WHICH MUST BE THE HEIGHT BETWEEN THE FLOOR AND THE ROBOT

**A.** Please see *Section 3.1.4*. A ROBOT has SCALED the TOWER if, at the conclusion of the MATCH, the ROBOT is in contact with a unique RUNG and has all of its BUMPERS fully above the height of the low GOALS. The low GOALS are 2 feet tall as measured from the top of the BATTER. ROBOT BUMPERS must be above that, and contacting a RUNG to SCALE. It's in your best interest to make sure the BUMPERS on your ROBOT are clearly above that opening to make it easy on the REFEREES.

#### Q645

**Q.** Team Update 1 included: G12-1 ROBOTS may not use FIELD elements, e.g. BOULDERS, to interfere with the operation of other FIELD elements, e.g. DEFENSES Is this intended to prohibit robots from using a boulder it is carrying to perform the normal operation required to traverse the defense? Examples: pushing down on one plank of the Cheval de Frise, or pushing/pulling the Drawbridge or Sally Port open. The intent is to continue to carry the boulder to score, not to wedge it in the defense.

**A.** No, using a BOULDER to operate DEFENSES as they are intended to be operated, such as pushing open the Sally Port, would not be a violation.

## Auto Rules

#### Q759

**Q.** Are teams allowed to use the camera on a computer during the Autonomous period to control their Robot a la "CheesyVision"?

**A.** Please see [Q654].

#### Q615

**Q.** Q607 is in context of T26-1, yet the question and the answer both seem to violate G14 since the human player in the SPY BOX is part of the DRIVE TEAM. Please re-affirm that the human player in the SPY BOX may wear items that intentionally provide reference to an autonomous robot (which could go in some insanely cool directions).

**A.**It would indubitably be a violation of G14 for the HUMAN PLAYER in the SPY BOX (who is indeed a member of the DRIVE TEAM) to interact with a ROBOT during AUTO. However, a HUMAN PLAYER in the SPY BOX may use non-powered signaling devices that do not mimic the Vision Guides nor "jam or interfere with the remote sensing capabilities of another Team" during TELEOP.

#### Q595

**Q.**If, when taking a BOULDER from the MIDLINE during AUTO, our intake mechanism passes slightly into the volume above the MIDLINE, would this be considered a FOUL?

**A.**We believe the answer to your question can be found in rule G13. If this does not answer your question, please let us know.

#### Q558

**Q.**Can spy bots breach a defense during Autonomous and earn points for it?

**A.**It's not possible to BREACH the OUTER WORKS during the AUTO Period. That being said, there are no rules that prohibit a SPY Bot from CROSSING or REACHING a DEFENSE during AUTO.

#### Q555

**Q.**If a robot crosses a defense in auto does the defense's strength decrease? Also, do tower goals scored during auto weaken the tower strength?

**A.**Please see [Q525] regarding ROBOTS in AUTO. Regarding BOULDERS, *Section 3.1.4* states "Each BOULDER scored in a GOAL decreases the TOWER'S STRENGTH by one (1)." A scored BOULDER decreasing TOWER STRENGTH is not contingent on occurring during a specific period of a MATCH.

#### Q525

**Q.**It is unclear if a defense's strength is decreased when a robot crosses the defense for the first time during auto, is it?

**A.**Yes, *Section 3.1.3* states that "Once a ROBOT CROSSES a DEFENSE in AUTO, any additional REACHES or CROSSES by that ROBOT during the AUTO period will not decrease DEFENSE STRENGTH nor contribute points to the ALLIANCE." which is intended to imply that the first CROSS does decrease DEFENSE STRENGTH.

#### Q510

**Q.**If a team has more than the allowed number of boulders in the castle during autonomous G33 states that a team would not be able to rectify the situation because boulders may not be introduced into tele-op. Will a team get a foul for having more than the allowed number of boulders in autonomous?

**A.**Good question. G34 will be updated in *Team Update 02* to clarify that it only applies during TELEOP. Our apologies for the conflict.

#### Q507

**Q.**Can I collect boulders from the midline during Auto (without crossing the midline)?

**A.**There are no rules that prohibit retrieval of BOULDERS from the MIDLINE in AUTO.

#### Q506

**Q.**Can I touch an opponent's robot when my robot is not in the opponent's secret passage but the opponent's robot is?

**A.**There are no penalties for contacting an opponent's ROBOT that is in their SECRET PASSAGE if your ROBOT is not contacting carpet in their SECRET PASSAGE per G21.

## Robot, Robot to Robot, & Gameplay Actions

#### Q952

**Q.**Follow-up to Q940: Team Updated 16 modified G13 to make contact transitive through Boulders.

G43 has a similar rule, but it is an "interfere" rule, not a "contact" rule. For purposes of G43, is transitive contact (pushing, bumping) through a Boulder considered "interference"? In other words, could a robot play defense on a shooting robot in the Outer Works through a Boulder?

**A.**As you point out, G43 doesn't require contact between the ROBOTS. If, in the judgement of the REFEREE, a ROBOT is interfering with an opponent attempting to traverse the OUTER WORKS (regardless of whether a BOULDER is involved), G43 will be invoked.

#### Q940

**Q.**Week 1 at the Northern Lights Regional a team used rule 3.4.10 DEFENSE Rules G43 to protect themselves from being defended while shooting for the high goal. In the spirit of the rule, I believe that this is not the focus - In no way was the robot in question trying to cross the OUTER WORKS at the time it was contacted by an opposing robot. It merely slides a part out the back of its frame, crossing over the boundary or plain of the OUTER WORKS so it can not be defended. Can this be addressed?

**A.**While we cannot comment specifically about a particular ROBOT or Event, the shooting ROBOT described in your scenario would indeed be protected as long as any part of their BUMPERS are within the opponent's OUTER WORKS. As noted in the Blue Box directly below G43, the ROBOT doesn't need to traverse the OUTER WORKS in order for the protection to apply. As noted in *Section 1.4* of the Manual: "Please avoid interpreting the text [of the Manual] based on assumptions about intent"

#### Q930

**Q.**As a followup to Q884: Assume that Robot enters the Opponent's SP from the Neutral Zone with a Boulder. That would be a G20 and G27 fouls. In order to avoid another G20, the Robot exits into the Opponent's Courtyard with the Boulder. Would the Robot then receive a G40? Does the G27 cause the Boulder to now be considered originating from the SP for purposes of G40? Otherwise, that would be a double penalty for basically the same infraction.

**A.**G40 is violated if a ROBOT causes a BOULDER to move from the NEUTRAL ZONE into the opponent's COURTYARD without meeting criteria required in A and B, regardless of whether other rules have been violated.

#### Q900

**Q.**In Regards to Rule G-39 My question is I have seen teams at Week 0 events parking on the COURTYARD side of the OUTER WORKS and in contact with one of the OUTER WORKS ramps and shooting the BOULDER, in my opinion this violates rule G-39 because the OUTER WORKS or sitting on top of carpet and the OUTER WORKS are defined as having an infinitely tall volume. We just need a clarification as of how this rule will be enforced.

**A.**G39 prohibits launching BOULDERS unless a ROBOT is: "in contact with the opponent's TOWER or carpet in the opponent's COURTYARD, and not in contact with any other carpet." A ROBOT which is contacting the carpet in the opponent's COURTYARD and also contacting the PLATFORM ramps (or any other non-carpet part of the OUTER WORKS) meets these criteria and therefore is not in violation of G39.

#### Q884

**Q.**As a follow-up to Q725, assume a Robot that enters the Opponent's Secret Passage from the Neutral Zone and is given a Foul per G20. Does the Robot then need to complete the bypassing of the Defenses and exit into the Opponent's Courtyard? What if they did not intend to use the Secrete Passage to bypass the Defenses. If the Robot immediately exits back to the Neutral Zone, does the Robot then get another G20 Foul? Would that be considered "repeated" for purposes of the Tech Foul?

**A.**If a ROBOT enters the opponent's SECRET PASSAGE (i.e. the only carpet the ROBOT is in contact with is the carpet inside the SECRET PASSAGE) and then exits to the NEUTRAL ZONE, however long or short that delay may be, they will receive two FOULS (one for entering, one for exiting). There is no FIRST Robotics Competition specific definition of "repeated" so the general definition applies, renewed or recurring again and again. This does not apply to a ROBOT's single action of accidentally entering the opponent's SECRET PASSAGE and exiting from/to the NEUTRAL ZONE.

#### Q869

**Q.** Rule G28 will reward an opponent robot with a SCALE if contacted within an alliance's COURTYARD in the final 20 seconds of the match. Suppose an alliance robot has become DISABLED, lost communication, or is for some other reason unable to move from their own COURTYARD, and is near or on their own BATTER. If all three opposing robots attempt to CHALLENGE, without ability to SCALE, will one robot be rewarded with a SCALE upon contact with the immobile robot?

**A.** Whether or not a ROBOT is physically capable of SCALING has no impact on G28. Additionally, DISABLED or E-Stopped (or otherwise immobile) ROBOTS are not exempt from receiving violations. While we cannot rule absolutely on hypothetical scenarios, each contact instance is evaluated separately, and those ruled violations of G28 would result in a SCALE being awarded.

#### **Q840**

**Q.** In regards to G25 - C: may a robot block a low goal while parked on its own BATTER if only the frame perimeter is used to block said goal?

**A.** A ROBOT parked on its BATTER and blocking a Low GOAL with only elements inside its FRAME PERIMETER does not violate G25-C.

#### **Q825**

**Q.** Can a defensive robot park on the batter to block a low goal throughout the match?

**A.** We're sorry, the purpose of the Q&A is not to develop/validate strategy, but instead offer clarity around specific rules. If you have a question about a specific rule, please ask again and include what specific rule you are concerned about.

#### **Q796**

**Q.** How much can the robot use the tower to assist in balancing?

**A.** We're assuming that when you say 'balancing' you mean SCALING. If this is not the case, please rephrase and ask again. If it is the case, we think the answer to [Q582] may help you.

#### **Q733**

**Q.** What constitutes as a pin in this year's game? Does the defensive robot have to initiate contact? If an offensive robot is on the tower battens trying to score in the tower and a defensive robot parks behind them without initiating contact and the offensive robot cannot get off the batten is this considered a pin?

**A.** There's no *FIRST* Robotics Competition specific definition of "pinning." From Merriam-Webster's Dictionary: a pin can generally be defined as "to prevent or stop (someone or something) from moving." There is no requirement of contact for pinning to occur. While we cannot rule absolutely on hypothetical game scenarios, generally speaking, parking behind an opponent ROBOT that is on the BATTER would be considered pinning as the dividers on the BATTER, combined with the pinning ROBOT, would prevent the opponent from escaping.

#### **Q725**

**Q.** G20 states a robot may ENTER and EXIT from the opponent's SECRET PASSAGE from/to the opponent's COURTYARD seems very specific. However, may a robot EXIT from the opponent's SECRET PASSAGE to the NEUTRAL ZONE without penalty?

**A.** No, per G20 a ROBOT "may only enter or exit their opponent's SECRET PASSAGE from/to the opponent's COURTYARD." (Emphasis added)

#### **Q673**

**Q.** what is defined as the robots perimeter as to abide by G18. If a frame is independent from the wheel base is it the frame itself or the wheel base that determines the angle of the perimeter perimeter. Ex: the frame is at 60 degrees but the wheels lie flat at 20 degrees.

**A.** Please see R2 and the associated Blue Box for information on determining a ROBOT's FRAME PERIMETER. There is no requirement that the FRAME PERIMETER be at any specific angle to wheels or the floor, though it must be within the BUMPER ZONE.

**Q668**

**Q.**If a boulder is bowled/kicked from the player station embrasure in such a way that it deflects off of a robot (either intentionally or unintentionally) and bounces over the defenses and into the opponents courtyard, does this action cause a penalty? If not, is there anything preventing a team from designing a mechanism (like a small ramp) that is intended to deflect boulders bowled/kicked from the player station embrasure over the defenses without ever actively controlling said boulder?

**A.**If a ROBOT causes a BOULDER to move from the NEUTRAL ZONE to their opponent's COURTYARD, regardless of intent, that ROBOT must follow through with the criteria described in G40 in order to avoid a penalty.

**Q665**

**Q.**When your robot is sitting flat on the ground is the robots plane defined at that position, even if your bumpers are angled, or is it when the bumpers are parallel to the ground?

**A.**We want to help, but don't understand your question. In the manual, we don't reference the plane of a robot. Can you please clarify and ask again, including what specific rules you are concerned about? It helps also to use specific all caps terms you can find in the Glossary, Section 6, so we can make sure we're talking about the same things. Thanks.

**Q638**

**Q.**G43 question: A blue alliance robot enters the outer works from the red courtyard. It is currently our interpretation that the blue alliance robot could be blocked from exiting the outer works in the direction of the red courtyard (without violating the 'regardless of direction' clause in G43), provided they are still free to complete their traversal into the neutral zone. Without ruling on the specific game situation, could you clarify the intent of G43 as it pertains to similar situations?

**A.**A ROBOT is considered traversing the opponent's OUTER WORKS if any part of its BUMPERS are within the opponent's OUTER WORKS and no part of it is in their opponent's SECRET PASSAGE - so it's traversing regardless of whether it entered the OUTER WORKS from the opponent's COURTYARD or the NEUTRAL ZONE and protected from interference per G43. As soon as that ROBOT's BUMPERS are no longer within the OUTER WORKS, it is no longer protected.

**Q629**

**Q.**Does G43 apply to ROBOTS that are physically incapable of TRAVERSING the OUTERWORKS?

**A.**Within G43, "traversing" is specially defined as such, "A ROBOT is considered traversing the opponent's OUTER WORKS if any part of its BUMPERS are within the opponent's OUTER WORKS." All ROBOTS are therefore provided protection by G43 any time their BUMPERS pass within the opponent's OUTER WORKS, regardless of whether or not the ROBOT is physically capable of passing through any given DEFENSE.

**Q620**

**Q.**Rule G43 forbids interference with opponent robots attempting to traverse the outer works. The blue box defines interference as including, but not limited to "pushing, bumping, or restricting a robot". Could you clarify the definition of "restricting"? It is my current understanding that a defending robot (perhaps attempting to block a high goal shot from a robot in the outer works) would be permitted to idle near a traversing robot provided the traversing robot can fully exit the outer wor

**A.**There is no *FIRST* Robotics Competition specific definition of "restricting" so the Dictionary definition applies: "depriving (someone or something) of freedom of movement or action." If a ROBOT is free to complete it's traversal without any interference occurring, then G43 is not violated.

**Q576**

**Q.**Regarding the update to G25: What constitutes "blocking"? If a robot is 15 feet from the Castle Wall, and can stop Boulders in the Secret Passage from traversing past the robot, does that constitute "blocking" since the Boulders are free to roll around in 1/2 the Secret Passage? Or, is "blocking" preventing a boulder from being fully introduced into the game field?

**A.**There's no *FIRST* Robotics Competition specific definition of blocking. Per Google Dictionary: "an obstacle to the normal progress or functioning of something." The normal use of an EMBRASURE or BRATTICE is to legally enter BOULDERS onto the FIELD such that they stay on the FIELD. If an

opposing ROBOT prevents this from being possible, that ROBOT is blocking the opening.

#### Q569

**Q.**If one team's robot crosses the Draw Bridge and is completely off of it, can they immediately recross before the obstacle closes.

**A.**Please see [Q505].

#### Q568

**Q.**Please provide additional clarification for G20. Is a ROBOT considered to be within the SECRET PASSAGE if one of the ROBOT's wheels is contained in the COURTYARD, and the other three wheels are contained by the SECRET PASSAGE? G20 states that a ROBOT is ONLY considered to be "in" the SECRET PASSAGE if the only carpet the ROBOT is in contact with is in the SECRET PASSAGE. Does this mean that a ROBOT is immune to drawing a G21 penalty so long as some part of the ROBOT contacts the COURTYARD?

**A.**We think you're confusing G20 and G21. G21 has no requirement that either ROBOT be "within" the SECRET PASSAGE- any contact at all with the carpet inside the opponent's SECRET PASSAGE leaves a ROBOT vulnerable to a G21 violation.

#### Q560

**Q.**May a robot feed a BOULDER from the SECRET PASSAGE, through the EMBRASURE, and into the CASTLE?

**A.**No, this would be a violation of G42, as the EMBRASURE is not a GOAL.

#### Q556

**Q.**On page 5 of the game-section manual the following is stated "The GOAL openings are not designed to be weight bearing surfaces. Using these elements to SCALE the TOWER is not only in violation of G12, but is also subject to an additional YELLOW CARD for egregious ROBOT behavior as described in the final paragraph of Section 3.3.2." What goal openings does this blue box refer to, the high goal, low goal, or all goal openings?

**A.**All of the GOAL openings.

#### Q542

**Q.**G21 (contact in Secrete Passage) was clarified that the violation is regardless of who initiates contact. Is that similar for a G28 violation (contact during last 20 seconds of Teleop in the Courtyard)? For example, if an opponent's robot remains in the Courtyard during the final 20 seconds of Teleop, is it a G11 violation to intentionally contact that robot to draw the G28 foul?

**A.**Yes, the use of contact is similar in G28, and *Team Update 02* will update G28 to make that clear. However, that does not negate the effect of G11 as described in G28's Blue Box. If the contact was such that it was solely to cause the opponent to violate G28, G11 will be implemented.

#### Q541

**Q.**If a robot, in trying to acquire a Boulder in the Neutral Zone, accidentally causes the Boulder to enter the opponent's Secret Passage, is that a violation of G27? In other words, does G27 require "intent"?

**A.**The game rules are intended to be read literally. If there is no specific mention of intent in the rule, intent is not required.

#### Q540

**Q.**Given the proximity of the Secret Passage to the Castle, can you provide an exception to G21 (robot contact in the opponent's Secret Passage) during the last 20 seconds of TELEOP?

**A.**Please see [Q535].

#### Q504

**Q.**G18 penalizes an extension more than 15" beyond the robot's frame perimeter. Is plane the measurement occurs in relative to the robot or the field? For instance, a robot uses a grappling

hook to climb and tilts 90 degrees as it winches itself up. Do you do the same "virtually transposing the robot to a flat floor" as with R22 to determine if the hook extends greater than 15"?

**A.** Extensions outside the FRAME PERIMETER are measured in the same plane as the FRAME PERIMETER. As the FRAME PERIMETER is re-oriented (e.g. when a ROBOT drives up the BATTER), the plane of measurement is similarly re-oriented.

## Human Actions

### Q947

**Q.** Does G31-C (During a Playoff MATCH, the ALLIANCE CAPTAIN clearly displaying the designated ALLIANCE CAPTAIN identifier (e.g. hat or armband)) allow an additional team member to be in the CASTLE during a MATCH? For example, the ALLIANCE CAPTAIN DRIVE TEAM is wearing their 4 buttons. A fifth member of the team is wearing the ALLIANCE CAPTAIN identifier but not wearing a DRIVE TEAM button.

**A.** No, the three items listed in G31 are not independent of each other. An ALLIANCE CAPTAIN would still need to meet the requirements of G31(a), which requires a DRIVE TEAM button.

### Q921

**Q.** From and previous answer... "There are no rules that prohibit such a non-powered signaling device." This question was regarding flags as a spy signal device. We'd like to use traffic directing flashlights (colored plastic cone over lens) to communicate with the driver. Is that permitted?

**A.** Please see [Q674]. And thanks for giving us the opportunity to refer to [Q674] again, it's one of our favorites this year.

### Q920

**Q.** Can the spy use signal devices?

**A.** Yes, but they must meet the requirements of T26-1. For additional information on this topic, please see [Q607] and [Q674].

### Q907

**Q.** Our Team is planing to use two colored flags from the Spy-box to signal robot positioning in our opponents courtyard. We want to use RED and BLUE flags. A few members of our team think the score keepers will be confused with our flags and the referees. We want to use RED and BLUE for two reasons. One is "R"ed = right, and b"L"ue = left. Also these colors a-line well with FRC colors.

**A.** There are no rules that prohibit such a non-powered signalling device, however they may not be used to interact with the ROBOT during AUTO per G14.

### Q902

**Q.** Can the arms of a human player extend beyond the spy box as long as a) they do not reach into the field and b) the rest of their body remains in the spy box?

**A.** G37 is only violated if anything outside the SPY BOX is *contacted*, similar to the STARTING LINE rule in G15 (the Blue Box in G15 is a great guide for this). There are no rules that prohibit reaching beyond the boundary line into the air, provided other rules aren't broken.

### Q874

**Q.** When tossing boulders through the lower Embrasure, is there a line of tape which the human player must stand behind? If so, hpw far back from the castle wall is it? -Thank you!

**A.** There is no tape line that HUMAN PLAYERS must remain behind when entering BOULDERS other than the white line co-linear with the CASTLE WALL that marks the front boundary of the CASTLE. Note that there are additional restrictions during the AUTO period per G9.

### Q803

**Q.** It appears that several teams are planning to have their spy use non-powered signalling directly to the robot (e.g. flags or scan codes). Does G35 prohibit the spy, who is a member of team BlueA, from using the signals provided by team BlueB during teleop, and if so, which robot is disabled?

**A.** A spy may signal an ALLIANCE partner's ROBOT from the SPY BOX with a non-powered signalling

device. G35 will be edited in *Team Update 10* to reflect this.

#### **Q704**

**Q.**For G38-B: Could you provide additional detail to the term "HERDING"? At what point does control by HERDING end? If a robot impels the ball into a corner, but makes no attempt to re-acquire that ball after, would that robot stop controlling the ball? Does the ruling change if the robot repeats this several times such that there is a group of balls in the corner, but the robot performing this action doesn't go to re-acquire those balls?

**A.**We cannot comment definitively on hypothetical scenarios. Generally, "herding" will be a judgement call by a referee. If a ROBOT is clearly making no attempt to continue "herding" a particular BOULDER (e.g. it begins driving away from the BOULDER), it will no longer be considered to be "herding" that BOULDER.

#### **Q701**

**Q.**We would like some clarification on G38-D. Would a ROBOT be allowed to move one boulder at a time into a corner of the COURTYARD by launching them along the ground, then going to pick up another boulder? The Manual implies that the ROBOT is still possessing the boulder while that ball is being launched across the ground. At what point does possession of the ball end under G38-D if the ROBOT makes no effort to re-acquire the ball once it is launched?

**A.**As long as you remain compliant with all other rules (notably G39, G40, G41, and G42), a ROBOT may launch BOULDERS anywhere within the COURTYARD. Once launched as per G38-D, a BOULDER is no longer being controlled by a ROBOT until the BOULDER is once again moved or positioned by the ROBOT.

#### **Q669**

**Q.**Regarding G34: What is the grace period for the 6 boulder limit? If an alliance scores a boulder into a castle containing 6 boulders, can that alliance expect a boulder to come out of the EMBRASURE or BRATTICE the moment the boulder crosses the plane of the GOAL? If that boulder doesn't come out, will the violating alliance be assessed a FOUL immediately?

**A.**We will confess that we were deliberately vague here. The intent is that as soon as a 7th BOULDER arrives in the CASTLE, that the ALLIANCE begin a concerted, good will effort to enter any extra BOULDERS back on to the FIELD as quickly and as safely as possible. It is not our intent to issue penalties if the DRIVE TEAM member clearing any surplus BOULDERS gets hung up by having to work their way around other people in the CASTLE. However if they are perceived as deliberately lagging in the eyes of a REFEREE, they will be issued a penalty.

#### **Q657**

**Q.**As a follow-up, may items be set down in the spy box without the human player touching them?

**A.**Yes, there are no rules prohibiting items from being set on the floor completely within the SPY BOX.

#### **Q628**

**Q.**According to G29, no electronic communications may be used by humans outside the castle. We wanted to ask whether any other means of non-electronic communication could be brought into the spy box, such as a mirror used for reflecting the opponent's courtyard to the drive team.

**A.**Per T26-1, a DRIVE TEAM member in the SPY BOX may use non-powered signaling devices, and there's no explicit prohibition of mirrors. Please note that whatever the device, it may not interfere with the remote sensing capabilities of other Teams and that reflecting the image of the Vision Guides from your own TOWER may just do that.

#### **Q563**

**Q.**Can the spy bot have a boulder loaded into it during autonomous?

**A.**Per *Section 3.2*, a DRIVE TEAM may elect to "pre-load one (1) BOULDER in or on their ROBOT such that the BOULDER is fully supported by their ROBOT." This does not exclude the SPY Bot.

#### **Q562**

**Q.**How many boulders can a human player carry (all at once) between the tower and the brattice?

**A.** There are no rules limiting the number of BOULDERS a HUMAN PLAYER may hold at one time. Please note, HUMAN PLAYERS should not compromise their personal safety or the safety of those around them (for example, by obstructing their vision).

#### Q543

**Q.** G29 prevents electronic communications from outside the Castle. Is it ok to receive electronic communications that originates inside the Castle? Can the Spy receive electronic communications from the Drive Team that is inside the Castle?

**A.** Such devices are not permitted in the CASTLE per *Section 5.5.9. Team Update 02* will update *Section 5.5.9* to also reference the SPY BOX.

## Boulder Rules

#### Q912

**Q.** During Teleop, robot RedA procures a boulder in the neutral zone, carries it through a defense, and pauses with its front wheels in the courtyard, but with the rear still in the outer works, where it launches the boulder into a high goal. RedA then completes the crossing (clearing its rear bumpers of the outer works). Is this boulder scored? Are technical fouls given under either G40 or G41? (Suggested by G40 blue box case B.)

**A.** Yes, the BOULDER is scored. No, there are no TECH FOULS assigned per G40 or G41, as the ROBOT met the requirements of completing a CROSSING as defined in *Section 3.1.3*.

#### Q896

**Q.** If a robot misses on a shot on goal, must that same boulder be played again or may the robot return to the neutral zone or its own courtyard to retrieve a new boulder?

**A.** There's no requirement that a ROBOT retrieve or "play" a missed shot, they're welcome to abandon any BOULDER and retrieve a different one as they please.

#### Q878

**Q.** If a ROBOT, in the process of CROSSING the LOW BAR, accidentally flips the flap such that it no longer stops boulders from rolling through the LOW BAR when thrown forcefully, then drives through the LOW BAR, will that ROBOT be assessed any penalties, since it now enables teams to throw boulders through the LOW BAR without violating G40-1, as the ROBOT is not specifically holding the LOW BAR flap up? If the HUMAN PLAYER chooses to take advantage of this situation, are they assessed any penalties?

**A.** While we can't answer conclusively on a hypothetical scenario, generally, there are no rules that penalize inadvertent flap flipping or the act of rolling a BOULDER through the LOW BAR. If the REFEREES determine that an action is done intentionally to circumvent G40-1, the REFEREES will deem that action as egregious and will issue a YELLOW CARD per *Section 5.5.4*.

#### Q788

**Q.** Assuming that a BOULDER that enters a DEFENSE from the COURTYARD can be returned from that COURTYARD without penalty, and that any BOULDERS that are placed in a DEFENSE by the defensive ALLIANCE can be moved into the COURTYARD without penalty (as in the blue box under G41). If a referee only sees a BOULDER at rest in a defense knocked into the COURTYARD by a robot carrying another BOULDER, will the robot be given the benefit of the doubt or will a TECH FOUL be called?

**A.** If a REFEREE is uncertain whether a violation occurred, no FOUL will be assessed.

#### Q755

**Q.** G38 & G39 question. When a robot releases "control" of a boulders after "carrying", is it considered a "launch" if the robot purposefully drops/releases the ball? Is it legal to release control of boulders from "carrying" in any way in either secret passage, your own courtyard, outer works or the neutral zone while still positioning them to gain advantage without triggering a "launch"? What would be the threshold when it would be considered "kicking across the floor?"

**A.** The important aspect to G38-BlueBox-D and the definition of "Launch" is the "in a forceful way." If your ROBOT is throwing/propelling a BOULDER "in a forceful way," that is considered a "Launch." If your ROBOT merely "plops" the BOULDER onto the floor - or releases in a non-forceful way - that

would not be considered "Launching."

### Q752

**Q.** Asked for some folks on Chief Delphi: Robot RedA, carrying boulderA, begins crossing a defense into the blue courtyard, and becomes stuck. Robot RedB, carrying a boulderB, crosses the same defense, pushing robot RedA and boulderA to complete their crossing in the process. For purposes of G41, did RedA or RedB cause boulderA to cross from the neutral zone to the courtyard? That is, is RedB charged a foul for causing both boulderA and boulderB to transfer with a single crossing?

**A.** A ROBOT that causes an ALLIANCE partner controlling a BOULDER to complete a CROSSING has not caused the ALLIANCE partner's BOULDER to move in to the opponent's COURTYARD (the ALLIANCE partner has). A ROBOT that is controlling a BOULDER (e.g. carrying it) and pushing a ROBOT that is also controlling a BOULDER (e.g. carrying it) is not controlling two BOULDERS and thus not violating G38. Finally, there is no requirement that a ROBOT complete its crossing under its own power.

### Q751

**Q.** Update 3 added an additional clause to rule G25 that prevented the isolation of boulders in the opponent's secret passageway without being in contact with the carpet in the secret passageway. Is the intent of this rule to make access to the secret passageway a protected act or can defence be played to prevent an opponent from entering the secret passageway? Will this rule be invoked if there is any action taken to prevent a team from entering its secret passageway to retrieve a boulder?

**A.** The intent was to prohibit the practice of a ROBOT sequestering opponents' BOULDERS returning to the FIELD without any risk (because the "protection" that affords their opponents right-of-way while in their SECRET PASSAGE per G21 wouldn't apply). There are no rules that prohibit defensive play to prevent an opponent from reaching their SECRET PASSAGE, but once the defender meets the criteria in G21, the defending ROBOT is at risk of a penalty if contact is made.

### Q750

**Q.** We believe that the intent of G39 is to prevent teams from moving boulders into their opponent's courtyard without first crossing a defense. With this intent in mind, we are wondering if alliance partners "passing" boulders to each other would violate this rule? For example, would launching a boulder from the secret passageway to a partner in the neutral zone violate G39? Would launching a boulder over the defenses from your own courtyard to the neutral zone violate G39? "launching" as in G38.

**A.** You're correct that one intent of G39 is to require ROBOTS and their associated BOULDER to CROSS into the opponent's COURTYARD together, but another intent is to prevent a relay strategy where ROBOTS don't have to move (or only have to move minimally) to forward a BOULDER into scoring position. If a ROBOT does not meet the criteria defined in G39, and it launches a BOULDER, it will have violated G39.

### Q708

**Q.** 3.1.3 + G40 (and answer to Q603) says to finish moving a boulder from Neutral Zone into the opponent's courtyard, a bot must contact the boulder in the Outer Works and complete its crossing. It is not stated whether G40 A & B is a sequence of actions or just 2 actions that must be completed? If a boulder is placed in the Outer Works by Bot A, can Bot B cross a separate defense, then contact the boulder from the Courtyard side and complete the movement from Neutral Zone to the Courtyard?

**A.** The language "its CROSSING" in G40-B means the CROSSING in progress when the contact required by G40-A occurs. Once a ROBOT completes a CROSSING - with or without a BOULDER - that CROSSING may not be used to satisfy additional conditions later. Therefore, the ROBOT must contact the BOULDER while the CROSSING is taking place. Contacting a BOULDER within a DEFENSE after a CROSSING has been completed requires a new CROSSING to take place.

### Q703

**Q.** If a boulder was moved from the Neutral Zone to the Outer Works, can it be moved back into the Neutral Zone by the original or a 2nd bot? Does this incur a G40 penalty?

**A.** G40 does not apply to a BOULDER moving from the NEUTRAL ZONE into the OUTER WORKS then back to the NEUTRAL ZONE as the BOULDER has not "move(d)" from the NEUTRAL ZONE into the

opponent's COURTYARD"

#### Q702

**Q.**G40 rules and the blue box examples only discuss when a boulder is pushed/dropped in the courtyard and the robot backs up to the neutral zone without completing it's crossing as a Foul. If a robot is controlling a boulder in such a way so when the attempt to cross a defense, that the boulder (but not the robot) is fully in the courtyard but still possessed. Can the robot back out into the Neutral zone taking the boulder with it without incurring a G40 penalty?

**A.**We cannot comment definitively on hypothetical scenarios. Generally, a ROBOT which causes a BOULDER to move from the NEUTRAL ZONE into the opponent's COURTYARD must meet both criteria A and B of G40 in order to not receive a TECH FOUL. Removing the BOULDER from the COURTYARD after it has fully entered would not undo a G40 violation.

#### Q693

**Q.**If a robot launches a boulder and misses, can that same Boulder be retrieved and reshot without returning to the neutral zone with the boulder?

**A.**There are no rules that require a BOULDER to be taken to the NEUTRAL ZONE after a missed shot.

#### Q603

**Q.**The response to Q588 regarding G40 answered the case where Robot B meets the criteria for a successful crossing. What if Robot B does not meet the criteria? If Robot B first encounters a boulder in the Outer Works, has it not violated G40 because it did not cause the boulder to move from the Neutral Zone, but from merely the Outer Works? Does the response depended upon which alliance caused the boulder to end up in the Outer Works?

**A.**If ROBOT B does not complete a CROSSING, then G40 has been violated. ROBOT B is the one that completes the action of the BOULDER moving from the NEUTRAL ZONE to the COURTYARD and is thus considered to be the one to have caused it.

#### Q588

**Q.**G40 scenario: Robot A in the NEUTRAL ZONE passes a BOULDER to Robot B in the OUTER WORKS. Robot B controls the BOULDER in the OUTER WORKS and travels with it into the COURTYARD. Legal? Robot A would appear to have only caused the robot to travel from the NEUTRAL ZONE to the OUTER WORKS. Robot B cause it to travel from the OUTER WORKS to the COURTYARD.

**A.**As long as ROBOT B meets all of the criteria for a successful CROSSING per *Section 3.1.3*, and all of the criteria in G40 are met (ROBOT contacts the BOULDER in the OUTER WORKS and it also starts in the NEUTRAL ZONE and ends in their opponent's COURTYARD, i.e. CROSSED), this would be a legal movement of a BOULDER to the opponent's COURTYARD regardless of ROBOT A's involvement.

#### Q552

**Q.**In accordance with rule G42 (robots may not eject a boulder from the field...), can a robot block one of the opponent's embrasures, and prevent boulders from entering the field at all?

**A.**We think *Team Update 02* addresses your question. If not, please feel free to submit a follow up inquiry.

#### Q544

**Q.**Is it a violation of G39 if a Boulder is launched from a robot that is in contact with the carpet in the opponent's Courtyard and the carpet of the opponent's Secret Passage? If that is not ok, then I would like to confirm that it is ok to launch a Boulder while in contact with the opponent's Courtyard carpet and the Berm of the Secrete Passage, since the Berm is not Carpet.

**A.**Launching while the ROBOT is contacting opponent's SECRET PASSAGE carpet is a violation of G39. Launching while the ROBOT is contacting the opponent's BERM and no carpet other than the opponent's COURTYARD carpet does not violate G39.

#### Q533

**Q.**Can you further clarify the definition of "launching" as it applies to G39? Would either of these actions be considered a G39 violation if performed while in contact with the Neutral Zone or a team's own Courtyard: A. A robot very weakly ejects a BOULDER through an upward-facing mechanism normally used for shooting, such that it rises a minimal height required to clear the mechanism and then drops to the ground. B. A robot forcibly ejects a ball at ground level, rolling it across the field.

**A.**Good question. Releasing a BOULDER such that it is not shot in the air, but dropped from a certain height is not launching. A ROBOT that "forcibly ejects a ball at ground level" would be considered "launching," and this will be clarified in *Team Update 03*.

#### **Q530**

**Q.**In reference to Q508: does a boulder that was thrown over the guardrail that is touching the secret passage will be placed in the secret passage?

**A.**Perhaps. FIELD Stewards are instructed to place BOULDERS "back into the FIELD approximately at the point of exit." If the BOULDER exited the FIELD toward the end of the SECRET PASSAGE, it may be placed on the FIELD just beyond the SECRET PASSAGE, which would be appropriate. Also, please note that intentionally throwing a BOULDER out of the FIELD would be a violation of G42.

#### **Q514**

**Q.**Per G39 ROBOTS are prohibited from launching BOULDERS unless they are in contact with the opponent's TOWER or carpet in the opponent's COURTYARD, and not in contact with any other carpet. If a Robot is in contact with an opponents courtyard and an outerwork are they allowed to launch BOULDERS?

**A.**Provided a ROBOT meets the requirements (i.e. in contact with the opponent's TOWER or carpet in the opponent's COURTYARD, and not in contact with any other carpet), they may launch BOULDERS, even if they're also in contact with another FIELD element.

#### **Q509**

**Q.**G38 describes the conditions in which you are in control of a boulder, but does not state when you no longer are in control. If a boulder is launched or herded (which is described as impelling to a destination while not necessarily maintaining contact) when does it cease to be in your control? Without a clear definition it is impossible to tell when a team can move onto another boulder.

**A.**A ROBOT is no longer in control of a BOULDER when it is no longer "Moving or positioning a BOULDER to gain advantage".

#### **Q508**

**Q.**Where will boulders be placed after they were thrown over a secret passage?

**A.**We think we know what you may be asking, but honestly, we're guessing just a little bit. Per *Section 3.2 MATCH Logistics*: "BOULDERS that exit the FIELD over a GUARDRAIL during a MATCH are placed back into the FIELD approximately at the point of exit" and "BOULDERS that exit the FIELD over a CASTLE WALL during a MATCH are returned to the COURTYARD at the corner of the GUARDRAIL and CASTLE". Whether the GUARDRAIL or CASTLE WALL section in question border the SECRET PASSAGE is of no consequence. If this doesn't answer your real question, please rephrase and ask again.

## **Defense Rules**

#### **Q760**

**Q.**G43 question: if a robot were to become disabled or otherwise incapacitated while in their own alliance's outer works (same half of field as alliance tower), would an opposing robot attempting to cross cause the incapacitated robot to incur a G43? Would the opposing robot incur a G11?

**A.**While we cannot rule absolutely on hypothetical game scenarios, generally speaking, yes, the ROBOT in its OUTER WORKS is interfering with the opposing ROBOT's attempt at traversing the OUTER WORKS in your scenario. Note that G43 wouldn't apply until the interference has occurred, but enforcement doesn't depend upon whether an "incapacitated" ROBOT is capable of moving out of the way. G11 is dependent on the REFEREES' assessment of the intent of the traversing ROBOT.

#### **Q583**

**Q.** If a blue robot is in contact with the red batter and trying to make a shot, can a red robot push them out of the way? In other words, is the batter a defense free zone?

**A.** ROBOTS are only "protected" from contact when their BUMPERS are within their opponent's OUTER WORKS (see G43). However, G28 explicitly regulates contact with an opponent ROBOT in your COURTYARD in the last 20 seconds of TELEOP. Also, G25 prohibits blocking of your own GOALS using anything outside your FRAMER PERIMETER. You should read each of these rules and their blue boxes carefully, but keep in mind that other rules also implicitly regulate defense via general game play legislation.

#### Q546

**Q.** If a robot is simultaneously in the opponent's Outer Works and the Opponent's Secrete Passage, what G43 and G21 penalties are there if an opponent's robot contacts the robot? Does the answer depend upon which robot causes the contact?

**A.** Great question. *Team Update 03* will update G43 to add criteria that a traversing ROBOT has no part of itself in their opponent's SECRET PASSAGE. As a result, the ROBOT you describe will not be protected.

#### Q532

**Q.** "A robot carrying a boulder crosses a defense into their opponents' courtyard. They then move back such that a part of its bumpers are within the opponent's outer works while their robot is still in contact with the courtyard carpet. They attempt to line up a shot, but an opponent contacts them. Does the opponent incur a G43 penalty?"

**A.** This situation does demonstrate a violation of G43. Per G43: "A ROBOT is considered traversing the opponent's OUTER WORKS if any part of its BUMPERS are within the opponent's OUTER WORKS." Even if you are shooting a BOULDER, you would be protected by G43 if your BUMPERS are within the OUTER WORKS.

#### Q512

**Q.** If my opponent's bumpers are entirely contained within the NEUTRAL ZONE but is contacting a defense which is extended into the NEUTRAL ZONE such as the Drawbridge or Sally Port, does contacting them or pushing them constitute as a violation of G43?

**A.** Assuming your ROBOT is on the same half of the FIELD as your TOWER and given the states described in your question, G43 is not violated, even if your opponent happens to be in contact with a DEFENSE in your OUTER WORKS. The OUTER WORKS, per *Section 2.2.2*, are defined by fixed volume that does not change shape with the action of DEFENSES during a MATCH.

#### Q511

**Q.** Per G43, ROBOTS are not allowed to interfere with opponents attempting to traverse the OUTER WORKS. What constitutes as "interfering with an attempt?" Does the my opponent's ROBOT have to already be in the act of traversing the OUTER WORKS per the definition of G43, or is preventing them from reaching the OUTER WORKS considered "interfering with an attempt"?

**A.** Good question. The rule was written with the intent being that a ROBOT attempting to traverse was in the process of traversing, but that language isn't consistent with our actual intent. *Team Update 02* will update G43 to clarify that ROBOTS on the same half of the FIELD as their ALLIANCE TOWER may not interfere with opponent ROBOTS traversing OUTER WORKS (regardless of direction). Our apologies for the confusion.

## Game Manual - Robot

#### Q956

**Q.** R46: The only circuit breakers permitted for use in the PDP are: A. Snap Action VB3-A Series, terminal style F57 B. Snap Action MX5-A40 R48: CUSTOM CIRCUIT Up to 40A ... R48 does not prohibit the use of smaller value breakers in the PDP or any fuses or breakers within CUSTOM CIRCUITS for additional protection This seems contradictory for a CUSTOM CIRCUIT on a 40amp circuit with a breaker less than 40amp. For clarity, should R46B say: "Snap Action MX5-A series breaker of 40amps or less"?

**A.** Per R46, the MX5-A40 is the only MX5 series breaker allowed for use in the PDP. To protect a circuit with a lower value circuit breaker in the PDP, it must utilize a VB3-A Series breaker and the corresponding channels on the PDP.

**Q932**

**Q.**We had issues with our Spike relay at the last competition. I am trying to buy one this week and they are discontinued with no inventory. Per the rules this is the only relay module allowed on a FIRST FRC robot. What else can I use?

**A.**You're correct on all accounts, however there are other ways to control actuators. For technical assistance, please use the [FIRST Forums](#).

**Q914**

**Q.**Concerning Budget Constraint Rules R10-R12, the blue box says there is no quantity limit on KOP items. If there were two Talon SRX's available through the Virtual KOP, and they were available through First Choice, do we have to count ANY Talon SRX's on the CAW? We had a possibility to get three through KOP and First Choice, but use 7, do we need to account four four on the CAW?

**A.**No, Talon SRXes are Kit of Parts items and thus not required on the CAW, regardless of the quantity installed on the ROBOT.

**Q792**

**Q.**I need a clarification on rule 53. I would like to use three (ebmpapst 412 fans previously supplied to cool victor controllers) fans to cool an onboard compressor. The compressor is powered from the PCM. If the fan power leads are spliced into the red and black wires supplying the compressor can I legally use the same circuit off of the PCM?

**A.**Splicing items in to compressor wiring is a violation of R76. Exception B in R76 does not apply because fans are not control system items.

**Q749**

**Q.1.** Is legal to use the two cameras at the robot usb and ethernet in the game 2. Is necessary to use the FRC Radio configuration utility in order to configure the robot radio

**A.**We cannot assess designs and determine legality via this Q&A system. There is no explicit prohibition of more than one camera, provided all other rules are met. If you have a question about a specific rule or set of rules that with which we can help (to help you understand if what want to do will pass Inspection), please let us know about which rules you're unsure and what elements of that rule you're having trouble with. At events, your radio must be configured with the appropriate encryption key for your team number (per R57), which can only be done using the configuration utility hosted on designated computers on-site (this will require the FIRST Robotics Competition specific firmware loaded). When operating outside events, there is no rule that requires a team to use the configuration tool to program their radio, however it is strongly recommended. If you're having trouble with this tool or activity, please seek help via the [FIRST Forums](#).

**Q746**

**Q.**Please ignore Q745, as we jumped the gun. Here is the real question: R28 states that numbers on the bumpers must be white or OUTLINED in white. Does that mean inside the OUTLINE must be red or blue, or can we fill that space in with team colors?

**A.**R28 does not impose color requirements for Team Numbers if the Team Numbers are outlined in White.

**Q742**

**Q.**Is there any requirement for how tall the frame structure (frame perimeter) supporting the bumpers needs to be? We will have 3.5" tall frame perimeter, so the bumpers will be 1.5" taller than the frame structure. Is this allowed provided the bumpers are contained within the prescribed bumper zone?

**A.**If you are suggesting that your FRAME PERIMETER is 3.5 in. from the ground, please note that per R2, the FRAME PERIMETER is determined by elements in the BUMPER ZONE and that per R4 "no part of the ROBOT shall extend outside the vertical projection of the FRAME PERIMETER". If you are instead suggesting that your FRAME PERIMETER elements are located within the BUMPER ZONE and are 3.5 in. tall, there is no explicit requirement for the height of any FRAME PERIMETER elements backing the bumper provided they are able to meet the requirements of R26: "BUMPERS must be supported by the structure/frame of the ROBOT" and R21-G: "must attach to the FRAME PERIMETER of the ROBOT with a rigid fastening system to form a tight, robust connection to the main structure/frame".

**Q735**

**Q.**Is it allowed to use a small sensor powered by a watch battery attached to an extension during the final 20

seconds? It would turn on a LED indicator light. If so, can it use an IR LED to send a signal to the RIO?

**A.**The only batteries permitted are those referenced in R31. If you have questions about what that rule means, please rephrase and resubmit.

### Q729

**Q.**At the end of their first competition, a team removes the electrical board from their robot before unbagging. The electrical board contains wood, zip-ties, and COTS electrical components, assembled. If the team brings the electrical board to their next event (still assembled), does the total weight of the electrical board count towards the withholding allowance or only the non-COTS portions of the board? That is, if we want to use our competition electronics between competitions without cutting

**A.**To be a COTS item a "COMPONENT or MECHANISM must be in an unaltered, unmodified state." Assembly of a COMPONENT or MECHANISM into a a single MECHANISM is a modification and thus part of and subject to rules regarding the WITHHOLDING ALLOWANCE. Meanwhile, we assume you meant "a team removes the electrical board from their robot before *bagging*." If not, please note that a team may not remove items from their bagged ROBOT at an event.

### Q710

**Q.**In general, if a robot is shaped like a polygon similar to the one portrayed here: <http://i.imgur.com/NeEARWC.png>, does the frame perimeter constitute A to B to C to D to E or A to C to D to E?

**A.**We cannot comment on specific designs, as there would be far too many to review fairly. Instead we invite you to review [Q699] and the procedures outlined in R19 - and do the string test described in the Blue Box in R2. The implication is such that a FRAME PERIMETER will never have concave features even if the ROBOT's frame does.

### Q700

**Q.**For rule r2, is a shaft included in the set of objects that can be extended out of the frame perimeter by 1/4"?

**A.**Yes, a shaft that protrudes from the FRAME PERIMETER by 1/4" or less is considered a minor protrusion.

### Q699

**Q.**If the side of our robot looks like this: <http://i.imgur.com/iu5zN37.png> The frame perimeter constitutes the distance between outermost vertices, as shown below, right? <http://i.imgur.com/snMzkKk.png>

**A.**We cannot comment specifically on a particular Team's design, as the purpose of this Q&A is to clarify specific questions regarding FIRST STRONGHOLD. That being said, we recommend you review the Blue Box under R2 for assistance in determining the FRAME PERIMETER.

### Q698

**Q.**Follow up to Q681, can a team that opted to get the drive kit but decides not to use the drive kit get up to \$450 of cost reduction specifically for items purchased thru AndyMark?

**A.**No, as the items purchased would not have been from a VOUCHER.

### Q681

**Q.**R10 excludes all KOP parts from the CAW cost. A \$450 voucher is part of the KOP if we do not choose the Drive System. Does that mean that \$450 worth of cost can be deducted from the CAW cost calc provided one spends that amount from AndyMark. Also, if we opted to get the Drive System but are not using any of the components, can we deduct up to \$450 from our CAW cost for things we then buy and use from AndyMark.

**A.**Items on the ROBOT that were acquired via a VOUCHER may be assigned a \$0 value per R10. That does not mean, however that a team that opted for the voucher instead of the drive base kit can automatically cut \$450 from the CAW. We rely on the honor system in review of the CAW and that items won't be claimed to have been acquired via a voucher, when they weren't actually part of a specific voucher transaction.

### Q678

**Q.**Per R28-A Bumper numbering must: "consist of numerals at least 4 in. high, at least ½ in. in stroke width, and be either white in color or outlined in white" Would black numbering 4 inch high, 1/2" stroke on a white rectangular field meet this requirement?

**A.**Black numbering on a white background satisfies R28. Your background should exceed the numbers sufficiently to make it easily read from a distance.

**Q644**

**Q.**With respect to Q623, If a ROBOT places two BOULDERS into their own MOAT, is that a violation of G12-1? If not, does that then render the MOAT uncrossable by the offensive alliance unless they first clear the MOAT by exiting from the COURTYARD into the NEUTRAL ZONE given that moving two BOULDERS into the COURTYARD is illegal? If it is not obvious which alliance caused a BOULDER to enter the OUTER WORKS, and a ROBOT moves it into the COURTYARD, will the referees assume a foul has occurred?

**A.**Yes, as this is considered affecting the operation of a DEFENSE per G12-1. Having said that, we acknowledge that G12-1 isn't clear about that. It will be revised in *Team Update 05*.

**Q623**

**Q.**G38 says you may not "control" more than one boulder at a time. If our robot has a ball inside it and is trying to cross a defense, but there is another boulder in front of the defense, is it a foul to push that boulder past the defense as you cross? Or do you have to avoid the boulder and try to cross another defense? Or do you need to try to knock the blocking boulder back into the neutral zone and then cross the defense. You give an example of Bulldozing but it say inadvertent contact.

**A.**We can't answer this hypothetical question directly because there are unknown elements that affect the response. Bumping in to a BOULDER as a ROBOT is playing the game without intent to direct that BOULDER in any specific direction is bulldozing and not considered control. However, a ROBOT causing two BOULDERS to move from the NEUTRAL ZONE in to the opponent's COURTYARD simultaneously is a violation of G41.

**Q614**

**Q.**The cost of two of the same part is over the \$400 limit, each one separately is less than the \$400. Are we allowed to purchase two of this item? The cost is \$369.00 per item. The item is Rhino Track Drive Module (am-3322) by AndyMark. Is this part legal for us to use?

**A.**The purpose of this Q&A is not to rule definitively on specific ROBOT parts. We suggest you review Examples 2 and 3 in the Blue Box below R11 and determine which most closely applies to your situation.

**Q600**

**Q.**The bumper is to be 8 inches from the corner of the robot so with that being said, can we cut the spot at the corner so it is 7 inches or so and be cut at an angle?

**A.**We can't rule on specific designs, but if you read R19 carefully and pay special attention to the blue box and Figure 4-3, this should tell you all you need to know about the 8" requirement. The 8" is measured along the FRAME PERIMETER. If this doesn't help, please rephrase and ask again.

**Q587**

**Q.**If a robot has grey or black tires which leave grey or black marks on the field carpet, is that considered damage to the field? If a robot has grey or black tires and leaves grey or black marks on the field elements' polycarbonate, is that considered damage to the field? (note - the colors in this question are not fully inclusive of all available wheels, but appear to be the most common for tires)

**A.**It is expected that the FIELD will get marked up by tires during play, so no.

**Q561**

**Q.**A company sells tank tread as kits of individual links that could be used to make 1 foot of tread for \$40. If our team made an 11 foot tread, the total cost would be \$440 and there would be two of these. Since the tread links could be configured in multiple configurations by a user, would these be counted as 22 kits at \$40 each (and thus legal) or as two \$440 items (and thus illegal)?

**A.**This is similar to Example 3 in the Blue Box below below R11. As the parts can be used in other quantities and configurations, they would be accounted separately for the purposes of the CAW and R11.

## General Robot Design

### Safety & Damage Prevention

**Q959**

**Q.**Assuming no interfering markings a la Q955, would a robot that completely fills the maximum sizing

volume allowed by R3 and is not transparent violate R9-A or any other rule? Assuming that to a reasonable observer that modifications are made to the robot to block shots, may a robot be modified and reinspected during the event to fill the maximum space allowed by R3? Must these modifications be made of transparent materials or have holes cut in them for visibility?

**A.** Before we address your questions, we want to be clear that, as a matter of principle, we try hard to answer the questions asked and avoid inferring what we think the questioner was trying to ask. Given that, please accept our apologies if the information that follows is not what you were seeking. A ROBOT that completely fills the maximum size volume allowed by R3 is not automatically a violation of R9-A, but it is impossible for us to say whether it would violate any other rule. Yes, a ROBOT may be modified after initial Inspection in a variety of ways that are still within the rule set, including increasing its size such that it maxes out the size constraints (and please note T15). There is no requirement that materials used be transparent. (edited 3/24/16 to correct spelling of "principle")

#### Q953

**Q.** I understand that you cannot determine whether or not a device is legal sight unseen. I am asking this question because an LRI said it would be a violation of R9-C if we had a piece of lexan on our robot standing vertically to prevent a camera from seeing the reflective tape on the goals. I see no difference between having a sheet of lexan standing 48" and a robot standing 48". Please clarify what is meant by "interfering with remote sensing capabilities" in R9-C

**A.** A piece of plastic installed to prevent a camera from seeing the reflective tape on the goals is a device specifically designed or intended to interfere with another ROBOT'S sensing capabilities and is prohibited by R9 and the added language included in its Blue Box. Meanwhile, please see the answer to [Q937] as we feel this is an important element to Lead Robot Inspector authority.

#### Q946

**Q.** Regarding R-9C, Is it legal to place a device in compliance with all other rules on our robot that would block a camera and only the camera from targeting goals. The device would not have any embellishments and be monochrome so it would not interfere with the camera other than the camera would not be able to see past the device.

**A.** We cannot determine the legality of ROBOT COMPONENTS or MECHANISMS in the context of this Q&A. However, ROBOTS that are found to be in violation of R9-C will not be allowed to compete until the violation is rectified.

#### Q853

**Q.** The FAQ answers make it fairly clear that in an open-chassis design, either side of the opening must be covered by 8-inch bumpers. To whom do I make the argument that this rule should be changed?

**A.** You may send suggestions you have to [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org). Please be aware that we do not intend to change the BUMPER rules for the current season.

#### Q740

**Q.** This is our first year with bumpers, we are having trouble fitting our intake system within the 8 inch limit from the corner. Please see this link: <https://drive.google.com/file/d/0B27ASI9FVUqPeTFBOFZvNGY2VVE/view?usp=sharing>. Are there any possible solutions, such as making the bumpers less than 8 inches? Thank you!

**A.** The purpose of this Q&A is to answer specific questions about the rules of *FIRST STRONGHOLD*. That being said, we're unable to grant individual Teams exemption to specific rules- that would be unfair to the other Teams. Compliance with ROBOT Rules is part of the Engineering challenge of the *FIRST* Robotics Competition.

#### Q601

**Q.** In the case of a U shaped drive train would the two leading front edges be considered as two separate sides or one side? If the entire front consisted of a 6" section of railing on either side of a 12" opening, would we be required to bumper the entire front or just the two 6" sections either side of the opening?

**A.** Per the Blue Box below R19, the measurement is made along the FRAME PERIMETER, the existence of actual "frame" is irrelevant. The FRAME PERIMETER is determined as described in R2 and the associated Blue Box. For an example, see the black outlined FRAME PERIMETER on the top right image of Figure 4-1.

#### Q551

**Q.**Hi there! We are wondering about R35. Is a spring considered storage achieved by deformation of ROBOT parts? Can a spring be stored energy at the beginning of a match and be considered in compliance with this rule? Thanks!

**A.**Yes, however please consider T18 B.

## Budget Constraints

### Q833

**Q.**Thanks, that's how I read things, but wanted to be sure. What about pre-2016 KoP items? For example, would parts from an old KoP chassis be listed on the CAW at market value, or at \$0?

**A.**The definition of Kit of Parts items is not restricted to 2016 items only.

### Q822

**Q.**When calculating robot cost do we need to include the cost of First Choice and AndyMark PDV (we took PDV instead of 2016 KoP Chassis)?

**A.**R10 excludes all Kit Of Parts (KOP) parts from the CAW cost. The KOP is a collection of items listed on any Kickoff Kit Checklists, distributed via *FIRST* Choice, or obtained via a Product Donation Voucher (PDV), etc. Also please be sure to read the answer to [Q681] in regard to the AndyMark 2016 KoP Drive Chassis PDV.

### Q809

**Q.**Questions about the glossary definition of KoP, particularly for purposes of R10-R12: Items listed on any Kickoff Checklists: Does this include the rookie checklist for veteran teams? Distributed via *FIRST* choice: is this any item available via *FIRST* choice, or only specific items obtained via *FIRST* choice? Obtained via..voucher: Is this only specific instances of items obtained via vouchers? For each of the three: does this include items listed, distributed, or obtained via a pre-2016 KoP?

**A.**Yes, the collection of items on any Kickoff Kit Checklists includes items on the Yellow Tote Kickoff Kit Checklist, even for veteran teams. Any item distributed via *FIRST* Choice is part of the Kit of Parts, even if you got that item in a different way, i.e. wasn't distributed to you via *FIRST* Choice. Yes, an item obtained via a voucher is part of the Kit of Parts, regardless of when it was obtained. Please note, that if an item could have been obtained via a voucher, but wasn't, it's not part of the Kit of Parts.

### Q724

**Q.**We wish to use a system that pushes a belt through a gearbox to lift up to the rung on the tower, however, the combined cost is \$490, so we want to make sure that this is legal under R11.. They sell the belt and gearbox as different line items, and there are several different lengths and materials for the belt. We therefore would compare this to example 1, in that there are different items that can be combined to make the final assembly. The gear housing system is like the gear box mentioned.

**A.**We will not rule definitively on parts or hypothetical scenarios in this forum as many factors may affect an individual ruling. The examples in the Blue Box below R11 are provided to aid teams and Inspectors in determining how to apply the rule. Generally, the sum of two individual elements that work together is not subject to R11, but each individual cost of those items is.

### Q631

**Q.**In regards to the total budget of our robot, how do we factor in the price of donated parts?

**A.**Please review R12 and its Blue Box. We recommend you pay particular attention to Example 2.

## Fabrication Schedule

### Q968

**Q.**Regarding R16-C, Is it legal to start a print job on our 3D printer in the pits and leave it running after the pits close for the night. We have several 3D printed parts on our robot that take a long time to print. The printer would stay in the pits and no team member would touch it while the pits are closed

**A.**As you've noted, R16-C prohibits working on ROBOT parts outside of Pit hours while attending events. Installing COMPONENTS that were made on a 3D printer outside Pit hours is a violation.

### Q931

**Q.**Regarding R18: After STOP Build day, we fabricate some parts and assemble them with COTS items into a working assembly that we then test and evaluate. We decide that the assembly should replace and a similar assembly on the robot during our access period. If we disassemble the new assembly into Fabricated parts and COTS parts and the Fabricated parts weight less than 30 lbs can we reassemble and install the new items during the six hour access period?

**A.**Yup!

#### **Q919**

**Q.**R18. "For Teams attending 2-Day Events, ... FABRICATED ITEMS constructed during the Robot Access Period and bagged with the ROBOT are exempt from this limit." Can the referenced "FABRICATED during Robot Access Period" items be direct replacement spare parts (not installed to the robot) as long as they are bagged with the robot? If yes, can they be bagged in a separate, tagged bag, for ease of transport?

**A.**Yes, any additional FABRICATED ITEMS built during the Robot Access Period may be bagged with the ROBOT, as per R18 of the *Game Manual*, or in additional bags, per *Section 5.2* of the *Admin Manual*. Please be aware that *Team Update 12* amended *Section 5.2* of the *Admin Manual* to say that you may only use a maximum of two (2) bags.

#### **Q918**

**Q.**R18. Our robot is bagged. If we create a spare Fabrication that is 30 pounds, we can carry it in to our event under R18. If we then bag this spare fabrication with our robot before leaving our event, are we allowed an additional 30 pounds of Fabrication to carry in to our next event?

**A.**Yes, the WITHHOLDING ALLOWANCE per R18 is assessed at each event during load-in, and items in the bag are not weighed. This would be an acceptable use of Bag and Tag.

#### **Q904**

**Q.**When you say "part of a BUMPER" do you mean an assembled Bumper Segment, or do you mean "Bumper parts", which would include individual fabricated parts, that when combined with other parts, could be assembled into a Bumper Segment. Since you only get to load-in once, it is important to know in advance what is included in the Withholding Allowance, and what is not. Retroactive determinations does not help. Parts dedicated to bumper use only are exempt?

**A.**There are no rules governing FABRICATED ITEMS that are never used on a ROBOT. If the FABRICATED ITEMS you bring with you are used in your BUMPERS at the time of inspection (and not in other ways, such as your drivetrain or similar) then the FABRICATED ITEMS are governed by R18-C and are exempt from the WITHHOLDING ALLOWANCE.

#### **Q903**

**Q.**Bumpers are excluded from the Bag & Tag and Withholding Allowance by R15 and R18. I would like to confirm that non-COTS items (cut fabric, cut pool noodles, etc) to make/repair bumpers are also excluded. This may be important since we may bring extra bumper supplies to help teams with non-compliant bumpers (8" rule) to make a compliant bumper.

**A.**If, at the point of Inspection, the item is part of a BUMPER it falls under R18-C and is exempt from the WITHHOLDING ALLOWANCE.

#### **Q898**

**Q.**So, if we withhold the RoboRIO by itself, it doesn't count toward the withholding allowance. But must we bag it?

**A.**The roboRIO, in its COTS state, is not part of a WITHHOLDING ALLOWANCE and does not need to be bagged.

#### **Q886**

**Q.**R15 & R18 - Bagging and Withholding R18 specifically states up to 30#'s FABRICATED items may be withheld. We'd like to withhold the RoboRIO, but since it's unmodified, it's not a FABRICATED part. Can we legally withhold the RoboRIO or any other COTS item?

**A.**The roboRIO by itself, even with code on it, is not a FABRICATED ITEM. Deploying code to the roboRIO is not considered a modification that would transition its status from COTS to FABRICATED. If the roboRIO is part of a MECHANISM (e.g. a control board assembly), it must be considered part of the WITHHOLDING ALLOWANCE. If the roboRIO is removed from a MECHANISM, it alone is again a COTS item and doesn't

count toward the WITHHOLDING ALLOWANCE.

#### **Q779**

**Q.**At bag and tag, do we have to bag our bumpers, or are they allowed to be worked on?

**A.**In *Team Update 08*, R18 was updated to include BUMPERS in the WITHHOLDING ALLOWANCE of FABRICATED ITEMS that does not need to be bagged and are exempt from the WITHHOLDING ALLOWANCE weight limit. So no, you do not need to bag your BUMPERS, and you may work on your BUMPERS as per R16 (specifically R16-E).

## **Material Utilization**

#### **Q938**

**Q.**When you order an assembly and the part supplier ships it disassembled, is it considered a modified COTS part if you assemble it?

**A.**If a particular item is sold by all VENDORS in an un-assembled state, then it is only considered COTS in its un-assembled state. If an item is sold by one or more VENDORS pre-assembled, then the assembled state may be considered COTS even if it was received un-assembled (provided no other modifications are made).

#### **Q906**

**Q.**Is the withhold allowance separate from the 120 pound robot weight limit, e.g. can the bagged robot weigh 110 pounds and you still have the ability to bring in 30 pounds of fabricated items?

**A.**You may bring up to 30 lbs. of WITHHOLDING ALLOWANCE items regardless of the weight of the items in the ROBOT bag. Please note that there is no weight restriction on the ROBOT and any other items in the bag, but the robot weight - as presented at Inspection - must be less than 120 lbs. per R5.

#### **Q871**

**Q.**Are cameras other than the Axis and Microsoft Lifecam (e.g. GoPro) allowed (provided they meet all other rules requirements)?

**A.**Yes, there is no requirement to use specific cameras on the ROBOT assuming they meet all other rules.

#### **Q868**

**Q.**Can we use Clippard Minimatic Air Power metal pneumatic storage tanks the 2011 and 2012 models on the robot this year?

**A.**The purpose of the Q&A is not to make definitive rulings on the use of individual parts, but instead offer clarity around specific rules. If you have a question about a specific rule, please rephrase and resubmit.

#### **Q837**

**Q.**Would the unique items be returns to COTS state before Kickoff in order to use them for 2016?

**A.**No, as long as everything (with the exception of items noted in R13) was fabricated (or re-fabricated) after Kickoff, R13 is not violated.

#### **Q835**

**Q.**For FIRST Stronghold, a team purchases a planetary transmission and a variety of gear kits. Once the required gear ratio is determined, the team assembles the transmissions per the manufacturer's instructions, attaches them to motors and installs on their robot. As a precaution they assemble spare transmissions and motors for use at competitions. Would the spares be considered COTS items or fabricated and subject to Withholding Allowance?

**A.**Assembled elements are FABRICATED ITEMS and subject to R15.

#### **Q834**

**Q.**For Recycle Rush, we purchased a transmission and a motor separately and assembled them per manufacturer's instructions and installed on our robot. Is this motor/transmission combination considered a Fabricated Item and not allowed for use in 2016? Neither item was modified with the

exception of wire connectors on the motor leads.

**A.**As assembled this would constitute a FABRICATED ITEM produced before Kickoff and not be legal for use in 2016. If the items were returned to the COTS state as received from the manufacturer, they would then be COTS items and legal for use.

### Q823

**Q.**R13 describes Fabricated Items that may be constructed prior to Kickoff. Exceptions A through C are also excluded from R18 Withholding Allowance. Is it the intent of the rules that the only allowable spare motors not part of R18 are COTS motors that have not been modified in any way? Can R13-D items be excluded from the Withholding Allowance?

**A.**Yes, COTS items (motors, etc.) that have been modified from their original condition (e.g. connectors have been added) are FABRICATED ITEMS. Specific FABRICATED ITEMS are exceptions to R13, but not exceptions to R18.

### Q776

**Q.**Can you use pool noodles with holes on one set of bumpers (say, for the red bumpers) and pool noodles without holes on the other set of bumpers (blue)?

**A.**Yes. *Team Update 09* will clarify that, as long as all BUMPERs in a given BUMPER set (e.g. Red or Blue set) have pool noodles which are the same diameter, cross-section, and density, R21-C is satisfied.

### Q758

**Q.**How do you join 10 ft. of Blue Nitrile Roughtop Tread, 1" Wide (am-3309) together?

**A.**We cannot give instruction or advice about ROBOT design or manufacturing. If you have a question about a specific rule or set of rules (to help you understand if what you want to do will pass Inspection), please let us know about which rules you're unsure of and what elements of that rule you're having trouble with.

### Q709

**Q.**Rule R21 refers to pockets in back of a bumper. Our current design uses a 4" fender washer on the exterior of chassis held by bolt head. 1. Are clearance pockets required for every fastener that protrudes outside the frame? 2. Will a pocket for the bolt head, with the bumper back resting on the washer, be legal? 3. If #2 above is not legal, will it be legal to make a shallow pocket 4" diameter for the washer and a deeper pocket for the bolt head?

**A.**R21 allows teams the freedom to design a BUMPER that mounts tightly to their frame (i.e. no gaps) in spite of minor protrusions. Clearance pockets are not required. We cannot comment on the use of "4" fender washers". Please review R4 and the examples of "minor protrusions" as being "bolt heads, fastener ends, rivets, etc"

### Q671

**Q.**Is there a ruling on diameter of fastner head? We are looking at a bolt head with a large fender washer so it would be closer to 4" diameter instead of ½" diameter of a bolt head .

**A.**There is no definition of diameter of a fastener head. It is unclear from your question whether you are referring to R2, R21-A, or another rule. Please ask again with more detail about the specific rule or rules about which you have a question.

### Q649

**Q.**Are we allowed to have magnets on the robot or does that interfere with too many wiring systems and signals?

**A.**The purpose of the Q&A is not to make definitive rulings on the use of individual parts, but instead offer clarity around specific rules. If you have a question about a specific rule that we may help you understand better, please feel free to ask!

### Q598

**Q.**Can teams use slime tire sealant or similar item in pneumatic tires?

<http://slime.com/184/products/8-oz-tire-sealant-10007/>

**A.**No, such sealant may end up interfering with the operation of other ROBOTS or the ARENA and thus is

not permitted per R9. This will be clarified in *Team Update 03*.

#### Q591

**Q.**Would the use of a radio controlled car shock containing silicon shock fluid be in violation of rule R9 (G)? Example Shock: <http://www3.towerhobbies.com/cgi-bin/wti0001p?&I=LXEFZY&P=ML> Example Fluid: <http://www3.towerhobbies.com/cgi-bin/wti0001p?&I=LX3306&P=ML>

**A.**We can't rule definitively on specific parts in this forum. Generally, though, the term 'hydraulic' is defined as "denoting, relating to, or operated by a liquid moving in a confined space under pressure." Inspectors will use this general understanding of what it means to be 'hydraulic' in determining whether a part used on a ROBOT violates R9, specifically the example given by blue box letter G.

#### Q585

**Q.**Would it be legal to use a 14Watt 12V electromagnet on the robot? Since this electromagnet would not be used as an actuator, is it still subject to the 10W limit of electric solenoids? If so, are 10W electromagnets legal? Here is a link to the magnet in question: <http://www.mcmaster.com/#5698k313/=10pox6t>

**A.**An electromagnet that operates without causing readily discernible motion would not be considered an actuator and would therefore not need to meet the requirements of R29. Such a device would be considered a CUSTOM CIRCUIT, and must follow all the rules required of that classification. The purpose of the Q&A is not to make definitive rulings on the use of individual parts, but instead offer clarity around specific rules. If you believe an item meets the requirements of a rule, but you're concerned about the rare nature of the item, please bring manufacturer's documentation with you that validates the item meets the requirements of the rule.

#### Q517

**Q.**We were wondering if Class 1 lasers are permitted in the 2016 Stronghold competition. We have been searching for all restrictions and a few Reddit posts on [Reddit.com/r/FRC](http://Reddit.com/r/FRC) mentioned that they were permitted.

**A.**Please see the Blue Box under R9. Exposed lasers other than Class 1 are prohibited, which means Class 1 lasers on your ROBOT are allowed. Keep in mind, though, that if lasers are used in such a way that they interfere with the ability of other DRIVERS to operate their ROBOTS, it would be disallowed by this same rules. Also, you did the right thing by posting on this Q&A instead of relying on Reddit! As you probably know, Reddit is not an official source of information for FRC.

## Bumper Rules

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**A**  
.No, there are no contradictions. A ROBOT doing a wheelie has not changed configuration, the same way as a ROBOTs imply driving up the BATTERY has not changed configuration; if the ROBOT were laid flat on the floor all of the bumpers would still be w

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#### Q922

**Q.**Our team has a Bumper issue we can't figure out. In R24 Figure 4-8 shows that a corner must be filled with noodles and fabric and cannot be empty. The question is does the corner have to be completely filled with noodles and fabric? That is, if our plywood overlaps by less than an inch, according to R21 B Figure 4-5, but the noodles do not extend past the plywood, is that legal?

**A.**We can't assess legality of specific BUMPER designs, but generally speaking, yes, corners must be completely filled with noodles and fabric, regardless of the amount of overlap of hard parts of two BUMPERS.

#### Q873

**Q.**Our team just read the issue with a 2x3in cutout in a bumper. However, what if the cutout still allowed for a full 5x8in supported bumper on both sides of the cutout? We are hoping to create a little relief for the boulder to pass under. A 1.5inx9in cutout.

**A.**The answer would be the same as given in [Q856]. All BUMPERS must meet the requirements of R21. An

assembly that does not meet these requirements would not be considered a BUMPER and would need to meet R4, which allows nothing but BUMPERS and minor protrusions to extent outside the FRAME PERIMETER in STARTING CONFIGURATION.

#### Q863

**Q.**we built our robot to do wheelies (the entire robot leans back) in order to get up over defenses. When we do this the top of our front bumper goes up over 12" off the ground (as the entire robot is tilted and the bumper is affixed to the robot). It is only intended as a way to go over defenses and will only be used in traversing defenses. Is this a violation of R22? I did read q807, q522, q630. Still would like clarification. Thx.

**A.**We cannot rule on individual ROBOT designs or behaviors. If BUMPERS are in the BUMPER ZONE when the ROBOT is resting normally on a flat floor (and are compliant with all other rules, e.g. not articulated, etc.), they meet the requirement in R22. Momentary excursions by BUMPERS outside the BUMPER ZONE during the MATCH are expected and, by themselves, are not violations of G19-1.

#### Q861

**Q.**In the spirit of Stronghold, we would like to use the standard Old English Text MT font. However, when we grow it to be 4" tall with a 1/2" stroke we have a little issue. Since it is a script font, a portion of the 0 curves of the 0 and 2 are smaller than 1/2 inch even though the rest of the number is the correct size. Will this be allowed?

**A.**We love the idea of using a font for your numbers that supports the theme of *FIRST STRONGHOLD* (assuming the font is easy to read), but R28-A does require at least a 1/2" stroke width, so something less than that would not meet the requirement of the rules.

#### Q856

**Q.**Do the bumpers need to be 5 inches tall all the way around or can there be a 2 inch deep and 3 inch wide cut out in one section resulting in a section of 3 inch tall plywood for that 3 inch piece?

**A.**No, this modification would not be within the BUMPER exceptions outlined in R21-A and thus not allowed.

#### Q830

**Q.**R19: My robot happens to have two 5-inch sides. They are entirely covered with bumper. This was the premise on which we built our bot. the two sides just happen to be coplanar and there is an opening between them. Now we are seeing an update to the rules which calls for a minimum of 8" of bumper not including the unsupported portion extending to the outside corner in our case. This means that we and probably many other teams will have to rebuild our bots. Am I reading this right?

#### Q818

**Q.**On a side of our robot, the entire side is 24 inches. We plan an opening to scoop up a boulder. On each corner of this side, we plan to have 4-6 inches of bumper. This will leave an opening of 12-17 inches to get a ball inside our robot. Under Sec 4.7 of the rules, it states "If a side is shorter than 8 in., the entire side must be protected by BUMPER ". Our question is this: Is the side considered to be the entire 24 inch section OR is "side" defined as each corner?

**A.**There is no *FIRST* Robotics Competition definition for side, it is generally defined as "the span from corner to corner." R21 dictates that each corner of the FRAME PERIMETER must have a minimum of 8 inches of BUMPER on each side of the corner, unless the FRAME PERIMETER side is too short in which the entire FRAME PERIMETER side must be covered. For a FRAME PERIMETER whose sides are all longer than 16 in., every FRAME PERIMETER side must have a minimum of 16 inches of BUMPER (8 inches from each corner). Thus, a 24-in. FRAME PERIMETER side may only accommodate an 8-inch opening maximum.

#### Q814

**Q.**Is it possible to put the wood of the bumper all over the frame but to put only two 8" bumper sections on both side of the front side of the robot?

**A.**All BUMPERS must completely adhere to R21, i.e. must be backed by wood, must contain stacked pool noodles, must be covered with cloth, and so on, the entire length of the BUMPER. You may place extra material (e.g. wood) surrounding your ROBOT'S current FRAME PERIMETER, but this would merely extend your FRAME PERIMETER.

#### Q807

**Q.**In regards to rule R22 keeping the bumpers between 4 and 12 inches relative to the floor, and section 3.1.4 (The Tower) if a robot used a system to push itself up from the batten over the low goal and touched the rung, would it be in violation of R22, since the bumper would no longer be between 4 to 12 inches relative to the lowest point of the robot?

**A.**We believe the answers to [Q630] and [Q522] apply in this situation as well. If not, please rephrase and ask again.

#### **Q798**

**Q.**Followup to Q785: Many teams have been assuming bumper construction was similar to the past 5 years when hook and loop was allowable to make reversible bumpers. It seemed reasonable enough that RoboPromo is supplying COTS reversible that are illegal per Q785. Would hook and loop in the "hard parts" portion of the bumper be acceptable? If not, there may be a lot of teams that don't notice an obscure Week 5 Q&A and show up with illegal bumpers and no good way to fix them.

**A.**Yes, hook and loop on hard parts of the BUMPER are permitted. R21-D and R27 will be edited in *Team Update 10* to accommodate this. Thank you for your question.

#### **Q795**

**Q.**We are wondering if we could use square pool noodles for our bumper. Thanks.

**A.**No. Per R21-C, pool noodles must be round, petal, or hex shaped. You are welcome.

#### **Q791**

**Q.**R21 C. "Use a stacked pair of approximately 2 1/2 inch. round petal or hex "pool noodles" as the BUMPER cushion material." In the Netherlands it's hard to find this size of pool noodles. What is the tolerance on the size? Is 2.75" allowed? Is 1.97" allowed? And if the pool noodles are slightly bigger or smaller than 2 1/2 Inch, what do we have to do with the backing plate? Adjust it to the pool noodle size? Thanks - Team Rembrandts

**A.**We cannot address your question here. Per Section 4.1, "Some of these rules make use of English unit requirements for parts. If your team has a question about a metric-equivalent part's legality, please e-mail your question to [frcparts@firstinspires.org](mailto:frcparts@firstinspires.org) for an official ruling. To seek approval for alternate devices for inclusion in future FIRST Robotics Competition seasons, please contact [frcparts@firstinspires.org](mailto:frcparts@firstinspires.org) with item specifications."

#### **Q785**

**Q.**Three part question regarding a possible design for reversible BUMPERS: 1) Is a hook-and-loop fastener allowed to be visible on the BUMPER, provided it does not obscure the team number? 2) If so, does the hook-and-loop fastener need to be the same color as the BUMPER? 3) If allowed, can either adhesive or thread be used to attach a hook-and-loop fastener to the BUMPER material (not to attach the BUMPER to the FRAME PERIMETER)?

**A.**Visible hook-and-loop fastener on the BUMPER violates R27-D. Please review Figure 4-7 for a legal cross-section for BUMPER construction.

#### **Q774**

**Q.**R21-G States that removable fasteners are considered a part of the Bumpers. R22 States that Bumpers must be between 4" and 12" above the floor. If the pool noodle and associated plywood backing are still within the Bumper Zone and assuming all other bumper rules at satisfied, would it be legal to have the mounting brackets/hardware located outside of the Bumper Zone? (I.E. Angle bracket bolts to top of frame tubing at 13" above the floor.)

**A.**We believe the answer to [Q594] also answers this question. If not, please follow-up with more detail.

#### **Q766**

**Q.**Our chassis is 6" from the ground at its highest point. Are we allowed to make our bumpers so that they start 6" above the ground and end 11" above the ground? They would start at the top of the chassis.

**A.**There is no rule that requires the BUMPERS to be backed by the "chassis", however they do have to be backed by non-BUMPER ROBOT elements (which constitute the FRAME PERIMETER). Please note that per R26: "BUMPERS must be supported by the structure/frame of the ROBOT (see Figure 4-9). To be considered supported, a minimum of 1/2 in. at each end of the BUMPER must be backed by the FRAME PERIMETER." and that per R21-G they "must attach to the FRAME PERIMETER of the ROBOT with a rigid fastening system to form a tight, **robust connection to the main structure/frame**" (emphasis added).

**Q744**

**Q.**Section R21-G, Figure 4.7, indicates a "1" limit for hard parts". However, a 1" width limit for hard parts is not explained in the rules. We are considering permanently attaching a 1"X1" angle to the back of the bumper (aluminum angle permanently attached to the wood backing) for the purposes of attaching our bumper to the frame perimeter so that the angle can rest on top of the frame perimeter and provide a place for fastening the bumpers to the frame. In this case, the hard parts of the bumpers would be 1.75" wide (1" angle plus 0.75" wood), but the wood backing of the bumper would be tight against the frame perimeter structure. Is this permitted provided we still follow R20 and R22?

**A.**The 1" restriction shown in Figure 4-7 is described in R21-B and is measured from the FRAME PERIMETER outwards. There is no explicit restriction on the distance hard parts used as part of the "rigid fastening system" may extend into the FRAME PERIMETER.

**Q743**

**Q.**Are there any rules or general guidelines regarding how many fasteners are needed per bumper (to attach to the frame perimeter), or how far apart the fasteners can be placed?

**A.**There are no rules explicitly specifying the number or spacing of fasteners used to attach BUMPERS to the ROBOT. Per R21-G the fasteners chosen must "form a tight, robust connection to the main structure/frame" and "must be designed to withstand vigorous gameplay." The number of fasteners required to meet these constraints will vary depending on the type of fastener chosen.

**Q741**

**Q.**Can bumper corners be offset? I.e. if one side bumper ends at 8" high, can the rear bumper be set at 12" high with a 4" offset?

**A.**There are no rules that specify that both BUMPER corner joints must meet within the same plane provided that all BUMPER segments adhere to R22 and the corner joints fully meet R24.

**Q716**

**Q.**Per 4.7 BUMPER Rules R19 The confusing part of this rule is that the third sentence refers to "side" which could be interpreted as either "frame" or "frame perimeter". Please confirm that figure 4.4 "C" is not okay because the bumper segment is less than 8" while the FRAME PERIMETER on that side of the robot frame is greater than 8".

**A.**As noted in the first sentence of R19 and in the Blue Box below it, R19 considers the FRAME PERIMETER. Your interpretation of the lower right corner of Figure 4-3 ROBOT FRAME PERIMETER C is correct, the FRAME PERIMETER side is greater than 8 in. therefore a minimum of 8 in. from the corner must be protected by BUMPER.

**Q690**

**Q.**R22 says the BUMPER must be in the BUMPER ZONE (4-12 inches from the floor). Can a BUMPER be mounted diagonally with one end at the 4 inch height, and the other end at 12 inches? Assuming the answer is "yes", does anything prevent an 8 inch long BUMPER from being mounted vertically (BUMPER ZONE is 8 inches high) to meet the requirements of R19?

**A.**You're correct that per R22, "BUMPERS do not have to be parallel to the floor," but their cross section must resemble that of Figure 4-7 which illustrates a proper BUMPER'S vertical cross-section. A BUMPER mounted vertically would not look like this image and is not permitted. We also want to reiterate that the required 8 in. length of BUMPER must be along the FRAME PERIMETER per the Blue Box associated with R19.

**Q685**

**Q.**In update 05, Section 4.7, the Figure caption reads, "an revised lower-left corner" Don't you mean "a revised lower-right corner?" Also, does that picture of less than 8" bumper mean that the robot is not allowed to have edges less than 8". I'm confused by why that bumper is "NOT OK." - FYI, this question is posted 3 times because it kept cutting me off.

**A.**Yes, you're correct, the language in *Team Update 05* will be fixed. Thank you! FRAME PERIMETER sides that are less than 8 in. are permitted, however they must be fully BUMPERED. While this corner does have a BUMPER, it's less than 8 in. along that side of the FRAME PERIMETER and therefore illegal. It's important to understand the difference between a ROBOT's frame (and its segments) and the ROBOT's FRAME PERIMETER, as described in the Blue Box under R2.

**Q672**

**Q.**Regarding Bumper Rules section 4.7. All frame examples in figure 4-3 show frames where the internal angle between frame members are 90 degrees or greater. If the internal angle between 2 frame members is less than 90 degrees (eg. 80 degrees), can the bumper follow the frame angling back toward the internal aspect of the robot as long as it meets the other bumper rules, ie minimum of 8 inches in length?

**A.**Please see the Blue Box below R2 for information about determining the FRAME PERIMETER of a ROBOT; This method of assessment always results in a convex polygon. Per R19 and its associate Blue Box, BUMPERS must be placed on the FRAME PERIMETER.

**Q663**

**Q.**Thank you for the answer but that brings up another. Referencing Figure 4-3 does the bottom left robot frame have 4 or 5 sides? 1. If the figure has 5 sides, then the two short sides can be less than 8 inches and therefore the short sides must be fully covered with bumper, correct? 2. If the figure has 4 sides, then does that force the two short sides to be greater than or equal to 8 inches?

**A.**The FRAME PERIMETERS of the ROBOTS in Figure 4-3 are denoted by the black outlines, the bottom left example in the figure has a 4-sided FRAME PERIMETER. As each side of that example ROBOT is > 8", a minimum of 8" on each side of each corner must be protected by BUMPERS. We will be updating Figure 4-3 via Team Update 05 to hopefully clarify this concept. There is no rule that specifies minimum length of FRAME PERIMETER segments. If a segment is less than 8 inches long, the entire segment must be covered with bumper.

**Q662**

**Q.**Are we mis-reading R26 or should the wording of R26 be: ... Additionally, any gap between the backing material and the frame: A. must not be greater than 1/4" deep, AND B. not more than 8 in. wide Changing "or" to "and". The figure shows a bumper that has the 7" deep gap; but since it is only 7" wide it is OK (both conditions must be violated for an infraction). With "or" wording only one condition is necessary for a violation (and the 7" x 7" opening would be NOT OK).

**A.**R26 refers to two conditions. The BUMPERS may have less than or equal to a 1/4" gap behind them for any length. If a gap is greater than 1/4" it may not be longer than 8 inches. Please see Figure 4-9. Typical BUMPERS will flex 1/4" without damage. BUMPERS unsupported for widths in excess of 8" may fail when the gap is greater than 1/4".

**Q659**

**Q.**Do bumpers need to be attached at any regular spacing along the frame?

**A.**Please see R21-G. A specific regular spacing along the frame is not required, but BUMPERS must be attached "to form a tight, robust connection" and the attachment system "must be designed to withstand vigorous game play".

**Q656**

**Q.**On a standard rectangular robot, all corners must be protected by bumpers as described in the rules. However, in the event of a completely concave side of the robot, would the bumpers follow the concave frame perimeter or the linear perimeter defined under R2? Also what is the airspeed velocity of an unladen swallow

**A.**The FRAME PERIMETER is always convex and is identified using the process indicated in the blue box in R2. Once you have identified the FRAME PERIMETER, all BUMPER requirements in *Section 4.7* must be met. In order for us to answer your second question, please specify African or European swallow.

**Q652**

**Q.**The manual states "at least 8 in of BUMPER must be placed on each side of each outside corner. If a side is shorter than 8 inches the entire side must be protected". For a rectangular robot frame this leads to two possible translations. 1. A L shaped bumper with legs at 4 inches each, for each side the two 4 inch legs would equal 8 inches per side. 2. A L shaped bumper with legs at 8 inches each, for each side the two 8 inch legs would equal 16 inches per side. Which interpretation is correct?

**A.**Reviewing Figure 4-3 may help. Every corner has two sides, and going corner by corner, both sides of each must have 8" protected by a continuous BUMPER as measured from the corner being considered. Having two 4" BUMPERS along a single side of a ROBOT would not meet this requirement.

**Q651**

**Q.** Do the elements of the bumper mounting system that are attached to the bumpers need to only be located in the same region of frame perimeter protected by bumpers? Put another way, if there is a gap in a bumper protection along a frame perimeter side, may a portion of the mounting elements (entirely within the frame perimeter) be within that gap?

**A.** There are no rules that require BUMPER fastening elements located inside the FRAME PERIMETER to be covered by a BUMPER (provided the requirements of R19 are met).

#### **Q650**

**Q.** Rule R22 specifies that the bumper zone is "in reference to the ROBOT standing normally on a flat floor," so does this mean that if the robot's normal position satisfies the bumper zone requirements, then tipping doesn't matter? For example, if a robot normally drives on large wheels, but may tip forward on to smaller wheels, then does the bumper still need to be entirely within the bumper zone vertically relative to the ground.

**A.** In the context of this rule, 'normally' means in intended mode(s) of operation. So, if you design your ROBOT to intentionally operate in several orientations or configurations, R22 must be met in all of them to pass inspection, and G19-1 must be met at all times during a MATCH. Note that this means if your robot accidentally tips over playing a match, and it's obvious to Referees that your robot was not intended to play the game in that position, you will not get called for violating G19-1. Please be careful with all the ROBOT rules if you are considering creating a ROBOT that can drive or operate in significantly different orientations.

#### **Q636**

**Q.** If there is a pneumatic wheel on an outside corner of the chassis, does a bumper need to go around the wheel or does the wheel cushion as a bumper would?

**A.** Please note that the FRAME PERIMETER is comprised of fixed, non-articulated structural elements of the ROBOT (R2). Nothing can be outside that FRAME PERIMETER at the beginning of the MATCH (R4), and BUMPERS must be installed on that FRAME PERIMETER such that they protect all outside corners of the FRAME PERIMETER (and other requirements in R19). This means that a pneumatic wheel (assuming it's articulated) is not part of the FRAME PERIMETER. A pneumatic wheel is also not a substitute for BUMPERS.

#### **Q633**

**Q.** Bumper Rule R19 From our understanding, a side of our robot can be less than 8 inches so long as the entire side of the robot is covered in bumpers. If we have a 3 sided robot, must those two sides extend 8 inches from the corner and be covered in bumpers, or can they extend 4 inches from the corner and be completely covered in bumpers?

**A.** If a side of the FRAME PERIMETER is less than 8 inches it must be fully covered by a BUMPER. Please note that the measurement is made along the FRAME PERIMETER, not what teams may consider as a frame. Please refer to the Blue Box below R2 and Figure 4-1.

#### **Q622**

**Q.** If a wheel starts inside the frame perimeter and then swings outward so that it passes the bumpers and is exposed to other robots, is that legal or is the wheel not able to extend past the bumpers?

**A.** There are no rules that explicitly prohibit wheels from extending beyond the BUMPERS during gameplay as long as R3-B (and all other ROBOT rules) are met.

#### **Q621**

**Q.** According to R21 part D multiple layers of bumper cover material are permissible so long as it does not compromise the cross sectional layout and it complies with R27. Is there a limit to how many layers of fabric that may be covering the noodles at once? We were looking into a reversible bumper design that has a maximum of four layers of fabric covering part of the bumper at once.

**A.** There is no explicit limit on the number of fabric layers in any portion of the BUMPER provided that the cross-section is not significantly altered.

#### **Q594**

**Q.** R20 discusses structures for mounting BUMPERS onto the ROBOT. Are there any restrictions on the size of structures that are contained completely inside the FRAME PERIMETER? Specifically, can these attachment structures (which are completely contained inside the FRAME PERIMETER) lie outside the BUMPER ZONE?

**A.** Per the Blue Box below R20 "elements permanently attached to the ROBOT will be considered part of the

ROBOT", such elements would therefore need to be inside the FRAME PERIMETER, but not necessarily inside the BUMPER ZONE. Additionally, "elements attached to the BUMPERS will be considered part of the BUMPER" and would therefore need to be located entirely within the BUMPER ZONE per R22.

#### Q553

**Q.**If we have a 27" side with 6" bumpers either side of a 15" opening are we legal? We're having a "they said, BI, THEY SAID!".

**A.**We cannot rule on the legality of a particular ROBOT design. We encourage you to review R19 for information regarding BUMPER requirements "on each side of each outside corner." The figures in the rule may be especially helpful to you. If you have a specific question about the meaning of a rule, please rephrase your question and resubmit.

#### Q522

**Q.**Is any mechanism that moves the robot relative to the floor such that the bumpers are out of the bumper zone while breaching a defense a violation of R22. we have seen the update posted on 01/12/2016

**A.**If the ROBOT is virtually transposed to a flat floor without changing configuration (e.g. retracting MECHANISMS) and the BUMPERS are not within the BUMPER ZONE, it violates G19-1.

#### Q520

**Q.**Bumper rule R19 states "If a side is shorter than 8 in., the entire side must be protected by BUMPER". If the side is 27" with a 13" cut-out (14" remaining) does the 8" minimum apply or is the 7" on either side of the cut-out considered a full side less than 8"?

**A.**Per the Blue Box below R19: the dimension defined in R19 is measured along the FRAME PERIMETER. A lack of physical frame elements between corners of the FRAME PERIMETER does not change the length of the FRAME PERIMETER side.

## Motors & Actuators

#### Q951

**Q.**We are using a Mini Cim part #217-3371 and want to replace the 2 bolts that hold the motor together with longer ones to give us 2 additional mounting points.

**A.**Replacing structural bolts integral to the motor is not one of the allowed modifications per R30.

#### Q893

**Q.**Are we allowed to use an electric brake on our climber motor? The proposed layout is as follows: Talon SRX ground lead connected to RS775 ground lead RS775 hot lead connected to Spike relay input Spike NO lead connected to Talon hot lead Spike NC lead connected to 775 ground lead We're not clear if this violates R53 (power regulating devices), since we're not using the Spike to control the motor, but to a) protect the Talon when power is disabled and b) provide an electric brake on the RS775.

**A.**This would be a violation of R53 and/or R55. Note that the Talon SRX has a dynamically selectable brake mode which will do basically what you have described in a legal fashion.

#### Q847

**Q.**We would like to use an Autotape or motorized tape measure on our robot. It is a COTS part but it does contain a motor. Can we still use this item on our robot?

**A.**The only legal motors for your ROBOT are listed in R29. If the device you mention does not use one of these motors, it would not be allowed as-is. There are no rules prohibiting you from modifying the device to use one of the legal motors in place of the original, however.

#### Q844

**Q.**Does that mean that all COTS computing devices are legal? And does that mean that any fan found on that COTS computing can be used? And Table 4-1 does not specifically say that these fans must be used in conjunction with the computing device such as the wording in the last cell "Factory installed vibration and autofocus motors RESIDENT.." Does that mean that these fans can be used elsewhere, for other cooling and blowing purposes?

**A.**Table 4-1 is about legal motors, to be a legal COTS computing device, the device must satisfy all ROBOT rules. A fan that has been removed from a COTS computing device is no longer "part of a legal

COTS computing device" and thus would not be legal.

#### Q838

**Q.** Since an unlimited number of 9015 motors are allowed by Fig 4.1, how are they to be controlled/operated?

**A.** Motors are to be controlled in accordance with R52 and R53, including Table 4-4. If this response clarify the rule requirements, please rephrase with a reference to a specific rule or concern, and ask again. If your question is of a technical nature, please use the [FIRST Forums](#) for guidance or advice.

#### Q836

**Q.** Clarification of wiring a motor. We have a planetary gear box that mounts up to four 9015 motors. Can a "custom circuit" be used to wire these motors in series or parallel?

**A.** No, please refer to R53.

#### Q829

**Q.** We have a Bane Bot planetary gearbox, and could not find GP-56012 that is no longer available. Would this C.I.M. to planetary be legal?

**A.** Please see the answer to [Q754].

#### Q816

**Q.** R29, Table 4-1 states that fans that are part of legal COTS computing device are legal. Can you define what a legal computer device is? If I wanted to can I put a PC into my bot and use it to communicate with the robo-rio. And if that is legal, can I assume that all fans that fit into a PC would be a legal fan?

**A.** A COTS computing device is any COTS device that is designed to calculate. We can't give an exhaustive list, but laptops and smartphones would be examples. All fans that are part of the original COTS computing device, and came installed by the manufacturer, would be legal per the COTS computing device entry in Table 4-1 of R29; in other words, the motors inside the fans are legal as long as the fans remain intact as a part of the COTS computing device.

#### Q811

**Q.** Hello all, we have a motor labeled as a rear gate motor, does this fall as a door motor or not? Thanks.

**A.** No, a *rear gate* motor is not a *door* motor and thus not permitted.

#### Q808

**Q.** In clarification, the magnetic encoder requires a magnet be embedded into the shaft being monitored. With the Cim motor, rear of the Cim shaft (which is inside the motor) is drilled for the small magnet to be placed, then the encoder is attached to the base of the CIM motor with small screws. This does not alter the function of the motor, just monitors the revolutions. Would this modification violate R30?

**A.** Yes, this violates R30. Drilling into the casing of the motor may compromise its mechanical structural integrity, which is the primary violation example in the R30 Blue Box.

#### Q805

**Q.** Regarding rule R-30. In order to use a magnetic encoder (Cross the Road Electronics, PN 15-697867) on a Cim or Mini-Cim motor, the rear of the motor shaft has to be drilled to embed a magnet and the sensor is mounted to the base of the motor housing in order to connect to the Talon SRX. Is this modification allowed?

**A.** R30 is specific about modifications permitted and doesn't include modifying any part of the shaft *inside* a CIM or miniCIM. We can't give you a definitive yes or no because we don't completely understand your question. If you're still unsure, please rephrase and resubmit your question. Thank you.

#### Q799

**Q.** Is the Firgelli Technologies L16 Actuator 50mm 63:1 6V RC Control allowed under R29? It is listed as a PWM controlled linear servo. It has a stroke longer than 1 inch, but is not solenoid operated.

**A.** We can't rule definitively on the legality of specific parts or ROBOT designs in this Q&A, only answer clarifying questions about rules within the Game Manual. In general, if a part is sold by a VENDOR as a

"servo" it should be regarded a servo for the purposes of assessing rules compliance. If you have a specific question about the meaning of a rule or need it clarified, please rephrase and resubmit. Thank you.

#### Q754

**Q.**We would like to use a 30" worm gear actuator as our lifting mechanism. Is this within the rules?

**A.**We cannot assess designs and parts to determine legality via this Q&A system. If you have a question about a specific rule or set of rules (to help you understand if what you want to do will pass Inspection), please let us know about which rules you're unsure of and what elements of that rule with which you're having trouble.

#### Q748

**Q.**DART linear actuator>>the bearing will not fit the rod. bearing inside diameter is .375 and the outside diameter of the rod is .391 (spacer inside diameter is .382) It seems we need wider diameter bearings. What is the solution to put this pieces together. Thank you.

**A.**The purpose of this Q&A is to answer questions specific to the rules of *FIRST STRONGHOLD*. We recommend you consult other local teams or companies to seek assistance when building your ROBOT.

#### Q738

**Q.**As per R29, does the spirit of this rule include power-antenna motors as "select automotive motors"?

**A.**No, power-antenna motors are not included in the allowed "select automotive motors" list as also described in [Q626].

#### Q642

**Q.**Does an actuator with an included motor sold as a "door lock actuator" meet the definition of "Select Automotive Motors" per R29 (sample: <http://www.amazon.com/dp/B0088YE6YQ/>)?

**A.**Yes. As per the answer to [Q626], the intent of "Select Automotive Motors" is to limit the selection criteria of automotive motors to those specifically listed in the parenthesis that immediately follows. "Door" motors are listed, and a motor sold as a "Door Lock Actuator" does fall under that category.

#### Q634

**Q.**If we purchase a 12V linear rotary actuator assembly, can it be used as the assembly with the motor that comes with it?

**A.**All motors used on your robot must conform to the allowed motor list *Table 4-1*. You may power the linear actuator with a legal motor.

#### Q626

**Q.**Team Update 03 changed R29 to add the word "Select" to the automotive motors with no definition of what the selection criteria are. Power? Weight? Size? Color? We have already ordered and received a replacement seat motor from Amazon that is clearly sold as a seat motor and runs at 12 VDC. We could not get any other information from the seller or manufacturer. How do we know if it is legal?

**A.**Sorry for the confusion, the selection criteria are the types indicated in the parentheses. The intent was to clarify that other automotive motors such as starter motors are not legal.

#### Q596

**Q.**Can we not use any of the motors from Servocity? I see that they are a sponsor for First. Their planetary gear motors are way cheaper than Andymark's.

**A.**Legal motors are listed in Table 4-1 as part of R29. Only motors listed there are allowed to be used on ROBOTS this season.

#### Q550

**Q.**Hi, are we only allowed to have a 1 inch stroke maximum for an electric actuator, or can we have a longer stroke? Is this also the case for pneumatic actuators, or just electric? Thanks!

**A.**Per R29, you can only have a one inch stroke for Electrical solenoid actuators. Please see R77-J as amended in *Team Update 02* regarding pneumatic actuators.

**Q521**

**Q.**Are Cobra CM 2206/20 Multirotor motors allowed? I have attached a link to the specifications below. <http://innov8tivedesigns.com/cobra-cm-2206-20-multirotor-motor-kv-2100>

**A.**No, the only legal motors and actuators for the 2016 *FIRST* Robotics Competition are defined in R29.

**Power Distribution****Q972**

**Q.**We use a flashlight to aim our robot. To not blind people, we use a spike to only turn on the flashlight before shooting. We would like to use the flashlight as an alignment device before the match when the robot starts as a spybot. Would including a manual switch to bypass the spike only before the match begins run afoul of R55? Would unplugging the wires to temporarily to remove the spike from the circuit then plug them back in before the match run afoul of R55?

**A.**A manual switch placed between the PDP and Spike violates R55. A switch placed between the Spike and flashlight does not violate R55. Be mindful of G8 when planning your setup strategy.

**Q960**

**Q.**May the West Coast Products Spartan Sensor Board be powered through a Spike Relay? We have a digital servo that doesn't disable when it loses PWM signal, and we're looking for options to force it off.

**A.**While R52 legislates devices that can be used to control actuators, there are no rules that prohibit using a Spike Relay to control an element that is not an actuator. Meanwhile, please note R54 which renders any power applied to/cut from a sensor board with pass-through PWM connectors irrelevant.

**Q949**

**Q.**If the robo rio power connections on the PDP are damaged can we use we use one of the other small outputs on the PDP with a 10-amp breaker?

**A.**No, that is a violation of R42.

**Q892**

**Q.**Ok, but the 3 Mohm resistance between motor leads and housing in turn creates a 3mohm resistance between APP connectors and robot frame. I'm assuming if this is measured as per the blue box, the robot will be deemed legal and no modifications will be required.

**A.**3MOhm is greater than 3Kohm which meets the requirement as described in the Blue Box of R38.

**Q885**

**Q.**A Spike Relay is attached to the PDP protected by a 20 AMP circuit Breaker. Per R49, 18 AWG is used between the PDP and the Spike. If the Spike has a 5 AMP fuse, can 22 AWG wire then be used after the Spike? Or, is the wire size of the entire circuit determined by the circuit breaker on the PDP? Note: This is not any different from using smaller wire off the 2A VRM connection, but that is explicitly allowed.

**A.**"Protected circuit" refers to the circuit breaker in the PDP. The circuit described would need to be wired entirely with 18AWG or larger, or use a 5A circuit breaker in the PDP.

**Q881**

**Q.**We are finding that a bunch of our new mini-CIM motors to have a 3 megaohm conductivity to the motor housing from leads. Motor functions perfectly fine, but I'm wondering if this condition will be considered legal. R38 requires a 3Kohm resistance between APP connectors and robot frame, which we pass. However, I've been told that judges check continuity by measure voltage from bat ground to robot and if they find any voltage, we need to remedy it. Is this how judges check for R38 compliance

**A.**R38 is checked by Inspectors as described by the Blue Box below R38 which specifies that Inspectors observe "a >3kΩ resistance between either the (+) or (-) post within the APP connector that is attached to the PDP and any point on the ROBOT." The 3Mohm resistance you observe between the motor leads and housing is not regulated by R38.

**Q880**

**Q.**Hi I was wondering if our team is allowed to physically stack TALON SR's on top of each other so that

the heat sync of one Talon would be below the bottom of another talon with spacers in between them.

**A.**There are no rules that explicitly prohibit this.

#### **Q852**

**Q.**Could you please define "low-load" on the asterisk below R53? We have two DC-DC converters that each draw < 3A @ 12 VDC that we would like to hook to one relay and are unsure if these meet the criteria for "low-load". On a lighter note: other than wood - what also floats?

**A.**There is no specific definition of a low-load CUSTOM CIRCUIT. In general, you will need to keep the peak current below 20A to avoid blowing the fuse inside the relay module.

#### **Q797**

**Q.**Are Talon SRXs, Talon SRs and Talons completely compatible with each other? Like can all 3 types be run through the same Power Distribution Board? Practically speaking, can any combination of all 3 be used on the same robot for speed control, or must it just be all SRXs or SRs? I'm trying to ascertain whether or not we must use only one type on the robot for optimal functionality. Thanks!

**A.**This system is for questions regarding the rules of *FIRST STRONGHOLD*, which don't require that all motor controllers on the ROBOT be identical. We're unable to provide advice regarding "optimal" functionality. For technical support, please visit the [FIRST Forums](#).

#### **Q793**

**Q.**Rule 54 states that "Servos must be connected to the PWM ports on the roboRIO." Are we allowed to connect the power conductor of a servo (typically 4 to 6 volts) to a separate 6 volt supply such as a second voltage regulator module to avoid overloading the Roborio?

**A.**Please note that R54 specifies that (emphasis added here) "servos must be connected *only* to the PWM ports on the roboRIO..." If the manual version to which you're referring doesn't have "only" please download the most recently published one.

#### **Q786**

**Q.**How many Talon SRXs are we allowed on the robot?

**A.**There are no rules that specifically limit the maximum number of motor controllers allowed on a ROBOT, as long as no other rules are broken, though R48 does provide a practical limit as the number of breakers on your PDP.

#### **Q739**

**Q.**We have a battery terminal question and would like to know if we are allowed to additionally terminate a quick battery charger connector to each terminal. Each terminal will be fully insulated with electrical tape.

**A.**No, additional connectors attached to the battery would be a violation of R36. R36 is an exclusive list of what may be connected between the ROBOT Battery and the Power Distribution Board, as shown in Figure 4-10.

#### **Q737**

**Q.**Are teams permitted to use RTV to insulate: A. The main breaker terminals and/or other power distribution connections (for example, terminals connecting to a Victor 888), B. Control, Command, and Signals wire termination points (for example, PWM cables to a Victor 888)? Thank you very much!

**A.**There are no specific *FIRST* Robotics Competition requirements on insulation materials for signal/power connections, provided that the insulation material is properly rated for its intended use. Please keep in mind the difficulty in removal and maintenance when using products such as RTV, and be sure to closely adhere to all safe use warnings when using the product. Be aware that the use of some products, such as RTV, may be restricted at some venues due to its hazardous nature.

#### **Q695**

**Q.**R35 allows for "closed-loop COTS pneumatic (gas) shocks" on the robot. Would a closed-loop "gas spring" that contains oil within its sealed housing meet the requirement of R35 and not violate the R9 ban on hydraulic fluid?

**A.**No, a shock containing oil, other than minuscule amounts for lubrication, is not considered a

pneumatic shock.

#### Q679

**Q.**R52.A.v (Talon SRX Motor Controller) states this about firmware: "See R59 if using via CAN." R59 does not pertain to firmware versions. Should the reference in R52 point to R70 instead?

**A.**Yes, you are correct. R52.A.v should reference R70 for CAN connected devices. We will correct this in *Team Update 06*.

#### Q531

**Q.**Would it be legal to connect WCP's new 775 Pro on the 30 Amp side of the PdP? If not, do we have to use a second PdP in order to get enough 40 amps slots?

**A.**Per R48, Motor Controllers may be connected to Circuit Breakers up to 40A; There is no required minimum value. Note that using 2 PDPs is not permitted per R36.

## Control, Command, & Signals System

#### Q969

**Q.**Can we connect two power controllers to the Roborio (IE Drive two motors on same gearbox) using the wye splitter? We have always used 1 PWM output for each power controller. Reading R68, the wye splitter does not seem to be precluded, but somehow I remember a time when it had to be 1 pwm output to each power controller.

**A.**There are no rules that prohibit the use of a PWM "Y" cable to allow two motor controllers to be driven by the same PWM signal supplied by a corresponding PWM output on the roboRIO.

#### Q966

**Q.**For three years, my team has had many failures with communication with the radio. The 1-800-FIRST line recommended I ask this question here. This is a technical question regarding the control system not related to the rules. What should students do to get consistent drive station (or operator console) communication with wireless radio?

**A.**We apologize, you seem to have been misdirected. This system is only for rules questions. Technical questions are best addressed through the *FIRST* Forums. We suggest you post this particular question in [this sub-forum](#).

#### Q936

**Q.**Is it legal to stream an Axis Camera's feed to a computer, bypassing the driver station and the RoboRIO during a match? Essentially we want to display the feed on our driver station computer and process the images for vision tracking there and just stream it from the computer.

**A.**Per R60, teams may communicate from the OPERATOR CONSOLE to the ROBOT (not necessarily the RoboRIO) as long as the communication meets the specified port and bandwidth criteria. If you are asking about bypassing the computer hosting the Driver Station altogether, please note R63 and R93.

#### Q927

**Q.**In order to ensure visibility of the Radio Signal Light from all sides, we intend to install a second RSLs on our robot at our first event this year, as allowed per R65. We understand that the two lights should be wired in parallel to the RSL port on the RoboRIO; is this correct? Is it necessary (or recommended) to use a single wire from the RSL port and splice wires analogous to R45 for power wires from the PDP?

**A.**Your understanding of R65 is correct. For technical assistance or advice, please use the [FIRST Forums](#).

#### Q901

**Q.**The RoboRio Networking instructions has the RoboRio getting its IP address from the Radio. There is a lot of connection problems this year with the new radio and mDNS. Can we go back to the old method and assign static IP addresses to the RoboRio of 10.x.y.2, and the Driver Station 10.x.y.5, where xy is the team number?

**A.**There are no rules prohibiting this. Please note that volunteers (e.g. FTAs) are trained to debug the system in the recommended configuration and may ask you to change to that configuration (DHCP on all devices) if you are unable to establish connectivity through the FIELD Management System.

**Q849**

**Q.**We are using a COTS computing device with an integrated battery. The second to the last check-off on the inspection checklist says "Remove power from the robot, confirm all LEDs are off". I am concerned that the COTS item as well as any USB peripherals may still be on after the robot battery is disconnected. Per R31, they may be independently powered. I foresee this confusing inspectors and would like an official ruling on whether the lights on the COTS item and USB peripherals can stay on.

**A.**LEDs that remain on as the result of a legal power source are permitted. The *Inspection Checklist* will be revised in *Team Update 12*.

**Q817**

**Q.**Is it legal to use the D-Link router (from previous years) as an ethernet switch? The device will not be used for any sort of wireless communication, but only to expand the number of ethernet devices we can use on the robot.

**A.**Yes, it is permitted to use the DLink DAP-1522 only as an Ethernet switch as long as the wireless functionality is disabled such that rules R57 and R63, among others, are not violated. While not required, please help the FIELD STEWARDS by mounting it such that they can quickly and easily see the LEDs and conclude that the wireless functionality is disabled.

**Q815**

**Q.**I am pretty certain that the intent of R63 is to prevent direct wireless electronic communication between digital devices (via RF, WiFi, Bluetooth, etc). However, its wording is so broad that it technically excludes all communication via such methods as light and sound. Thus, using a camera or ultrasonic sensor to detect the environment and lights to convey status are illegal. Heck, even an IR beam-break sensor is excluded. I really hate to nit pick, but can you please clarify the wording?

**A.**Great question. Devices that employ signals in the visual spectrum (e.g. cameras) and non-RF sensors that don't receive human-originated commands (e.g. "beam break" sensors or IR sensors on the ROBOT used to detect FIELD elements) aren't wireless communication devices and thus R63 doesn't apply. We'll clarify this in **Team Update 11**.

**Q806**

**Q.**Is a team allowed to change the motor on a window motor gearbox? According R30 part E, it says we may not use the motor without using the gearbox but does that mean we cannot use the gearbox without the motor?

**A.**There are no rules that prohibit using the gearbox without its motor, however the motor you do use must be legal.

**Q800**

**Q.**Is it legal to plug in an Ethernet switch into the Robot Radio? I am aware you must have a direct connection from the robo-rio to the radio, but I would like to add more ports in order to use two axis cameras.

**A.**There are no rules that prohibit plugging a switch into the other port on the ROBOT radio.

**Q768**

**Q.**Are teams allowed to change autonomous programs via Smart Dashboard, or do autonomous codes need to be changed via on-board switches?

**A.**With the exception of G14, there are no rules that prescribe or restrict specific methods for manipulating multiple autonomous code routines.

**Q767**

**Q.**Our RoboRio's mDNS name is incorrect, which prevents us from connecting over the network. RoboRio's DNS name is roboRIO-2187-FRC.lan instead of roboRIO-2187-FRC.local Addition info: firmware: 3.0.0f0 Image Version: FRC\_robRIO\_2016\_v19

**A.**Please see [Q761].

**Q761**

**Q.**In the regional event in the game can permit is correct . replaced the "axis.local" to the static ip or

there are some restrictions.

**A.** For technical assistance, please check out the [FIRST Forums](#).

#### Q728

**Q.** Is there a limit for how many frames per second you can have for cameras attached to your robot?

**A.** No, there is no explicit limit on camera framerate. If you plan to send the camera stream over the network we recommend paying close attention to R60 and the [FMS Whitepaper](#).

#### Q726

**Q.** If a team wanted to use the feedback from a sensor while robot is disabled and activate an LED is this allowed?

**A.** Yes, there is no rule prohibiting reading sensors or controlling non-actuator outputs while the ROBOT is DISABLED.

#### Q717

**Q.** My team's KOP router came to us broken. The first time we tried to power it up with the proper power it did not start up even after a couple of minutes. We confirmed that the power was the correct voltage. We already called FIRST HQ and frcteams and were directed here. How can we get a replacement or reimbursement?

**A.** We require that missing or faulty Kickoff Kit items be reported per the Replacement Parts process detailed [here](#), and unfortunately, the deadline has passed. Please email [frcparts@usfirst.org](mailto:frcparts@usfirst.org) as there may be other options worth pursuing.

#### Q713

**Q.** When we deployed our programs, it showed up that our roboRIO was not found, everything could not work, but we had already wired everything (including the network cable, the radio, the motors, and solenoid, etc). How can we solve this problem?

**A.** Please see [Q616].

#### Q707

**Q.** If a team wanted to use a smartphone (similar to those used for FTC) as a co-processor would they be allowed if they disabled all wireless radios (R63) and didn't use the vibrating motor (to comply with R29)?

**A.** R63 only prohibits wireless communication to, from, or within the ROBOT, except those required per R57 and R62; it does not prohibit disabled radios. Team Update 06 will update Table 4-1 to allow factory installed vibration and autofocus motors resident in COTS computing devices (e.g. rumble motor in a smartphone). Great question, and thank you for asking about those motors!

#### Q646

**Q.** In this post: <http://www.chiefdelphi.com/forums/showthread.php?p=1527681&postcount=3> and following, it is suggested that the brake/coast pin of a PWM-controlled motor controller may be wired to a control signal from the RoboRIO's DIO port. I read this as a violation of R68, and as a modification beyond the wording of R66, especially bullet I. Others there see it as legal. Is this practice permitted? If allowed, I suggest providing clarification in the rules as to how to wire this safely.

**A.** You are correct, this practice is a violation of R68. We acknowledge that this has been a common practice, and we will review this with Inspectors.

#### Q619

**Q.** We use JAVA eclipse and when we try to Robot Builder nothing happens (does not open). We've tried to open it using command prompts and there is an error on reader line 3. Also, there is no version number on the program. Any ideas on how to fix this or whom we should contact to fix this? Thanks so much!

**A.** Please see [Q616].

#### Q616

**Q.**We are having trouble loading JRE on the Robo Rio. It has failed multiple times. Can someone help us figure out what we are doing wrong? Many thanks!

**A.**The purpose of this Q&A is to answer questions about the *FIRST STRONGHOLD* Manual. For technical assistance, please post on the [FIRST Forums](#).

#### Q604

**Q.**R61 requires the Wireless Bridge to be configured per "Getting Started with the 2016 Control System". R57 does not provide the required firmware version number for the Wireless Bridge. I am having problems with using the "Programming your radio for home use" instructions, but was successful using Andymark's instructions to flash openwrt-15.05-ar71xx-generic-om5p-squashfs-factory.bin. Is that the correct version? If not, is the correct version available for download?

**A.**No, the *FRC Radio Configuration Utility* contains a custom version of the firmware which is not available for separate download. For technical assistance, please use the [FIRST Forums](#).

## Pneumatic System

#### Q971

**Q.**Can a separate external compressor (Viair 00090) be used and be controlled by the robot to charge the robot pneumatic system off-board, while the on-board compressor is electrically disconnected? During game play, the on-board compressor would be used to maintain pressure. The intent of this configuration, is to reduce the operating duty cycle of the on-board compressor. The use of the two compressors would be mutually exclusive. Can submit diagram if required and FRC Q&A address provided.

**A.**R79 states that "Compressed air on the ROBOT must be provided by one and only one compressor." Having two compressors, even if run separately, violates R79.

#### Q967

**Q.**Do R77-I, R78-G or R82 prohibit the use of an electronically controlled variable working pressure regulator? Note that the applicable rules do not specifically state that the "working" regulator be "mechanically" adjustable. For example, consider a regulator whose 0 to 10VDC electronic control input results in a 0-120 PSI output pressure. Further consider this 0 to 10VDC control input is connected to the roboRIO 0 to 5VDC analog output ports thus making it impossible to exceed 60PSI output.

**A.**Even though the interface is electronic, the adjustment on the regulator is likely still being controlled by a solenoid or another actuator within the device. If the actuator is not listed in R29, and controlled per the restrictions in R52-R54, the device is prohibited from use.

#### Q963

**Q.**R77.G permits Check and quick exhaust valves as long as R89 is satisfied. R89 States that a pressure vent plug must be connected to a pneumatic circuit so it will vent all stored air in a reasonable amount of time to the atmosphere. R78 also says that at least one Pressure vent plug is required, implying multiple can be used. When the check valve is used in the pneumatics system it is essentially creating an additional pneumatic circuit. Each circuit would then have their own pressure vent plug, allowing them to each be evacuated in a reasonable amount of time. Would this satisfy R89 provided each pressure vent plug is easily accessible (preferably next to each other) on the robot and can be vented releasing all air into the atmosphere in a reasonable amount of time?

**A.**A single vent plug valve must release all stored pressure on the robot. Legal check valves under R77-G will vent to relieve pressure when the inlet pressure is removed. The second vent plug valve is used when the compressor is off-board as shown in Fig. 4-17.

#### Q945

**Q.**Is a venture vacuum pump, such as Vaccon JD-60M-AA4, an allowed component on a pneumatic system per the blue box under R77?

**A.**As per the Blue Box under R77, vacuum pumps are not considered a pneumatic item and are not disallowed under R77. However, pay special attention to R29 as the motor within the vacuum pump is very likely not one of the allowed motors.

#### Q933

**Q.**Does the diagram in R78 or R89 require the pneumatic vent valve to be on the storage pressure side

or may it be installed on the working pressure side?

**A.** There are no rules that require the pressure vent plug be installed on "storage" side of the pneumatic circuit. As long as the installation meets all requirements in R89, you're good to go!

#### Q928

**Q.** Re: Rule 77D. In industry valves are rated for optimum working pressure range typ. from 20-115psi. This implies max is 115psi, when in reality a separate "proof" pressure is spec't to indicate when things are unsafe, typically 215psi. If a valve is documented to be safe to 215psi, do we still need a separate PRV upstream that does nothing to improve the system safety? Suggest mod'ing 77D to read: "Solenoid valves that have a maximum safe (or "proof") pressure rating of less than 120 psi..."

**A.** The purpose of this forum is to answer questions about what rules mean. If you have suggestions for improving them, we'd love to review. Please send them to [frcteams@usfirst.org](mailto:frcteams@usfirst.org) and they will be considered (most likely for future seasons).

#### Q926

**Q.** Is a quick release valve or quick exhaust valve, such as the ones sold by Bimba (#1BQEV), or Automation Direct (QEU14) considered a check valve, and thus a legal pneumatic component under R77 (G), provided other rules are also met?

**A.** Yes, Team Update 15 will update G to explicitly state that quick exhaust valves are permitted.

#### Q910

**Q.** Is the intent of R77I to limit teams to only using Pressure regulators with a published operating range of less than 60 PSI, or is this meant to allow regulators with an operating range above 60 PSI provided they are adjusted such that the working pressure is at or below 60PSI?

**A.** The meaning of R77-I was unclear, sorry about that. It will be revised in *Team Update 14* to allow pressure regulators with the outlet pressure *adjusted* to 60 psi or less. Regulators with an *operating range* above 60 psi will be allowed provided they are adjusted to no more than 60 psi.

#### Q905

**Q.** For teams using pneumatic wheels, will a small portable air compressor (of the type used by contractors to power air tools) be allowed in the pit to inflate tires? It's not clear if this is allowed under 4.7.9 "Machine Tools At Events".

**A.** You are correct that air compressors are not specifically mentioned in the *Admin Manual*, because venue restrictions may vary at each event for reasons including, but not limited to, safety, pit power restrictions, and others. Please contact the Regional Director or District Event contact for your particular event to learn if air compressors are allowed at the venue where your event will be held.

#### Q895

**Q.** R83 has a reference to Norgren relief valve 16-004-011. Is this the ONLY legal pressure relief valve, or a suggested P/N? Can a functionally equivalent rigidly connected relief valve be used? In R78 there is no mention of a specific part number. Based on the fact that R78 only explicitly calls out a P/N for the pressure switch and teams are can choose properly rated compressors, pressure vent plugs, and gauges/regulators it would seem they can also choose properly rated relief valve.

**A.** You're right - that's inconsistent, and we'll clarify this in *Team Update 13*. The Norgren 16-004-011 relief valve is the only relief valve approved for use in *FIRST* Robotics Competition.

#### Q891

**Q.** R87 requires the pressure relief valve to be hard line connected to the compressor. The fittings on the compressor can be weak, and adding the relief valve and required fittings and adapters adds a significant weight load to those fittings. Could R87 be modified to allow the pressure relief valve to be mounted off compressor, with a distance limitation, to limit the damage potential to the compressors?

**A.** The purpose of this Q&A is to answer questions about the *FIRST STRONGHOLD* Manual. Please send any suggestions to [frcteams@usfirst.org](mailto:frcteams@usfirst.org)

#### Q870

**Q.** We are using a COTS computing device, Raspberry Pi, to process our vision targeting data this season.

What is the legality of using a COTS power shield specifically <http://www.modmypi.com/raspberry-pi/breakout-boards/pi-modules/ups-pico> with our Raspberry Pi to ensure safe shutdown of our device?

**A.**The purpose of the Q&A is not to make definitive rulings on the use of individual parts, but instead offer clarity around specific rules. Note that per R31, the only batteries permitted on the ROBOT are the one 12V SLA ROBOT battery and batteries "integral to and part of a COTS computing device or self-contained camera".

#### **Q860**

**Q.**1. If a compressor which meets the requirements of R79 is sold with a steel braided leader hose, is use of the hose with the compressor allowed and/or required? 2. If a similar compressor is sold without a leader hose, but a leader hose is offered by the manufacturer as an accessory, is use of a steel braided leader hose on the compressor allowed as an additional safety precaution to help dissipate heat energy?

**A.**Required, integrated parts that come from the manufacturer as part of the compressor are considered part of the compressor for the case of R77. An element sold separately or as an optional accessory must be listed in R77 in order to be legal; braided leader hose is not, and therefore not permitted.

#### **Q859**

**Q.**Not really a rules question, but a safety question raised by Q855. If the airway is reduced to 1/8" prior to entering the relief valve, this would reduce the maximum air flow through the relief valve by approximately a factor of four (though still up to 20x the compressor's capacity). Was the intent of R87 that there should be a continuous 1/4" (or larger) airway from the compressor to the relief valve?

**A.**There is no explicit size requirement of the connection between the compressor and pressure relief valve, the requirement is that the connection be made via legal hard fittings per R87.

#### **Q858**

**Q.**Per R79, legal compressors are those that have a CFM of 1.1 or less at 12 VDC. How are we expected to prove that? Can we print out product literature?

**A.**Teams should be prepared to document compliance for non-KOP compressors. Manufacturer documentation (e.g. Specification sheet) is sufficient to prove that the flow rate meets R79.

#### **Q855**

**Q.**Per rules R77 and R83, the only permitted pressure relief valve is the Norgren 16-004-011, which is a 1/4" NPT part. Please amend the rules to permit the use of the Norgren 16-004-003, which has the same specs but is a 1/8" NPT part. Since the KoP compressor and all of our other fittings are 1/8", it would be nice not to need an adapter on the relief valve.

**A.**The purpose of this Q&A is to answer questions about the rules of FIRST STONGHOLD. If you have other feedback, you may send it to [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org).

#### **Q846**

**Q.**Per Rule R80, if we leave our compressor off the robot, can we design something that will cool the compressor for extended use, fans, ice bath, etc or do you need to leave the compressor exactly as it came from the store?

**A.**Per R76, pneumatic COMPONENTS must be used in their original, unaltered condition, with the exceptions indicated. This does not prevent you from using fans to cool your compressor, as long as the compressor itself is not modified, such as by drilling supplemental holes in the compressor for fan mounting. A liquid coolant, such as an ice bath, in your pit or in queue is not recommended and may draw the unwanted attention of Safety Advisers.

#### **Q845**

**Q.**Per Rule R80, if we leave our compressor off the robot, can we use it to pre-charge extra storage tanks off the robot as well and swap out tanks after matches. I'm told that some matches might be back to back and we may not have adequate time to charge up our onboard tanks using legal compressors. Since I believe we are allowed to recharge multiple batteries and swap batteries, it seems like we wouldn't be violating rules intended to ensure fairness.

**A.**No, per R81: "No stored air pressure intended for the ROBOT may be located off-board the ROBOT."

#### **Q831**

**Q.R89:** additional Pressure Vent Plug (PVP) for off-board compressor. R85 and R86 show the position of the off-board PVP. In that position, the off-board PVP seems redundant to the on-board PVP. It makes more sense for the off-board PVP to vent to the atmosphere when the off-board compressor is connected to the Robot. With the on-board PVP closed, the off-board PVP could be opened to relieve pressure before the tubing is disconnected. Also, should the reference in R89 to R79 be R80?

**A.**Per your request, we will not respond to the first part of your question. Yes, you are correct. R89 should reference R80 for off-board compressor use instead of R79. We will correct this. Thanks for the heads-up!

#### **Q819**

**Q.**Rule R77 F specifies "connecting fittings". Does it refer to any type of hard fittings (brass, nylon, etc) that are 1/8" NPT? Effectively, would it be legal to use all brass (or steel) 1/8" NPT fittings, such as a nipple, in lieu of pneumatic tubing?

**A.**R77-F allows all connecting fittings that meet all other rules (ex. R75), it does not provide any restriction on size. There are no rules that require the use of pneumatic tubing in a legal FRC pneumatics system.

#### **Q772**

**Q.**My team recently ran into a problem when trying to use C++ to code our PCM and air compressor. If you have any resources or tips to help us it would be much appreciated! -Joanna Seymour

**A.**Please see [Q761].

#### **Q736**

**Q.**Can we use a vacuum to manipulate the ball?

**A.**Provided the ball is not damaged, there are no rules that prohibit this. We do recommend taking particular note of R29 and the Blue Box below R77 if considering using a vacuum.

#### **Q734**

**Q.**I was just trying to verify the "rotary" in rule 77-J was the same rotary as on the Bimba site. I have not worked with pneumatics before and thought maybe rotary meant "like a pneumatic drill" or something. A pneumatic motor can get to very high RPM very quickly and it technically is rotating (rotary) as well. Thank you.

**A.**An item is considered a pneumatic rotary actuator if it is sold by the VENDOR with the same name. If you're concerned, we recommend you bring manufacturer documentation with you to Inspection.

#### **Q727**

**Q.**Is a rotary actuator permitted? Here is a link to an example of what we would like to use.  
<http://www.bimba.com/Products-and-Cad/Actuators/Inch/Rotary/Rack--Pinion/Pneu-Turn/>

**A.**We will not rule on specific parts using this forum. R77-J specifically allows pneumatic rotary actuators as long as they meet all other rules.

#### **Q715**

**Q.**Under rule R77 C, we have in past seasons used an air operated pneumatic valve to control our air cylinder. The valve meets the 1/8 NPT rules and at events the inspector only required that we use the specified tubing between the cylinder and pneumatic valve. To paraphrase, under R77C are rules for air operated pneumatic valves the same as solenoid valves. The part number of the valve, McMasterCarr #6124K40

**A.**R77-C specifically allows solenoid valves (this includes both direct operated solenoid valves and the more common solenoid piloted valves). Fully air-operated valves are not allowed per R77. While we will not use this forum to definitively rule on any part, we recommend double checking the documentation for your part to determine legality.

#### **Q688**

**Q.**Are inflatable pool tubes allowed when using a solenoid to pressurize in the match?

**A.**"Inflatable pool tubes" are not included as pneumatic items that are allowed on FRC ROBOTS in R77.

**Q686**

**Q.**Can we use holding tanks on the "low pressure" side of the system? There isn't anything saying we can't, but there are no examples of any configuration with tanks on the low side either.

**A.**Legal pneumatic storage tanks may be used in either "stored" or "working" pressure systems under R77.

**Q655**

**Q.**Last season, we were required to add the Pneumatic Control Module even though there was no pneumatic devices on the robot. Do we need to have the Pneumatic Control Module on board our robot even though there are no pneumatic devices?

**A.**The requirement for a PCM on the ROBOT is contingent on use of pneumatics (specifically use of a required pressure switch per R88).

**Q647**

**Q.**Regarding the second sentence of R79 [Compressor specifications must not exceed nominal 1.10 cfm flow rate @ 12VDC.]: Some vendors provide nominal flow rates of their compressors based on various back pressures such as 60psig or 100psig, but the historical FRC interpretation appears to be at 0psig. Must this nominal flow rate be based on a specific back pressure, and if so, what back pressure?

**A.**The flow rate of a compressor must not exceed 1.10 cfm when operated at 12 VDC. This means that over the entire operating spectrum the flow rate can not be more than 1.10 cfm. The largest measurement of flow rate for a compressor typically occurs at 0 psi.

**Q625**

**Q.**Can R77 D be reviewed and modified to include cylinders? This would allow teams the opportunity to access a larger variety of COT cylinders while still ensuring that pneumatic systems can operate within safe parameters.

**A.**This forum is designed to answer questions about the rules themselves. We're happy to consider suggestions, but please send them to [frcteams@firstinspires.org](mailto:frcteams@firstinspires.org).

**Q597**

**Q.**Could our team get permission to use a pneumatic cylinder that is rated for 100 PSI, since the system is restricted to 60 PSI as long as we ensure the safe operation by adding a second release valve? We used similar cylinders last year and were granted permission during the inspection. These particular cylinders are an important feature in our lifting device.

**A.**No, exceptions to rules will not be made for individual teams.

**Q586**

**Q.**Does R77-D also apply to pneumatic cylinders rated for less than 120 PSI?

**A.**While solenoid valves, per R77-D, are an exception to R75, which requires pneumatic items be rated for 120psi working pressure minimum, pneumatic cylinders are not considered solenoid valves, so no.

## Operator Console

**Q889**

**Q.**In that case, PLEASE make it obvious through a new version and date, that this is the new version.

**A.**The purpose of this Q&A is to answer questions about the *FIRST STRONGHOLD* Manual. Please send any suggestions to [frcteams@usfirst.org](mailto:frcteams@usfirst.org)

**Q883**

**Q.**Update 12, dated February 19, mentions a driver station update to version 16.0.2. Following the link from the update to the NI download page shows this: Standard Download:FRCUpdateSuite\_2016.1.0.zip (808.67 MB). Checksum (MD5): b4d107e2e8489c938b8e889791bd67a5 Download Language: English Product Line: Academic Version: 2016 Release date: 01-06-2016 Software type: Application Software Operating system: Windows Is this really the update? From the version and date, it looks like the original.

**A.**Yes, the *FRCUpdateSuite\_2016.1.0\_downloader.exe* download contains the new version of the Driver Station software, 16.0.2.

#### Q789

**Q.**May the Operator Console include an additional graphic display ie separate monitor that displays data from the PC that hosts the Driver Station software and dashboard as long as it complies with R94?

**A.**Yes. You may want to review information on the power outlet available in the PLAYER STATION in *Section 2.2.3.1*.

#### Q687

**Q.**R94 specifies the maximum length and depth of the operator console, but no maximum height. Additionally, in Section 2.2.3.1, the PLAYER STATION is described as being "behind" a 6' 6" wall, but also does not specifically state the height of the PLAYER STATION. Further, it does not specifically state that the operator console needs to be contained fully in the PLAYER STATION. Given those rules, is there a maximum allowed height of the operator console?

**A.**Updated 3-17: We apologize for the adjustment. A height limitation has been introduced in [Team Update 16](#).

## Game Manual - Tournament

#### Q909

**Q.**We would like to know if it is legal to begin the match with our operator console on our back connected to the drive station by an ethernet cable and we will plug in the controllers after autonomous has ended.

**A.**No, that is a violation of G15.

#### Q804

**Q.**Is colluding with the opposing alliance such that both alliances choose easier defenses to allow both alliances to better secure a breach and gain ranking points a violation of T7 or T8? Can both alliances collude to both choose the shorter defenses so everyone has better vision to better secure a capture? We don't believe this would be "playing beneath their ability," as they are playing the long game of securing ranking points to seed well vs. playing to just win the match.

**A.**In *FIRST STRONGHOLD*, ALLIANCES are expected to to fortify their OUTER WORKS. Working with your opponent to mutually select 'easier' DEFENSES does not fortify your OUTER WORKS. Selecting optimal DEFENSES that fortify your OUTER WORKS, both type and placement, with imperfect knowledge of your opponent's capabilities, is a skill. The approach you are asking about does not engage that skill, is playing beneath your ability, and a violation of T7 and T8.

### Overview

Not Available

### Match Schedules

Not Available

### Practice Matches

Not Available

### Schedule

Not Available

### Filler Line

Not Available

### Qualification Matches

Not Available

### Schedule

Not Available

## Match Assignment

Not Available

## Ranking Score (RS)

Not Available

## Qualification Seeding

Not Available

## Playoff Matches

Not Available

## Alliance Selection Process

Not Available

## Backup Teams

Not Available

## Playoff Match Bracket

Not Available

## Playoff Scoring

Not Available

## Tournament Rules

### Q607

**Q.**In Rule T26-1, "including imagery that, to a reasonably astute observer, mimics the Vision Guides", the caveat is "provided it does not jam or interfere with the remote sensing capabilities of another Team". Is the team member in the spy box allowed to carry a shaped device with reflective tape similar to the vision guides to provide a reference point for his own team's robot? If no, can a "non-powered signaling device" be used for the same purpose if it doesn't mimic the Vision Guides?

**A.**As you have noted, mimicking the Vision Guides is an example of something that is not allowed. Non-powered signaling devices which do not mimic the Vision Guides and do not "jam or interfere with the remote sensing capabilities of another Team", are permitted.

### Q606

**Q.**In Rule T26-1, are devices such as headphones or earbuds which connect to the operator console to receive audio signals from the console allowed (provided they are either worn and not connected or connected and not worn during autonomous)?

**A.**Devices that are part of the OPERATOR CONSOLE are permitted per T26-1 A. As part of the OPERATOR CONSOLE, all rules referencing the OPERATOR CONSOLE apply (including, but not limited to G14, and G16). However, keep in mind that as a matter of safety DRIVE TEAMS must be able to communicate with FIELD STEWARDS at all times - if headphones or earbuds impairs your ability to hear/communicate with FIELD STEWARDS, they will not be allowed.

## Safety and Security Rules

### Q929

**Q.**Do all strategies in which two opposing ALLIANCES agree to play a certain way violate T7 or T8? For example, in the spirit of cooptition, opposing ALLIANCES agree before a MATCH to feed BOULDERS to each others' ROBOTS through the SECRET PASSAGE. This makes it easier for both ALLIANCES to CAPTURE and get more RPs. Both alliances would be playing to the best of their ability since they would have a net RP gain. Does this strategy violate T7 or T8?

**A.**First, we applaud the spirit of Coopertition expressed in your question. Having said that, any time two ALLIANCES agree to play in a way that throtles how they would have played without any agreement, they're considered playing beneath their ability, and in violation of T7/T8. In addition to this being considered playing beneath ALLIANCES capabilities, it would open the door for less well known or accomplished ALLIANCES or TEAMS to feel like they are being bullied into a strategy they

may not genuinely support.

## Eligibility and Inspection

Not Available

## Referee Interaction

Not Available

## Yellow and Red Cards

### Q590

**Q.**If at some point during a Qualification MATCH an ALLIANCE feels they have no chance to win, is deliberately but safely and non-damagingly violating game rules (esp. one or more of G26, G34, G38, and G43) to prevent the opposing ALLIANCE from BREACHING and/or CAPTURING a valid strategy or are teams liable to receive YELLOW or RED CARDS under 5.5.4? More generally does the GDC consider such a strategy to be a part of the game (like fouling to stop the clock in basketball) or poor sportsmanship?

**A.**We can only address rules questions here and not specific strategies. If the question related to the rules is "Does intentionally violating rules put a TEAM at risk of a YELLOW or RED CARD for egregious behavior per *Section 5.5.4*?", the answer is yes. As the blue box in *Section 5.5.4* states, "Examples of egregious behavior include, but are not limited to, severe and/or repeated violations of a rule..."

## Match Replays

Not Available

## Timeout and Backup Team Rules

### Q944

**Q.**How are District Ranking points calculated for a backup team? (example: Played and won 1 finals match)

**A.**Teams (including BACKUP TEAMS) get District Ranking Points from Playoff matches that their ROBOT participates in and wins, but only if the ALLIANCE eventually advances from that level. In your example a BACKUP TEAM is brought into the ALLIANCE for the second Finals match, after the ALLIANCE won the first Finals match. The ALLIANCE, with the BACKUP TEAM, also wins the second match thus winning the tournament. The BACKUP TEAM will receive only five (5) points for winning a single MATCH that their ALLIANCE subsequently advanced from (in this case, to win).

### Q824

**Q.**According to T21: "If an ALLIANCE wishes to call a TIMEOUT, they must submit their TIMEOUT coupon to the Head REFEREE within two (2) minutes of the ARENA reset signal preceding their MATCH." We would like to know if there is a requirement for "who" must submit the TIMEOUT coupon. We have looked through the manual and cannot find any confirmation that it must be the ALLIANCE CAPTAIN (as is stated for the BACKUP TEAM coupon). Can you please clarify if there is any such requirement?

**A.**Only the ALLIANCE CAPTAINS will be given the TIMEOUT and BACKUP coupons, and would need to present them if they wish to use them. This will be clarified in *Team Update 11*, thanks!

## Pit Crews

Not Available

## Measurement

### Q934

**Q.**Tournament Rules allow for 5.5.8 Measurement time pre-time of qualifications schedule. Robots can be calibrated for vision during this time. Teams assume arena lighting is set and will not be altered during match play. What provision are provided to protect teams who calibrate their vision systems per only this 30 minute window, and then during tournament play, the event opens large doors which lets in bright sunlight to shine on the field to interfere with the vision system of a calibration?

**A.**The intent of this rule is to allow vision systems to be calibrated under conditions similar to what ROBOTS will experience during MATCH play. While some variation should be expected, we recognize a significant change could affect the accuracy of the calibration. We suggest you work with the FTA to point out the issue, see if it can reasonably be addressed by undoing the change (if this can be controlled), or ask for an additional calibration period. As noted in the rule, "Teams may bring specific questions or comments to the FTA".

## Special Equipment Rules

### Q965

**Q.**What criteria are used to decide if non-powered personal protective equipment meets the requirements of T26-1 G? For instance, would a leg of mutton, if it provides protection from a hazard in the CASTLE, appears in an OSHA description of PPE, and meets relevant standards (e.g., USDA inspection :-), be allowed under this rule? Would PPE for other varsity sports, meeting standards defined by organizations such as NOCSAE, and protective against hazards in the CASTLE, be allowed?

**A.**While we do not have an exhaustive list of criteria for PPE items, PPE cannot be used in order to gain a competitive advantage or damage ARENA components. For example, ear protection may be used to protect someone from environmental hazards like noise, but protective equipment that enables HUMAN PLAYER game play behavior is not a valid use of PPE.

### Q890

**Q.**Based on the answer to Q851 I'm assuming this is legal, however would having the camera connected to the operator console laptop violate T26-1? Would it be legal to have the webcam attached to the pole and connected to the operator console laptop to display the live feed from the webcam? The live feed would be shown locally on the laptop and would not be sending anything to the FMS or the driver station dashboard.

**A.**Updated 3-17: We apologize for the adjustment. The OPERATOR CONSOLE is specifically allowed in the CASTLE per T26-1 A. Per [Team Update 16](#), there is a maximum height of the OPERATOR CONSOLE. We will not rule on the legality of specific parts or setups, if you have further questions about a specific rule, please rephrase and resubmit.

### Q872

**Q.**If a driver/operator brings in a step stool so that they can see the field better to track their strategy would this be in violation of Section 5.5.9 Special Equipment Rules or in violation of any other rules?

**A.**This would be a violation of T26-1, as a step stool would not be considered a strategy tracking device. The only purpose of the stool would be to give a DRIVER or OPERATOR greater visibility. The stool itself would not be used to track strategy. Examples of allowed planning or strategy tracking devices would be white boards or clipboards used to plan strategy for the match or make notes. Please see [Q783] for a related question about vertically challenged drivers.

### Q674

**Q.**Would a flashlight be considered a powered or a non-powered signaling device under 5.5.9?

**A.**It would be considered unpowered, unless you switched it on. Then it would be powered. It would be fine to use, switched off, as a pointing device, in just the same way you would use a baguette or a leg of mutton.

## Selecting Defenses

### Q637

**Q.**When an alliance selects defenses prior to their match, are they selecting the defenses that they will have to cross to potentially get a ranking point or are they selecting the defenses that the other alliance will have to cross in order to potentially get the ranking point?

**A.**Each ALLIANCE selects the DEFENSES and locations that will fortify their own OUTER WORKS (the OUTER WORKS closest to their TOWER). Great question, and our apologies for not specifying that in the documentation! [Team Update 04](#) updated *Section 5.5.10* to include this detail.

### Q513

**Q.** If my ALLIANCE cannot decide on which DEFENSES to select, can we request to have the DEFENSES randomly selected, similar to T31?

**A.** Sure! Just tell the DC you aren't going to be picking DEFENSES for that MATCH and he/she will generate the random picks for your ALLIANCE after the other ALLIANCE makes their picks.

## Championship Additions and Exceptions

Not Available

### Four Robot Alliances

Not Available

### Championship Pit Crews

Not Available

### FIRST Championship Match Bracket

Not Available

## Game Manual - Glossary

Not Available

## Admin Manual - Introduction

Not Available

## Admin Manual - Team Resources

### Q720

**Q.** Getting an e12 2goPC from First Choice does not come with an operating system. Site referred questions to FRC admin. Where do we get the Windows Operating system to install on these computers?

**A.** We're sorry to bounce you again. This system is reserved for questions about *FIRST STRONGHOLD* and *Admin Manual* documentation. For technical questions or assistance, please use the [FIRST Forums](#), we are confident you'll be able to get the help you need there.

### Q692

**Q.** usb image - we used our image on our computer and now everything is gone and windows can not activate because I can not find my drivers for my network at home.

**A.** This system is reserved for questions about *FIRST STRONGHOLD* and *Admin Manual* documentation. For technical questions or assistance, please use the [FIRST Forums](#), we are confident you'll be able to get the help you need there.

## Admin Manual - Team Organization

Not Available

## Admin Manual - At the Events

### Q964

**Q.** If a team forfeits their competition so that they no longer have a spot in their competition, are team members from that team still allowed to go into the pits in order to get advice from other teams to help their team in the following year?

**A.** *FIRST* Robotics Competitions are free and open to anyone! (including the pits, provided the proper Personal Protective Equipment rules are followed).

### Q882

**Q.** During competition, in our pit, are we allowed to enable our robot via local ethernet cable and test controls and basic functionality? I reviewed the game and admin manuals and can't find any mention of what is and is not allowed in our pits during competition.

**A.** Yes. Please refer to T2 (in *Game Manual, Section 5*) which requires operation of/communication with the

ROBOT to happen via tether when not on the FIELD or Practice Field.

#### Q756

**Q.**For the Team Standard requirements, can joints between the vertical and horizontal supports be larger than 1/2" od? Thank you.

**A.**Yes.

#### Q571

**Q.**For the team standards (banner), are we allowed to have 3d texture on the standard or does it have to be entirely 2d? We're considering adding some relatively flat origami to our standard, but wanted to verify that that's ok first. Thanks!

**A.**Having a 3D texture on your STANDARD is fine (it sounds pretty neat, actually), as long as you stay within the STANDARD size requirements in the Tournament section of the manual, as indicated in T9.

## Admin Manual - Robot Packaging and Transporting

#### Q923

**Q.**We have unbagged the robot for 5 of the 6 hours preceding our district event. Can we unbag the robot for the one hour we have left or do we need to leave the robot bagged and not use the one hour of time we have left? Right now our robot is in parts in the bag. We thought we could use the one hour separately- we looked at an older game manual and it said we could unbag it but after we bagged it I looked at the newer manual and it says we can't. We really need that hour of unbagged time. What would the penalty be if we unbag the robot for the hour? Would we be disqualified from the district event or would it be a time penalty? It looks like a non-compliance form would be filled out but I don't know what that means. The team really needs that one hour of unbag time in order to have the robot ready.

**A.**You're correct that the *Admin Manual, Section 5.5.2* requires that no single access period be shorter than two (2) hours. Any non-compliance with the bag and tag rules results in a Team at least needing to fill out a non-compliance form from the Inspector and obtaining required signatures of specific event staff. This process is intended to take time, and as a result causes significant delay in when a Team may unbag their ROBOT. Depending on the severity of the non-compliance, there may be additional repercussions (such as ineligibility for Playoff MATCHES, Awards, or even full disqualification from event participation) at the discretion of FIRST HQ. Every district event has several hours of pit time for teams before the first Qualification MATCHES, you should consider using that time instead of unbagging now, which would be a rules violation.

#### Q876

**Q.**Must bumpers be bagged and tagged with our robot on bag day?

**A.**Please see [Q779].

#### Q864

**Q.**We are participating in a NASA sponsored demo in accordance with Admin Manual 5.4.3 the week after stop build date. We have 2 primary mechanisms that we plan to hold back as part of our withholding allowance, and they take about 30 minutes to put on/hook up and about 15 minutes to take off. Can we leave them on the robot when we bag it up on stop build day and remove them after the demo in order to reduce the amount of time spent in demo prep? If not, can we install and remove them at the demo?

**A.**The contents of the bag can not be modified during a display period (i.e. what was in the bag at the start needs to be in the bag at the end). The rules prohibit activity that would be considered 'work on' the robot, but the intent was to prohibit activity that would leave the ROBOT in a better state after the display than before it. If a Team installs something for a demo then takes it off, it doesn't violate the rule.

#### Q857

**Q.**Can we use more than 1 bag and tag for our robot and parts? Example, robot is in one bag and completed spares are in another bag.

**A.**There is no specific requirement that teams bag their ROBOT in only one bag, but we see the ambiguity in the Manual. *Team Update 12* will edit *Admin Manual, Section 5*, to allow teams to use two bags if needed.

#### Q780

**Q.**Where can the inspection form for the 2016 season be found?

**A.**The Inspection Checklist hasn't been published yet. Once it is, it will be announced in a Team Update.

## Admin Manual - Awards

### Q917

**Q.**In the Admin Manual under section 6.4.8 regarding the Chairman's Award Interview, it states that "Not more than three (3) student team members, plus one (1) adult mentor, are allowed to attend the interview." We would like to know if the silent observer could be a student as opposed to an adult mentor. Thanks!

**A.**No, the observer must be an adult mentor.

### Q770

**Q.**For Dean's list award nomination the submitted essay should not have more than 4,000 characters. Does the character number include spaces or only the characters are counted without spaces? Thank you.

**A.**The 4,000 character limit includes spaces. You are welcome!

### Q664

**Q.**Regarding the Entrepreneurship Award, Admin Manual section 6.9.2. I find it unusual that all of the bulleted items fall under EXECUTIVE SUMMARY. My understanding is that the ES would be one or two pages of highlights. I would not expect to see detailed Financial Statements included in the ES. Is it intentional or a typo error that they are all listed as parts of the EXECUTIVE SUMMARY. (Then again, I'm just a rookie .... FRC Team 5962)

**A.**Sorry for the confusion! The term 'Executive Summary', as used as a heading to the bulletized list of business plan elements in *Section 6.9.3 of the Administrative Manual*, makes no sense. We deleted it in *Team Update 05*. You may still see this term in the award submission portal itself, but please ignore it. Our IT resources are currently tightly constrained, and we don't want to make any changes to the submission portal unless we must. We will, however, be updating the language in the portal for 2017. And, welcome to the *FIRST* Robotics Competition!

### Q624

**Q.**Please forgive a rookie question from FRC Team 5962. We are trying to figure out if we can nominate 2 students for Dean's List at each competition we are in, or if it is 2 total submissions per team per season. We are registered for 2 events and want to know if we can submit 2 for Dean's List for each competition, giving us a total of 4 students for consideration.

**A.**Each *FIRST* Robotics Competition team is allowed to nominate up to (2) student members as Semi-Finalists who are in the 10th or 11th grade. These Semi-Finalists will compete at (1) qualifying event only, so it's (2) total submissions per team, per season. Also, we love questions from rookies like we love rookies themselves! Welcome to the party!

### Q609

**Q.**The administrative manual awards section seems to imply that teams can nominate a previous year's WFFA winner for the current year WFA at Championship, and a new nominee for a regional WFFA. However, However, in the STIMS award submission section, there are only input fields to nominate one person. Is this a mistake? Can you please clarify the process? It is our understanding that both a previous winner can be renominated for Championship, and a new mentor can be nominated at a regional. Yes?

**A.**If a team already has a mentor who has received the WFFA in a prior year, then that team may re-submit that mentor in the current year in addition to nominating a mentor for the WFFA if they wish. In order for a mentor to be re-nominated they must be listed in the team roster, at that point the portal will have a section for you to select the mentor.

## Admin Manual - Team Advancement

### Q970

**Q.**In the Admin Manual - Team Advancement 7.4.2.1 Third Event Participation (at District Competitions). It states, "Teams will still be eligible for all awards at those later events, and any benefits that go along with winning those awards,". Much like the Chairman's Award allows for a team to advance to the District Championship even if their performance didn't warrant it, Can the team "benefit" from points of that award at a third event toward advancement to District Championship?

**A.***Section 7.4.2.1 of the Admin Manual* specifically states that Teams only earn District Points within their first two events, chronologically, within their home District. No District Points are earned from events beyond a

Team's first two, even from Awards. However, as you've noted, benefits beyond District Points are still earned - for example, advancement of the Team (with their ROBOT) by winning the Chairman's Award, and advancement of the Team (without their ROBOT, if the team doesn't have enough Points to qualify) for winning Engineering Inspiration and/or Rookie All-Star awards.

#### **Q592**

**Q.**In regards to the Admin Manual - Team Advancement 7.4.2.3 Multiple Awards (at District Competitions). In this section, it is stated that "District Teams will only be able to be selected for FIRST Robotics Competition's most prestigious awards - Chairman's Award, Engineering Inspiration Award, and Rookie All Star Award - once per season at the District level." Does this mean that a team can only win each award once or that only one of those awards can be won by a team each season?

**A.**It means that a Team can only win each award once at the District Event level. For example, winning the Engineering Inspiration Award at one District event does not mean you can't win Chairman's Award at a different District event. We will update the the language in *Team Update 03*.