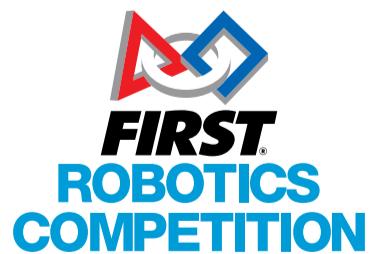


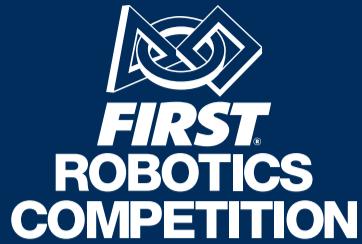
2016 FIRST® Robotics Competition

Team Updates



200 Bedford Street
Manchester, NH 03101, USA
<http://www.firstinspires.org/frc>

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Team Update 21

04/19/2016

GENERAL

- No changes

ADMIN MANUAL

- No changes

GAME MANUAL

Section 2.2.3.1 CASTLE WALL > Human Player Station

- For FIRST Championship Playoff MATCHES, a 4th Standard Holder will be installed above the Human Player Station, centered over the BRATTICE, to hold the Standard for the ALLIANCE member not listed on the LINEUP for that MATCH.

Section 3.1.4 The TOWER

- Each TOWER starts the MATCH with eight (8) ten (10) STRENGTH.

Section 3.4.9 BOULDER Rules

- **G12** The following actions are prohibited with regards to interaction with ARENA elements (item C excludes use of the PLAYER STATION hook-and-loop tape, plugging in to the provided power outlet, and plugging the provided Ethernet cable in to the Driver Station computer and items A-E exclude any DEFENSE, opponent's RUNGS, and BOULDERS)

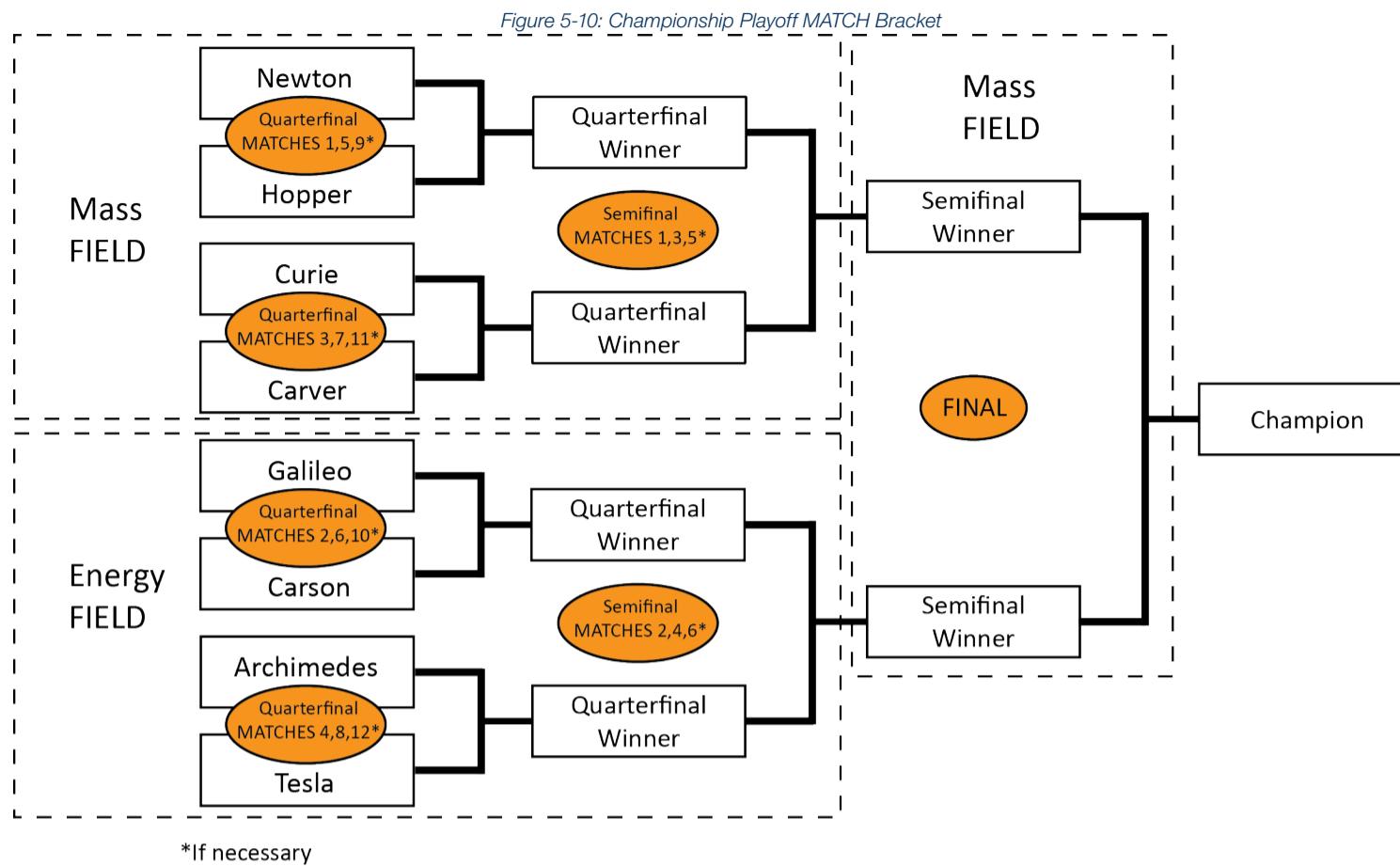
- **G41**

For example, if a Red ROBOT is CROSSING the Blue OUTER WORKS and a Blue ROBOT causes a BOULDER to bounce off of the Red ROBOT and through the OUTER WORKS, there is no violation of this rule as the action was caused by the Blue ROBOT.

A ROBOT will be in violation of G41 if it, while CROSSING the OUTERWORKS with a BOULDER in its CONTROL, causes a different BOULDER (e.g. a BOULDER paused in the OUTERWORKS) to complete a transition from the NEUTRAL ZONE to the COURTYARD, regardless of how the BOULDER got from the NEUTRAL ZONE to the OUTERWORKS.

Section 5.6.3 FIRST Robotics Competition Championship MATCH Bracket

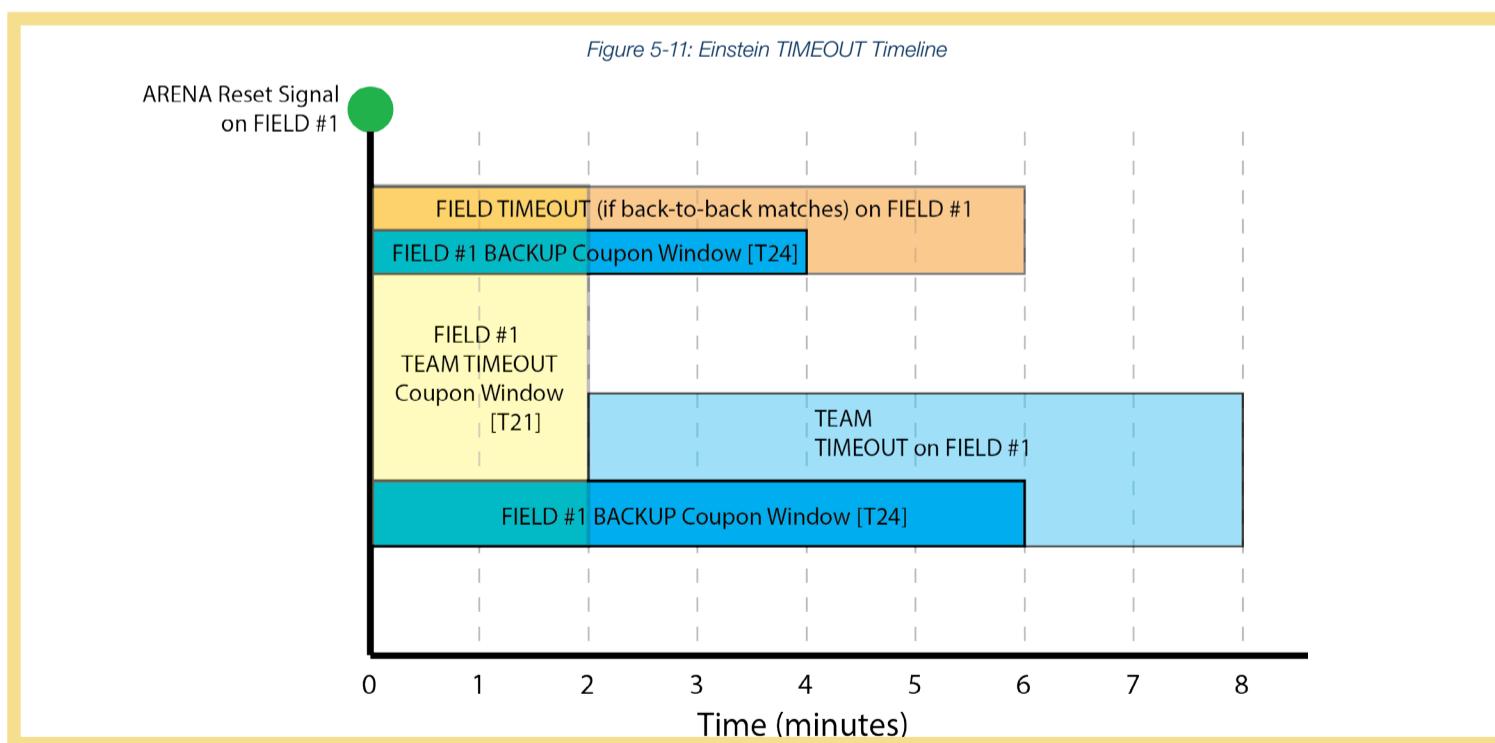
- Figure 5-10 has been edited to change the order of MATCHES so that all odd-numbered Quarterfinal and Semifinal MATCHES are played on the Mass FIELD, and even-numbered MATCHES are played on the Energy FIELD.



Section 5.6.4 TIMEOUTS

- For the Einstein Tournament, each ALLIANCE will be issued one TIMEOUT coupon for use as described in Section 5.5.6 TIMEOUT and BACKUP TEAM Rules.

T37 If an Einstein ALLIANCE wishes to call a TIMEOUT, the ALLIANCE CAPTAIN must submit their TIMEOUT coupon to the Head REFEREE (or their designee) on the FIELD that will host their next MATCH within two (2) minutes of the ARENA reset signal from the previous MATCH and associated FIELD. If there is no preceding MATCH, the TIMEOUT coupon must be submitted no later than two (2) minutes before the scheduled MATCH time. The TIMEOUT will begin two (2) minutes after the ARENA reset signal (i.e. at the end of the TEAM TIMEOUT Coupon Window depicted in Figure 5-11).



GENERAL

- No changes

ADMIN MANUAL

Section 7.4.3 District Championship

- Team capacity at District Championships for the 2016 will be as follows:

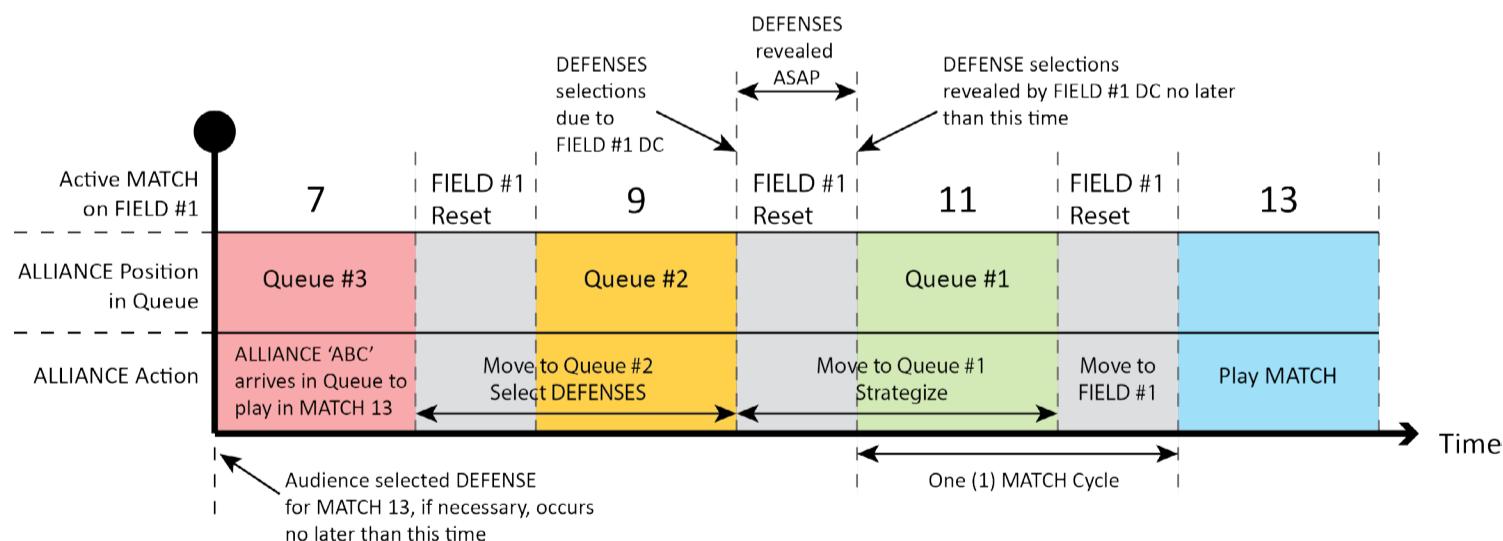
...

Mid-Atlantic Robotics District Championship 55 60

Section 7.4.3.1 Michigan District Championship

- Each team earns 5 points for each Match in which they participated and won, and only if their Alliance advances.
- The Defense selection for the Michigan District Championship has been adjusted to accommodate the two-Field setup. A graphic showing implementation on Field 1 is illustrated in Figure 7-1, and from this implementation the even-numbered matches on Field 2 can be inferred.

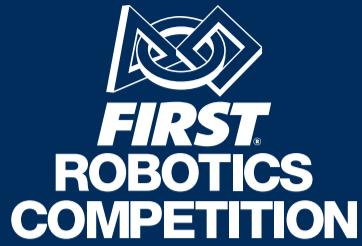
Figure 7-1: Defense Selection Timeline for Qualification Matches at the MICMP



GAME MANUAL

Section 4.11 Pneumatic System

- **R77-E** Additional pneumatic tubing, with a maximum 0.160 in.-0.165 in. inside diameter, functionally equivalent to that provided in the KOP,



Team Update 19

04/05/2016

GENERAL

■ The following drawings have been updated as described below.

- GE-16004_REV_A (tape has been added to mitigate the risk of BOULDERS resting just inside the High GOAL opening)
- GE-16028_REV_C (a steel brace has been added to reinforce the Cheval de Frise platform)
- GE-16029_REV_A (Low Bar material and assembly has been updated as described in *Team Update 15*)
- GE-16155 (removed)
- GE-16156 (removed)
- GE-16178_REV_A (additional holes have been added to accomodate change to GE-16028_REV_C)
- GE-16239_revA (added)
- GE-16242 (added)

ADMIN MANUAL

7.4.3.1 Michigan District Championship

■ At the 2016 Michigan District Championship, because of the number of teams in attendance, the event will have a 16 Alliance playoff, rather than a standard 8 Alliance playoff. The first round of this playoff, the Octofinals, will be played similarly to a standard Quarterfinal playoff, under the same rules, with the 8 winning Alliances then advancing to the Quarterfinals. Once the top 8 Alliances have been determined, the process will proceed as described in the *Game Manual, Section 5, The Tournament*.

Alliance selection will follow the same serpentine draft and process as the standard 8 Alliance selection described in the *Game Manual, Section 5, The Tournament*, but with 16 Alliances rather than 8.

With the exception of the 'Alliance Selection Results' category, points at the Michigan District Championship will be awarded as described in *Section 7.4.1*, and will be multiplied by three and summed with district event points, just like all other districts, in determining final season point totals for Teams. As an example, a team winning the Engineering Inspiration Award at the Michigan Championship will earn 24 points, the standard 8 points as shown in *Section 7.4.1*, multiplied by three, as with other Districts.

In place of the ‘Alliance Selection Results’ category in Section 7.4.1, Teams at the Michigan District Championship will be assigned points per the table below. Please note these points will not be multiplied by three as points at District Championships normally would be in determining final season point totals for Teams. Instead, the points are added, just as shown, to Teams’ season point totals, in place of the ‘Alliance Selection Results’ points shown in Section 7.4.1.

Alliance	Captain	First Pick	Second Pick
Alliance 1	48	48	1.5
Alliance 2	46.5	46.5	3
Alliance 3	45	45	4.5
Alliance 4	43.5	43.5	6
Alliance 5	42	42	7.5
Alliance 6	40.5	40.5	9
Alliance 7	39	39	10.5
Alliance 8	37.5	37.5	12
Alliance 9	36	36	13.5
Alliance 10	34.5	34.5	15
Alliance 11	33	33	16.5
Alliance 12	31.5	31.5	18
Alliance 13	30	30	19.5
Alliance 14	28.5	28.5	21
Alliance 15	27	27	22.5
Alliance 16	25.5	25.5	24

As an example, the Team picked second for Alliance 11 would earn 16.5 points, and these points would be added, without multiplying, to the Team’s season total.

The first playoff round, with 16 Alliances, is the Octofinals. As in Quarterfinals, the first Alliance to win 2 matches will advance. Each team earns 5 points for each Match in which they participated and only if their Alliance advances.

Eight Alliances advance from the Octofinals to the Quarterfinals using the same advancement rules from Quarterfinals to the Semifinals defined in Game Manual, Section 5.4.3, but with 16 Alliances narrowing to eight.

All Timeout and Backup rules per Game Manual, Section 5.5.6 apply during Octofinals. Octofinals are played on two separate Fields, and as such, reference to the Field Reset Signal preceding an Alliance’s Match in T21 and T24 refers to the Field Reset Signal for the last Match played in the tournament, which in most cases will be the Match just played on the opposite Field.

GAME MANUAL

Section 3.1.4 The TOWER

■ The starting STRENGTH of a TOWER will not be changed for District Championships.

Section 5.5.9 Special Equipment Rules

■ **T26-1** The only equipment, provided it does not block visibility for FIELD STEWARDS or audience members or jam or interfere with the remote sensing capabilities of another Team, including vision systems, acoustic range finders, sonars, infrared proximity detectors, etc. (e.g. including imagery that, to a reasonably astute observer, mimics the Vision Guides), that may be brought in to the CASTLE are as follows:

- A. the OPERATOR CONSOLE,
- B. non-powered signaling devices,
- C. reasonable decorative items,
- D. TEAM STANDARDS and devices, if needed, to assist placement in the Standard Holder,
- E. special clothing and/or equipment required due to a disability
- F. devices used solely for the purpose of planning or tracking strategy provided they meet all of the following conditions:
 - i. do not connect or attach to the OPERATOR CONSOLE
 - ii. do not connect or attach to the FIELD or ARENA
 - iii. do not connect or attach to another ALLIANCE member

- iv. do not communicate with anything or anyone outside of the ARENA.
- v. do not include any form of enabled wireless electronic communication (e.g. radios, walkie-talkies, cell phones, Bluetooth communications, Wi-Fi, etc.)
- vi. do not in any way affect the outcome of a MATCH, other than by allowing PLAYERS to plan or track strategy for the purposes of communication of that strategy to other ALLIANCE members.

G. non-powered Personal Protective Equipment (examples include, but aren't limited to, gloves, eye protection, and hearing protection)

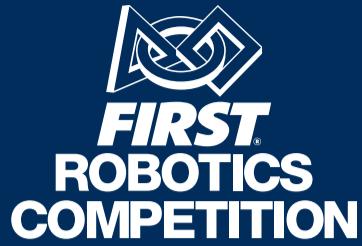
Items B, C, E and F, and G also apply to the DRIVE TEAM Member in the SPY BOX.

Violation: MATCH will not start until situation remedied.

Section 5.5.10.2 Team Selection of Defenses

■ **T29** During Qualification and Quarterfinal MATCHES, ALLIANCES must inform the DC of their DEFENSE selections prior to moving to "Queue #1"

■ **T30** During Playoff Semifinal and Final MATCHES, ALLIANCES must inform the DC of their DEFENSE selections prior to the conclusion of the MATCH or FIELD TIMEOUT which immediately precedes their scheduled MATCH.



Team Update 18

03/29/2016

GENERAL

- No changes.

ADMIN MANUAL

Section 7.3.3 Wild Card Slots at Regional Events

- A team who has already earned a spot at *FIRST* Championship prior to the Regional and earns two qualifying spots at their current Regional will generate two Wild Card slots. This is the only way for a single team to generate more than one Wild Card at a single Regional.

Section 7.4.3 District Championship

- Team capacity at District Championships for the 2016 season will be as follows:

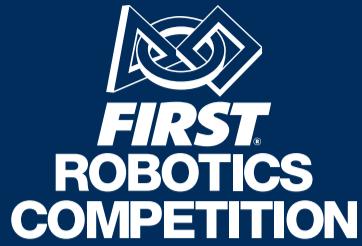
...

New England District Championship.....6064

GAME MANUAL

Section 5.5.9 Special Equipment Rules

- **T26-1, G** non-powered Personal Protective Equipment (examples include, but aren't limited to, gloves, eye protection, and hearing protection)



Team Update 17

03/22/2016

GENERAL

■ No changes.

ADMIN MANUAL

■ No changes.

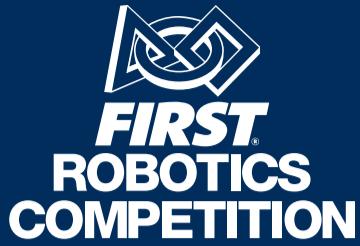
GAME MANUAL

Section 3.4.3 General Rules

■ **G12** The following actions are prohibited with regards to interaction with ARENA elements (item C excludes use of the PLAYER STATION hook-and-loop tape, plugging in to the provided power outlet, and plugging the provided Ethernet cable in to the Driver Station computer and items A-E exclude any DEFENSE, RUNGS, and BOULDERS)

- A. Grabbing
- B. Grasping
- C. Attaching to (including the use of hook-and-loop tape against the FIELD carpet)
- D. Grappling
- E. Hanging
- F. Becoming entangled
- G. Damaging

Violation: If prior to MATCH, and situation can be corrected quickly, it must be remedied before the MATCH will start. If during a MATCH, FOUL. If during a MATCH and extended or repeated, YELLOW CARD. If offense is via a ROBOT and if the Head REFEREE determines that further damage is likely to occur, offending ROBOT will be DISABLED. Corrective action (such as eliminating sharp edges, removing the damaging MECHANISM, and/or re-Inspection) may be required before the ROBOT will be allowed to compete in subsequent MATCHES.



Team Update 16

03/15/2016

GENERAL

■ **Edits to Section 4.12:** Limited visibility for drivers was one of the intended challenges with this game, built-in from the very beginning. We love the various ingenious solutions we've seen Teams come up with to address this challenge, both high-tech and low. However, seeing the literal heights to which Teams have taken the Operator-Console-camera-on-a-pole approach over the weekend, we have significant concerns.

The primary concern is safety. Even a relatively lightweight object accidentally dropped from 20 or 30 feet in the air could cause significant injury. Secondly, it is very hard for us to maintain consistency with our original approach of allowing event-by-event decisions regarding safety and potential interference with overhead objects. We know of at least one event at which these tall Operator Consoles were disallowed over safety concerns, and with over 120 official events this year, we can't guarantee, for example, that every Player Station location even at a given event will have the same overhead space available as every other.

So, as you will see below, we have made the difficult decision to limit the height of Operator Consoles. We have also added an explicit rule that Operator Consoles must be safe. We were extremely reluctant to make this change mid-season, and we are very sorry for the frustration and potential expense this will cause some Teams, and that we did not see this issue coming, but we believe it's best for FRC overall that this change be put in place.

In addition to the rules changes below, we will be editing our Q&A responses on this topic to indicate that a height limit is in place.

ADMIN MANUAL

■ No changes.

GAME MANUAL

Section 3.4.6 ROBOT to ROBOT Interaction

■ **G13** During AUTO, ROBOTS may not enter the volume above the MIDLINE.

Violation: FOUL. If contact is made with an opponent ROBOT beyond the MIDLINE (either direct contact or transitive contact through a BOULDER), an additional FOUL is assessed and the opponent ROBOT is immediately awarded the CROSSING of the closest DEFENSE from the point of contact.

Section 4.12 OPERATOR CONSOLE

■ **R94** The OPERATOR CONSOLE must not exceed 60 in. long by 14 in. deep (excluding any items that are held or worn by the DRIVERS during the MATCH) and may not extend more than 11 ft. 8 in. above the floor.

■ **R96** OPERATOR CONSOLES shall not be made using hazardous materials, be unsafe, cause an unsafe condition, or interfere with other DRIVE TEAMS or the operation of other ROBOTS.

Section 5.4.1 ALLIANCE Selection Process

■ Of the remaining eligible Teams, the highest seeded Teams must either accept or decline to be included in a pool of available Teams until there are (up to eight (8)) Teams that accept to be added into the pool. These Teams should remain on standby and be ready to play as a BACKUP TEAM. Field staff will coordinate the assembly of this BACKUP pool immediately after the top ranked ALLIANCE has made their final pick. If a Team is not available to accept inclusion in the BACKUP pool, it will be assumed they have declined the invitation.

Section 5.4.2 BACKUP TEAMS

- In this situation, the ALLIANCE CAPTAIN has the option to ~~invite~~ bring in only the highest seeded ~~eligible~~ Team from the pool of available Teams to join its ALLIANCE. The Team who's ROBOT and DRIVE TEAM replaces another ROBOT and DRIVE TEAM on an ALLIANCE during the Playoff MATCHES is called the BACKUP TEAM.

Section 5.4.3 Playoff MATCH Bracket

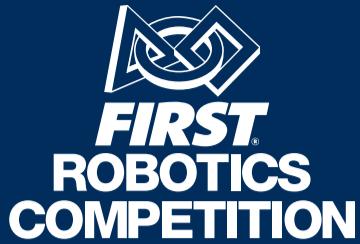
- ~~The higher seeded ALLIANCE will always be assigned to the Red side of the FIELD. Additionally, ALLIANCE Leads will always be assigned to the center PLAYER STATION, the first pick will be assigned to the station to their left while they're facing the FIELD, and the second pick will be assigned to their right while they're facing the FIELD. If a BACKUP TEAM is in play, they will be assigned to the PLAYER STATION that was assigned to the DRIVE TEAM they're replacing.~~

Section 5.5.2 Eligibility and Inspection

- **T13** Each Team must send at least one (1) member of its DRIVE TEAM to the FIELD and participate in each of the Team's assigned Qualification and Playoff MATCHES. The Team should inform the Lead Queuer if the Team's ROBOT is not able to participate.

Violation: RED CARD, with the exception of a Team that has not passed an initial, complete Inspection, per T12

Also: Figure 5-3 has been updated to clarify the two possible states for a Team that has not participated in a MATCH.



Team Update 15

03/08/2016

GENERAL

■ **Low Bar Fabric:** As many of you have already observed, the Low Bar flap fabric is not holding up well at events. We have been investigating replacement materials that would be comparable for teams, appropriately durable, perform the necessary function of helping to keep boulders from accidentally rolling into the opponent's courtyard, and easily deployable to events. We believe we have a solution.

Instead of a single continuous flap, we will be using 5 separate 8 inch strips of heavyweight vinyl, side by side, draped over the low bar and secured in place with cable ties. The material is McMaster-Carr part number 1894A214, opaque black. 33½-in. long strips will be cut and draped over the Low Bar at regular intervals and in such a way that the front and back flaps are of equal length. The vinyl will then be secured to itself using cable ties a short distance below the bar to allow free, independent rotation of individual strips. Additional cable ties will be used to maintain spacing between the strips. We apologize for not having a drawing ready for release at this time, but we wanted to get this basic information out to teams as quickly as possible. A drawing will follow shortly. We will send notifications on social media when the drawing is available.

This solution will be implemented at most events this weekend, assuming shipments are on time. Events outside the United States may need to continue to use the existing system until the new material arrives.

If, despite this intended change, two or more flaps are damaged beyond repair, and no additional replacements are available, Event Personnel are instructed to remove the flaps from both Low Bars on the Field and continue playing Matches. Additionally, Referees are instructed to not call penalties if a Robots or Drive Team members accidentally cause Boulders to roll through that opening. However, if they perceive it as deliberate, they will issue a Technical Foul.

You can help keep things flowing during matches. Please check your Robot for any sharp edges or points and cover or smooth them over. You don't want to get hung up crossing the Low Bar, and we don't want you to get hung up either.

We are very sorry for this issue, but grateful to the many volunteers who did whatever it took to keep the matches rolling so far this season despite this problem.

ADMIN MANUAL

■ No changes.

GAME MANUAL

Section 2.2.2.1 DEFENSES

■ Low Bar

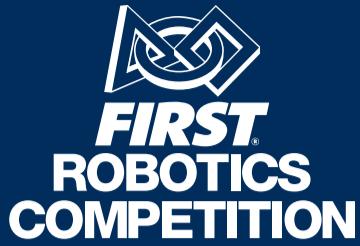
The Low Bar is constructed from 1" 6061 Aluminum Schedule 40 pipe. The pipe creates an opening that is 1 ft. 4 in. tall and 3 ft. 10-1/2 in. wide. It features opaque walk-in freezer door flaps ~~a black Cordura flap~~, designed to keep BOULDERS from passing through on their own. The material is McMaster-Carr part number 1894A214, opaque black. 33½-in. long strips are draped over the Low Bar at regular intervals and in such a way that the front and back flaps are of equal length with an approximate 1 in. gap between the base and the bottom of the flaps. The vinyl is secured to itself using cable ties just below the bar to allow free, independent rotation of individual strips. Additional cable ties are used to maintain spacing between the strips. ~~The flap is 3 ft. 9 1/2 in. wide, with a 1 in. gap between the base and the bottom of the flap, and swings freely around the top tubing to allow ROBOTS to pass under it. The Low Bar is mounted 1 ft. 4-1/2 in. from edge of the PLATFORM on the NEUTRAL ZONE side of the OUTER WORKS.~~

Section 4.11 Pneumatic System

■ **R77-G** Check and quick exhaust valves, provided that the requirements of R89 are still met.

Section 5.5.6 TIMEOUT and BACKUP TEAM Rules

Teams are expected to have their ROBOTS staged on the FIELD by the end of the TIMEOUT. Teams that cause a significant delay to the start of a MATCH after a TIMEOUT are subject to G8.



Team Update 14

03/01/2016

GENERAL

- **Week 1/2 Observations:** The 2016 FIRST Robotics Competition officially kicked off with the Week 1/2 Palmetto Regional last weekend. The competitors were great to watch, but there were some observations from the event we'd like to share with the rest of the community.
 - The most common Inspection Issue was noncompliant BUMPERS, which seemed to result from misunderstandings about what the FRAME PERIMETER is and how it's different from the ROBOT'S frame pieces. Please take a few minutes to watch [this video](#).
 - The Head REFEREE had to issue several YELLOW CARDS to DRIVE TEAMS for entering the FIELD after a MATCH, but before the TOWER LEDs are green. Please review G2, and wait for the signal to enter the FIELD.
 - There was a relatively high frequency of ROBOTS in AUTO driving into the CASTLE WALLS, resulting in OPERATOR CONSOLES getting knocked off the shelf. Remember that there's loop side of hook-and-loop tape on the shelf, and this year there's much incentive to take advantage of it and put hook tape on the bottom to help secure your OPERATOR CONSOLE.
 - Remember that the white, plastic Clippard tanks aren't legal for use on the ROBOT, and should be discarded.
 - We strongly recommend you use the [Robot Preemptive Troubleshooting](#) article to check your machine during your Robot Access Period or Practice Day (whichever is applicable) to mitigate any risk of it not working once it's connected to the the FIELD Management System. FIRST STRONGHOLD will push your ROBOT to its limits, so it's important to thoroughly check your electrical connections.

■ Drawing Package Update:

The [Field Components](#) drawing package has been revised to include the updates below.

- Drawing GE-16019, pg 3, NOTE: A number decal, between 1 and 4, black in color, will be added to the top corner, such that it's visible when viewed from the Low Bar side of the Outer Works. (to help REFEREES track CROSSINGS)
- Drawing GE-16023, pg 3, NOTE: A number "5" decal, black in color, will be added to the top corner, such that it's visible when viewed from the Low Bar side of the Outer Works. (to help REFEREES track CROSSINGS)
- Drawing GE-16028: [countersunk] .708 [diameter] X 82° [counterbored] .704 [depth] .200
- Drawing GE-16038, replaced BOM Part Number HW-00089 with HW-00118 (effective change: 2.5" Long, 1/4" 20 Pan Head 1/4"-20 Machine Screw, 2.25" Long)
- Drawing GE-16178, replaced BOM Part Number HW-00096 with HW-00119 (effective change: flat head screw, 3/8-16 x 1.25" Button Head Cap Screw, 3/8"-16, 1.25" Long)
- Drawings GE-16181 and 3: Note 1: MATERIAL: 3/4" CLEAR POLYCARBONATE OR BLACK HDPE
- Drawing GE-16184: Note 1: MATERIAL: 1/4" 3/4" CLEAR POLYCARBONATE OR BLACK HDPE
- Drawings GE-16185, 6, 7, and 8 are now included.
- Drawing GE-16213 Note 1: MATERIAL: 1/4" THICK, BLACK, HDPE or CLEAR POLYCARBONATE
- Drawing GE-16241 has been added.

The [Field Assembly](#) drawing package has been revised to include the following update:

- Drawing FE-0039 has been updated to include GE-16241 and HW-00120.

■ Eclipse Plugin Update:

Updated WPIlib Eclipse Plugins for C++ and Java have been released. These plugins contain 2 fixes for C++ teams, a fix for an issue with the Camera Server class and a fix for a "permission denied" error on deploy after updating to Eclipse Mars 2. If you are experiencing the permission denied error, you will need to re-image your roboRIO after updating your Eclipse plugins to the latest version. The Java plugins are unchanged, but you will see an update as they are published as part of the build process.

To update your plugins manually (or if you installed the plugins offline) see "Updating the plugins manually" near the bottom of the [Installing Eclipse](#) page.

ADMIN MANUAL

■ No changes.

GAME MANUAL

Section 2.2.3.1 CASTLE WALL

■ (height changed in Team Update 7, but this edits corrects the corresponding text) Each of the high GOALS is marked with two (2) vertical strips of 2 in. retro-reflective material (3M 8830 Silver Marking Film) and one (1) horizontal strip of 2 in. retro-reflective material (with the unsupported .25 in. folded over the bottom edge of the GOAL opening such that 1.75 in. is visible) to form a u-shaped target. The targets are 1 ft. 2 in. tall and 1 ft. 8 in. wide.

Section 3.4.5 ROBOT Rules

■ The change to the violation in G19-1 made via *Team Update 13* was accidentally made to G19. *Section 3* now has this edit correctly implemented, and the document revision has been incremented to V9.

Section 4.4 Budget Constraints

■ **R10** Blue Box

Teams should be prepared to disclose to Inspectors the cost of any non-KOP item and the total cost of the ROBOT.

~~There is no quantity limit on KOP items in regards to R10. If the item is a KOP item, it does not need to be require an associated cost on the Cost Accounting Worksheet (CAW).~~

Per T11, Teams must be prepared to display a CAW to Inspectors during Inspection. The CAW may be displayed in either printed or electronic form.

Individual COMPONENTS or MECHANISMS, not excluded in **R10**, that are retrieved from previous ROBOTS and used on 2016 ROBOTS must have their undepreciated cost included in the 2016 CAW and applied to the overall cost assessment.

Section 4.11 Pneumatic System

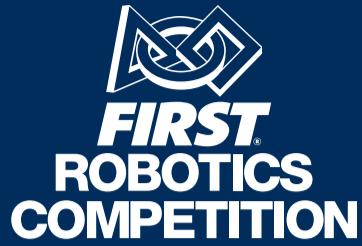
■ **R77-I** Pressure regulators with ~~at the maximum~~ outlet pressure adjusted to ~~of~~ no more than 60 psi,

Section 5.5.2 Eligibility and Inspection

■ Each registered FIRST Robotics Competition team may enter only one (1) ROBOT (or ‘Robot’, which to a reasonably astute observer, is a Robot built to play FIRST STRONGHOLD) into the 2016 FIRST Robotics Competition.

“Entering” a ROBOT (or Robot) in to a FIRST Robotics Competition means bringing it to the event such that it’s an aid to your Team (e.g. for spare parts, judging material, or for practice). Spare FABRICATED ITEMS may be brought to the event in a bag or part of a WITHHOLDING ALLOWANCE.

This rule does not prohibit teams from bringing in FIRST LEGO® League or FIRST Tech Challenge robots for the purposes of awards presentations or pit displays.



Team Update 13

02/23/2016

GENERAL

■ **Team Update Schedule:** Given that Fridays will be mid-event for most competitions, Team Updates will now only be released on Tuesday of each week (instead of Tuesdays and Fridays). Good luck at the competitions!

ADMIN MANUAL

■ No changes.

GAME MANUAL

Section 3.4.5 ROBOT Rules

■ **G19-1** ROBOTS must be in compliance with Section 4 (4.7 BUMPER Rules) throughout the MATCH.

Violation: FOUL. DISABLED if structurally non-compliant or the Team number or ALLIANCE color is ambiguous.

Section 3.4.6 ROBOT to ROBOT Interaction

■ **G22** Blue Box:

There is no FIRST Robotics Competition specific definition of pin, so a general definition applies; “to prevent or stop something from moving.” As a result, contact is not required for pinning to occur. For example, a ROBOT parked right behind an opponent that is on the BATTER could be considered pinning because the dividers on the BATTER and the parked ROBOT prevent the opponent from moving.

Generally, pins that exceed fifteen (15) seconds are considered extended and egregious, regardless of a pinning ROBOT’s mobility, however circumstances vary and the assessment is open to REFEREE discretion.

Section 4.11 Pneumatic System

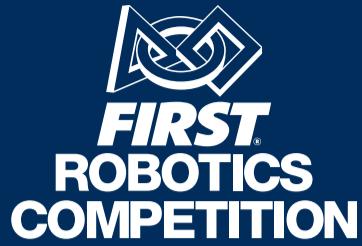
■ **R78-B** Pressure relief valve (Norgren Part Number 16-004-011) connected via legal rigid fittings (e.g. brass, nylon, etc.),

Section 5.5.3 REFEREE Interaction

■ T19, added Blue Box

As a process improvement, in this year's REFEREE training we instructed them to not record details about FOULS and TECHNICAL FOULS; as a result, we don't expect REFEREES to recall details about what FOULS or TECHNICAL FOULS were made, when they occurred, and against whom.

The goal is to increase consistency across events while enabling and empowering REFEREES to focus on the play on the FIELD (instead of worrying about keeping detailed records during the MATCH). Any reasonable question is fair game in the Question Box, and Head REFEREES will do good faith efforts to provide helpful feedback (e.g. how/why certain FOULS are being called, why a particular ROBOT may be susceptible to certain FOULS based on its design or game play, how specific rules are being called or interpreted), but please know that they will likely not be able to supply specific details.



Team Update 12

02/19/2016

GENERAL

■ **Inspection Checklist:** Rev 1.1 clarifies that

- LEDs that remain on when the ROBOT is turned off, as the result of a legal power source, are permitted
- the required Driver Station version number is now 16.0.2.

■ **Driver Station:** A required update has been released for the FRC Driver Station powered by LabVIEW (version 16.0.2). This update can be downloaded as part of the FRC 2016 Update Suite from the [National Instruments FRC page](#). This update contains

- a fix for mDNS discovery when multiple NI devices are on the same network
- improvements to functionality when used with a full FMS (version number coloring and DNS discovery of the roboRIO).

ADMIN MANUAL

Section 5.2 Bag and Tag and Robot Transport to Regional/District Events

- All teams must “Bag and Tag” their robots. Teams are also required to transport their bagged and tagged robot to their competition event(s). For convenience, teams may disassemble their robots and use two bags to “Bag and Tag” them. However, no more than two bags may be used and each bag must have its own numbered tag and entry on the Robot Lock Up Form described below.

Section 7.2 Pre-Qualifying Teams

- By being one of the 2016-2015 FIRST Championship winners, or
- By being one of the 2016-2015 FIRST Championship Engineering Inspiration Award winners.

GAME MANUAL

Section 2.2.2.1 DEFENSES

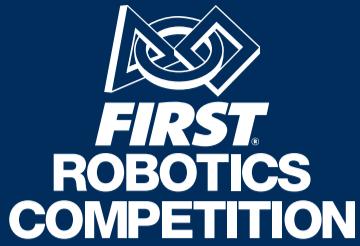
- A 10th DEFENSE has been added:

Video 2-i: The 10th DEFENSE (download pdf or open in FIRST app and click to play)



Section 4.12 OPERATOR CONSOLE

- **R91** The Driver Station software provided on the National Instruments website is the only application permitted to specify and communicate the operating mode (i.e. Autonomous/Teleop) and operating state (Enable/Disable) to the ROBOT. The Driver Station software must be revision ~~16.0.1~~ 16.0.2 or newer.



Team Update 11

02/16/2016

GENERAL

- No changes

ADMIN MANUAL

- No changes

GAME MANUAL

Section 2.2.3.1 CASTLE WALL

-

Table 2-2: TOWER STRENGTH Light States and Meanings

Light State	Meaning
Off	FIELD is ready for the MATCH to begin, all personnel should be off the FIELD at this time. Or Tower has been WEAKENED during a MATCH.
Bottom two-thirds Green	FIELD is safe to enter
Pulsing at 0.5-1 Hz for three (3) seconds	The final twenty (20) seconds of the MATCH has begun
Top one-third in opposing ALLIANCE color (Red or Blue)	TOWER has been CAPTURED.

Section 3.4.6 ROBOT to ROBOT Interaction

- **G24** Strategies aimed at the destruction or inhibition of ROBOTS via attachment, damage, tipping, entanglements, or deliberately putting a BOULDER on an opponent's ROBOT are not allowed.

Violation: FOUL and YELLOW CARD. If harm or incapacitation occurs as a result of the strategy, RED CARD

Section 3.4.7 ROBOT Gameplay

- **G25-C** blocking GOAL(S) while in contact with its own BATTER using anything outside its FRAME PERIMETER except its BUMPERS

Section 3.4.8 Human Actions

- **G37** DRIVE TEAM members may not contact anything outside the zone in which they started the MATCH (either the CASTLE or SPY BOX) for the duration of the MATCH, unless for personal safety.

Violation: FOUL. If strategic (i.e. for a net points gain), RED CARD for the ALLIANCE

Section 4.10 Control, Command & Signals System

■ R57 Blue Box

The D-Link DAP1522 radio distributed from 2011-2015 is not legal for the 2016 FIRST Robotics Competition unless the wireless functionality is disabled.

- **R63** No form of wireless communication shall be used to communicate to, from, or within the ROBOT, except those required per R57 and R62 (e.g. radio modems from previous FIRST competitions and active Bluetooth devices are not permitted on the ROBOT during competition).

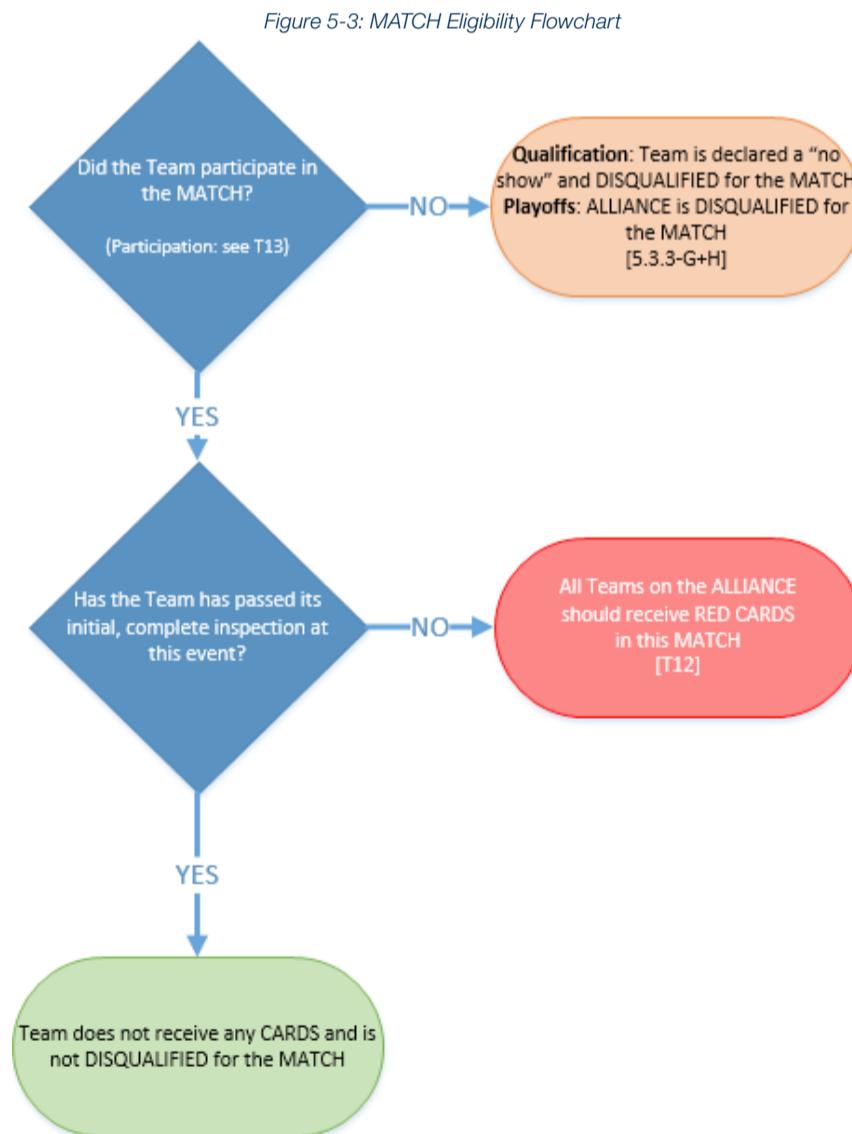
Devices that employ signals in the visual spectrum (e.g. cameras) and non-RF sensors that don't receive human-originated commands (e.g. "beam break" sensors or IR sensors on the ROBOT used to detect FIELD elements) aren't wireless communication devices and thus R63 doesn't apply.

Section 5.4.3

- The higher seeded ALLIANCE will always be assigned to the Red side of the FIELD. Additionally, ALLIANCE CAPTAINS Leads will always be assigned to the center PLAYER STATION, the first pick will be assigned to the station to their left while they're facing the FIELD, and the second pick will be assigned to their right while they're facing the FIELD.

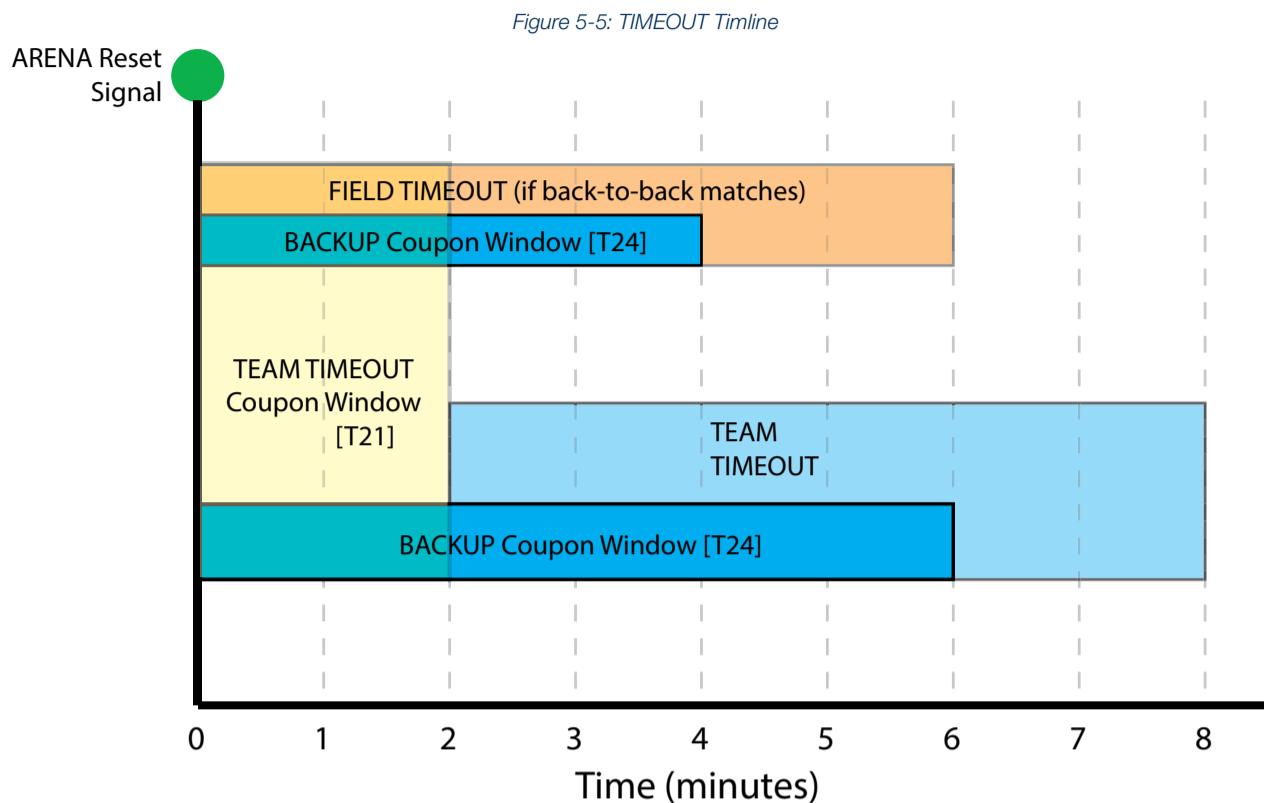
Section 5.5.2 Eligibility and Inspection

- References in image updated:



Section 5.5.6 TIMEOUT and BACKUP TEAM Rules

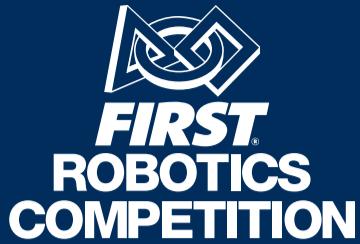
- References in image updated:



- **T21** If an ALLIANCE wishes to call a TIMEOUT, they the ALLIANCE CAPTAIN must submit their TIMEOUT coupon to the Head REFEREE within two (2) minutes of the ARENA reset signal preceding their MATCH. If there is no preceeding MATCH, the TIMEOUT coupon must be submitted no later than two (2) minutes before the scheduled MATCH time. The TIMEOUT will begin two (2) minutes after the ARENA reset signal (i.e. at the end of the TEAM TIMEOUT Coupon Window depicted in Figure 5-5).
- **T22** There are no cascading TIMEOUTS. If an ALLIANCE calls a TIMEOUT during a FIELD TIMEOUT, the FIELD TIMEOUT will immediately expire two (2) minutes after the ARENA reset signal and the ALLIANCE'S TIMEOUT will begin.

Section 6 Glossary

- **ALLIANCE CAPTAIN:** a designated student representative from an ALLIANCE in a Playoff MATCH displaying the ALLIANCE CAPTAIN identifier (e.g. hat or armband)



Team Update 10

02/12/2016

GENERAL

- **Robot Lockup Form:** Based on feedback from the Lead Robot Inspectors, the [Robot Lockup Form](#) has been updated to include some of the relevant rules from the Admin Manual in the notes at the bottom of the form.
- **Radio Utility Update:** An update has been posted for the [FRC Radio Configuration Utility](#). This new version fixes an issue with NetConsole\rioLog communication over the radio wireless. It also contains a workaround for users seeing the “NPF” error when loading firmware on Windows 10. To use the workaround, make sure all other network adapters (even if not connected) are Disabled in Windows.
- **WPILib C++\Java Update:** Updated Eclipse plugins are available for C++\Java that fix a number of bugs that users have encountered and reported this season. This update does contain one minor breaking change for custom implementations of the SpeedController interface. Please see the [C++\Java Plugin Changelog](#) page for complete details.
- **Field Lighting Change:** In this Team Update, you will notice that we've made some changes to the indicator lights on the field. We've eliminated the light strings we had planned to put just above the shelf in each player station and adjusted the tower lighting scheme to provide information similar to what those strings would have provided.

We did this because we encountered an unexpected component shortage. When we heard about the shortage, we got together as a group, carefully discussed our options, and developed a plan that let us still reach our overall goals with minimal disruption to our schedule. There were a variety of opinions within the group discussing this at first, but in the end we came to a consensus. The result includes some tradeoffs, but still meets the primary goals of the original design. We recognize that, like in every season, some teams are encountering component shortages themselves this season. We wanted to share that it happens to us, too.

ADMIN MANUAL

- No changes

GAME MANUAL

Section 2.2.3.1 CASTLE WALL

- One (1) Phillips Color Kinetics iColor Flex LMX LED light string. Indicates information as defined in Table 2-2.

Table 2-2: Player Station Light String States and Meanings

Light State	Meaning
Green	FIELD is safe to enter
Off	FIELD is ready for the MATCH to begin, all personnel should be off the FIELD at this time.
Yellow	MATCH is in AUTO
ALLIANCE color	MATCH is in TELEOP
Pulsing at 0.5 Hz	MATCH is in its final twenty (20) seconds

Table 2-3: TOWER STRENGTH Light States and Meanings

Light State	Meaning
Off	FIELD is ready for the MATCH to begin, all personnel should be off the FIELD at this time. Or Tower has been completely WEAKENED during a MATCH.
Bottom two-thirds Green	FIELD is safe to enter
Pulsing at 0.5 Hz for three (3) seconds	The final twenty (20) seconds of the MATCH has begun
Top one-third in opposing ALLIANCE color (Red or Blue)	TOWER has been CAPTURED.

Section 3.4.1 Safety Rules

- **G2** DRIVE TEAMS may only enter the FIELD if the ~~PLAYER STATION~~ TOWER LED strings are green, unless explicitly instructed by a REFEREE or an FTA.

Violation: *YELLOW CARD*

Section 3.4.2 Pre and Post-MATCH

- **G8** Blue Box

DRIVE TEAMS are expected to stage their ROBOTS for a MATCH, and remove it from the FIELD afterwards, safely and swiftly. DRIVE TEAM efforts that either intentionally or unintentionally delay the start of a MATCH or the FIELD reset are not allowed. Examples include, but are not limited to:

- A. Late arrival to the FIELD
- B. Failing to exit the FIELD once the ~~PLAYER STATION~~ TOWER LED strings have turned off (indicating MATCH ready)
- C. Installing bumpers, charging pneumatic systems, or any other ROBOT maintenance, once on the FIELD
- D. Use of alignment devices that are external to the ROBOT
- E. Failing to remove OPERATING CONSOLES from the PLAYER STATIONS in a timely manner

Section 3.4.6 ROBOT to ROBOT Interaction

- **G22**

There is no FIRST Robotics Competition specific definition of pin, so a general definition applies; “to prevent or stop something from moving.” As a result, contact is not required for pinning to occur. For example, a ROBOT parked right behind an opponent that is on the BATTER could be considered pinning because the dividers on the BATTER and the parked ROBOT prevent the opponent from moving.

Section 3.4.8 Human Actions

- **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.

Violation: *Offending ROBOT will be DISABLED*

Section 4.2 General ROBOT Design

- **R4** In the STARTING CONFIGURATION (the physical configuration in which a ROBOT starts a MATCH), no part of the ROBOT shall extend outside the vertical projection of the FRAME PERIMETER, with the exception of its BUMPERS and minor protrusions such as bolt heads, fastener ends, rivets, etc.

Section 4.7 BUMPER Rules

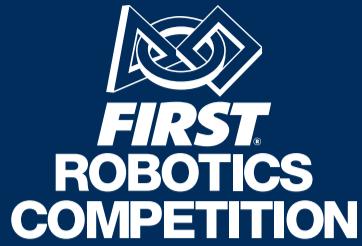
- **R21-D** be covered with a rugged, smooth cloth. (multiple layers of cloth and seams are permitted if needed to accommodate R27, provided the cross section in Figure 4-7 is not significantly altered).

The cloth must completely enclose all exterior surfaces of the wood and pool noodle material when the BUMPER is installed on the ROBOT. The fabric covering the BUMPERS must be a solid Red or Blue in color. The only markings permitted on the BUMPER fabric cover are the Team number (see R28) and hook-and-loop backed by the hard parts of the BUMPER.

- **R27** Each ROBOT must be able to display Red or Blue BUMPERS to match their ALLIANCE color, as assigned in the MATCH schedule distributed at the event (reference Section 5 (5.1.1 MATCH Schedules)). BUMPER Markings visible when installed on the ROBOT, other than those explicitly allowed per R21-D or required per R28, are prohibited.

Section 5.5.3 REFEREE Interaction

- **T19** If a DRIVE TEAM needs clarification on a ruling or score, one (1) pre-college student from that DRIVE TEAM should address the Head REFEREE after the ARENA Reset Signal (e.g. ~~PLAYER STATION~~ TOWER LED strings turn green). A DRIVE TEAM member signals their desire to speak with the Head REFEREE by standing in the corresponding Red or Blue Question Box, which are located on the floor near each end of the scoring table. Depending on timing, the Head REFEREE may postpone any requested discussion until the end of the subsequent MATCH.



Team Update 09

02/09/2016

GENERAL

- The [2016 Inspection Checklist](#) is now posted in the [Resource Library](#) and linked from the [Game & Season Materials site](#).
- TE-16006 has been updated to include a second page with an exploded view and the BOM balloons to help visualize the individual parts.
- TE-16157 has been updated to include the BOM balloons in the exploded view.

ADMIN MANUAL

Section 4.6 LOAD IN PROCEDURES

- If pit set-up will be allowed:
 - Safety is the top priority.
 - » Safety glasses
 - » Closed heeled and closed toed shoes.
 - » Appropriate clothing
 - » Appropriate hair ties

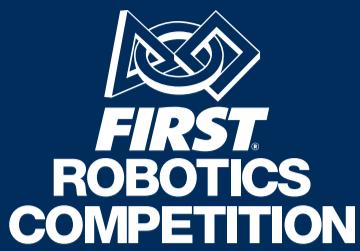
GAME MANUAL

Section 2.2.2.1 DEFENSES

- Figures 2-5 and 2-7 have been updated to match the platform orientation depicted in GE-16025.
- Figure 2-15 has been updated to include the correct depth dimension depicted in drawing GE-16081-01.

Section 4.7 BUMPER Rules

- **R21-C:** All pool noodles used in a BUMPER set (e.g. Red set of BUMPERS) on a ROBOT must be the same diameter, cross-section, and density (e.g. all round hollow or all hex solid).



Team Update 08

02/05/2016

GENERAL

- Drawing GE-16209: Note 1 has been updated to include the constant force spring part number (~~MANUFACTURER:~~ VULCAN SPRINGS PN: J25S65FR) and the diameter of the hole has been increased (~~0.19~~ 0.26)
- **Control System Note:** We have heard sporadic reports of link failure between the roboRIO and the radio after a cold boot, characterized by the amber and green link LEDs on the roboRIO Ethernet port remaining off (and a roboRIO reset resolving the issue). We have located a set of hardware that reproduces the issue and are currently investigating the root cause. In the meantime, teams experiencing this issue can connect the roboRIO Ethernet to the radio port labeled "18-24v POE" (next to the power connector) as a temporary workaround (the issue only affects the port labeled "802.3af POE").

ADMIN MANUAL

Section 6.2 Complete Awards List

Award	Description	Selected By	Regional	District	District CMP	FIRST CMP Division	FIRST CMP
Quality Award <i>Sponsored by Motorola Solutions Foundation</i>	Celebrates machine robustness in concept and fabrication.	Judges	X	X	X	X	

Section 6.12.2 Quality Award Sponsored by Motorola Solutions Foundation

GAME MANUAL

Section 4.2 General ROBOT Design

- **R1** A Team must submit their ROBOT for Inspection. The ROBOT must be an electromechanical assembly built by the FIRST Robotics Competition Team to perform specific tasks when competing in FIRST STRONGHOLD. The ROBOT must include all of the basic systems required to be an active participant in the game – power, communications, control, BUMPERS, and movement. The ROBOT implementation must obviously follow a design approach intended to play FIRST STRONGHOLD (e.g. a box of unassembled parts placed on the FIELD, or a ROBOT designed to play a different game does not satisfy this definition).

■ **R2** The ROBOT (excluding BUMPERS) must have a FRAME PERIMETER, contained within the BUMPER ZONE, that is comprised of fixed, non-articulated structural elements of the ROBOT. Minor protrusions no greater than $\frac{1}{4}$ in. such as bolt heads, fastener ends, and rivets are not considered part of the FRAME PERIMETER.

To determine the FRAME PERIMETER, wrap a piece of string around the ROBOT (excluding BUMPERS) at the BUMPER ZONE described in R22. The string describes this polygon.

Note: to permit a simplified definition of the FRAME PERIMETER and encourage a tight, robust connection between the BUMPERS and the FRAME PERIMETER, minor protrusions such as bolt heads, fastener ends, rivets, etc. are excluded from the determination of the FRAME PERIMETER.

Section 4.6 Material Utilization

■ **R18** ...

Items exempt from this limit are:

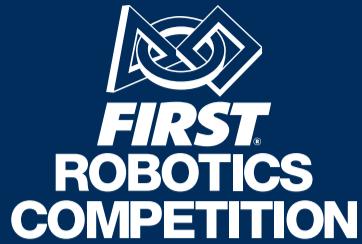
- A. the OPERATOR CONSOLE,
- B. any ROBOT battery assemblies (as described in R5),
- C. BUMPERS

Section 4.9 Power Distribution

■ **R36** The one (1) ROBOT battery, a single pair of Anderson Power Products (or APP) 2-pole SB type connectors, the one (1) main 120-amp (120A) circuit breaker (Cooper Bussman P/N: CB185-120), and the one (1) Cross The Road Electronics Power Distribution Panel (PDP, P/N: am-2856, 217-4244) shall be connected with 6 AWG wire or larger, with no additional devices or modifications, as shown in Figure 4-10.

Section 6: Glossary

■ ROBOT: an electromechanical assembly built by an *FIRST* Robotics Competition Team to perform specific tasks when competing in *FIRST STRONGHOLD*. It includes all of the basic systems required to be an active participant in the game: power, communications, control, BUMPERS, and movement. The implementation must obviously follow a design approach intended to play *FIRST STRONGHOLD* (e.g. a box of unassembled parts placed on the FIELD or a ROBOT designed to play a different game would not satisfy this definition)



Team Update 07

02/02/2016

GENERAL

- No changes.

ADMIN MANUAL

6.14.4 Rookie All-Star Award

- Celebrates the rookie team exemplifying a young but strong partnership effort, as well as implementing the mission of FIRST to inspire students to learn more about science and technology.

As there are often far fewer rookie teams than veteran teams present at events, Judges have the option of not presenting this award if they feel no rookie team competing meets the criteria.

6.14.6 Rookie Inspiration Award Sponsored by National Instruments

- Celebrates a rookie team's outstanding success in advancing respect and appreciation for engineering and engineers, both within their school, as well as in their community.

As there are often far fewer rookie teams than veteran teams present at events, Judges have the option of not presenting this award if they feel no rookie team competing meets the criteria.

GAME MANUAL

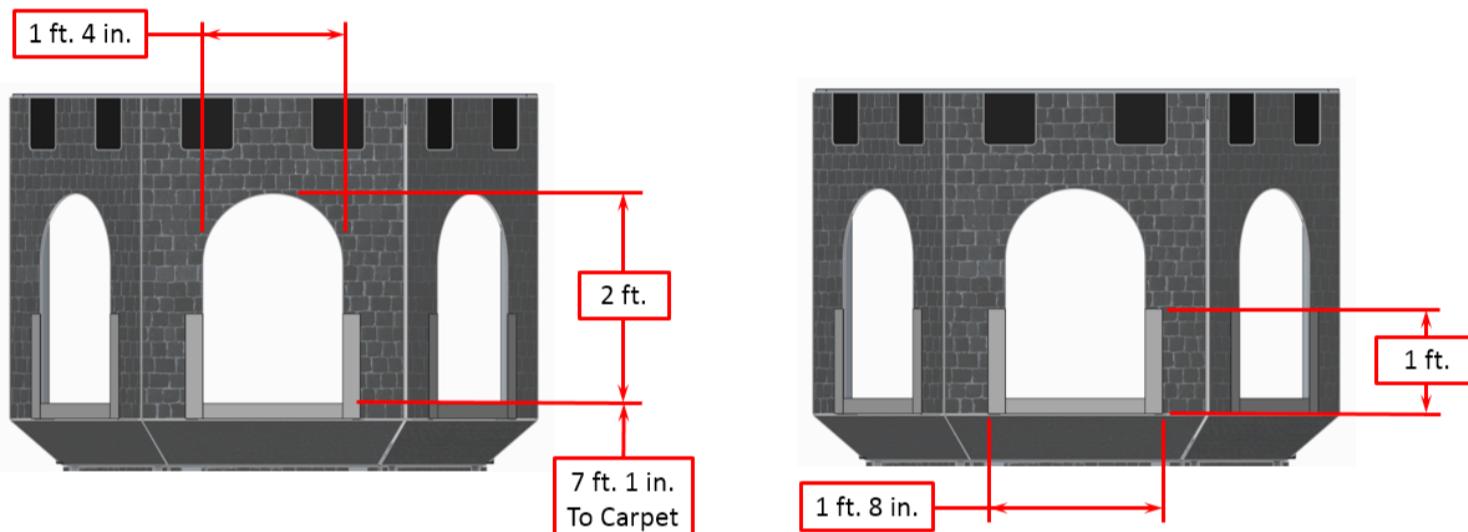
Section 2: ARENA

- GE-16139 has been included in the drawing package.

Section 2.2.3.1 CASTLE WALL: GOALS

- Each of the high GOALS is marked with ~~three (3)~~ two (2) vertical strips of 2 in. retro-reflective material (3M 8830 Silver Marking Film) and one (1) horizontal strip of 2 in. retro-reflective material (with the unsupported .25 in. folded over the bottom edge of the GOAL opening such that 1.75 in. is visible) to form a u-shaped target.
- Figure 2-29 has been edited to correct the height of the target tape: ~~1 ft. 2 in.~~ 1 ft.

Figure 2-29: High TOWER GOAL Dimensions

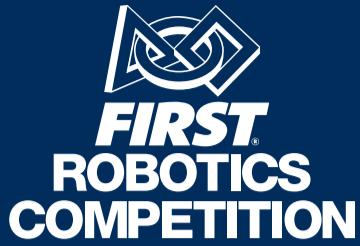


Section 3

- **G34** No more than six (6) BOULDERS may remain in a CASTLE during TELEOP. If the BOULDER count ever exceeds six (6), excess BOULDERS must be introduced to the FIELD immediately.

Violation: FOUL per excess BOULDER

The intent is that as soon as a 7th BOULDER arrives in the CASTLE, the ALLIANCE begins 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.



Team Update 06

01/29/2016

GENERAL

Where To Get Help

- We understand your team may have questions about a variety of things at this point in the season, and we are here to help!
 - Please post your *FIRST STRONGHOLD*SM Game and Admin Manual questions to the [Q&A System](#).
 - Need technical (e.g., programming, electrical, or mechanical) assistance? Post to the [FIRST Forums](#).
 - Direct your other (e.g., TIMS/STIMS) questions, suggestions, and feedback to frcteams@firstinspires.org or call Team Support at 1-800-871-8326, ext. 0.

ADMIN MANUAL

- No changes.

GAME MANUAL

Section 2.2.3.1, “Tower”

- Each CASTLE has a TOWER between PLAYER STATIONS one (1) and two (2) ~~two (2) and three (3)~~. (*edit is to correct an error so this text matches the rest of the manual and FIELD drawings*)

Section 2.3 BOULDERS

- Each MATCH begins with eighteen (18) BOULDERS on the FIELD. BOULDERS are staged before the MATCH in the following manner:
 - A. Six (6) BOULDERS are staged evenly along the length of the Midline, 3 ft. 9-1/2 in. apart as shown in Figure 2-35. Small rings are used to keep them in place prior to the start of a MATCH. Rings are O-rings, Dash 222, Buna N, 1.762 in. outer diameter, .13 in thick (Grainger Item#: 1KLE7). Rings will be secured to the carpet by the MIDLINE tape.
 - B. Three (3) BOULDERS are staged in the CASTLE
 - C. Three (3) BOULDERS are staged on or in each ROBOT or in the CASTLE. See Section 3.2 – MATCH LOGISTICS for more detail.

Section 4.8 Motors & Actuators

■ Table 4-1: Factory installed vibration and autofocus motors resident in COTS computing devices (e.g. rumble motor in a smartphone).

Section 4.9 Power Distribution

■ R31, Blue Box

Examples of batteries which meet this criteria include:

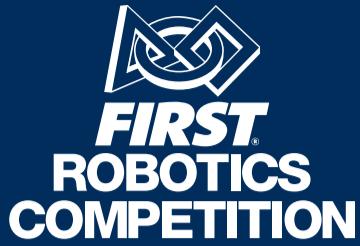
- Enersys (P/N: NP18-12, NP18-12B, NP18-12BFR)
- MK Battery (P/N: ES17-12)
- Battery Mart (P/N: SLA-12V18)
- Sigma (P/N: SP12-18)
- Universal Battery (P/N: UB12180)
- Power Patrol (P/N: SLA1116)
- Werker Battery (P/N: WKA12-18NB)
- Power Sonic (P/N: PS-12180NB)
- Yuasa (P/N: NP18-12B)
- Panasonic (P/N: LC-RD-1217)
- Interstate Batteries (P/N: BSL1116)
- Duracell Ultra Battery (P/N: DURA12-18NB)

Teams should be aware that they may be asked to provide documentation of the specifications of any battery not listed above.

Batteries should be charged in accordance with manufacturer's specification. The battery charger output should not exceed 6 amps and they must have the corresponding Anderson connector installed. (Please see the [FIRST Safety Manual](#) for additional information.)

Section 4.10 Control, Command, & Signals System

■ R52 A. v.: Talon SRX Motor Controller (P/N: 217-8080, am-2854, 14-838288), equipped with firmware version 0.28 or newer if using via PWM. See R70 R59 if using via CAN.



Team Update 05

01/26/2016

GENERAL

Battery Connectors Mis-assembly

- We have received two reports from teams that the Anderson SB50 battery connectors provided in the Kickoff Kit and available via FIRST Choice have had the red and black wires reversed. Please check your connectors to ensure that you do not have an issue. Most of the core control system components have reverse polarity protection however motor controllers do not and could be damaged by this. The red wire should be on the positive side of the connector and the black should be on the negative. If you do have an issue there is a fix which is detailed [here](#). We are interested in tracking this and request that you fill out [this form](#) if you have issues. Going forward we will be working with our suppliers to reduce the chance of this happening. On behalf of FIRST and our suppliers we apologize for an inconveniences this may have caused.

FRCSim

- Details about FRCSim, a Linux simulation environment for teams using C++ and Java, has been added to the Virtual Kit section of the [2016 Kit of Parts page](#). For more information see the [Kit of Parts page](#) or the [ScreenSteps documentation](#).

ADMIN MANUAL

Section 6.9.3 Business Plan Template

Teams must complete the following fields in order to be considered for this award.

~~EXECUTIVE SUMMARY~~

...

- PICTURES**

Picture 1: Please upload 5" x 4" 100 dpi resolution images that end in .JPG or .GIF

Picture 2: Please upload 5" x 4" 100 dpi resolution images that end in .JPG or .GIF

Picture 3: Please upload 5" x 4" 100 dpi resolution images that end in .JPG or .GIF

Picture 4: Please upload 5" x 4" 100 dpi resolution images that end in .JPG or .GIF

- ~~Team Captain/Student representative that has double checked this submission~~**

~~First Name, Last Name~~

GAME MANUAL

Section 3.4.3 General Rules

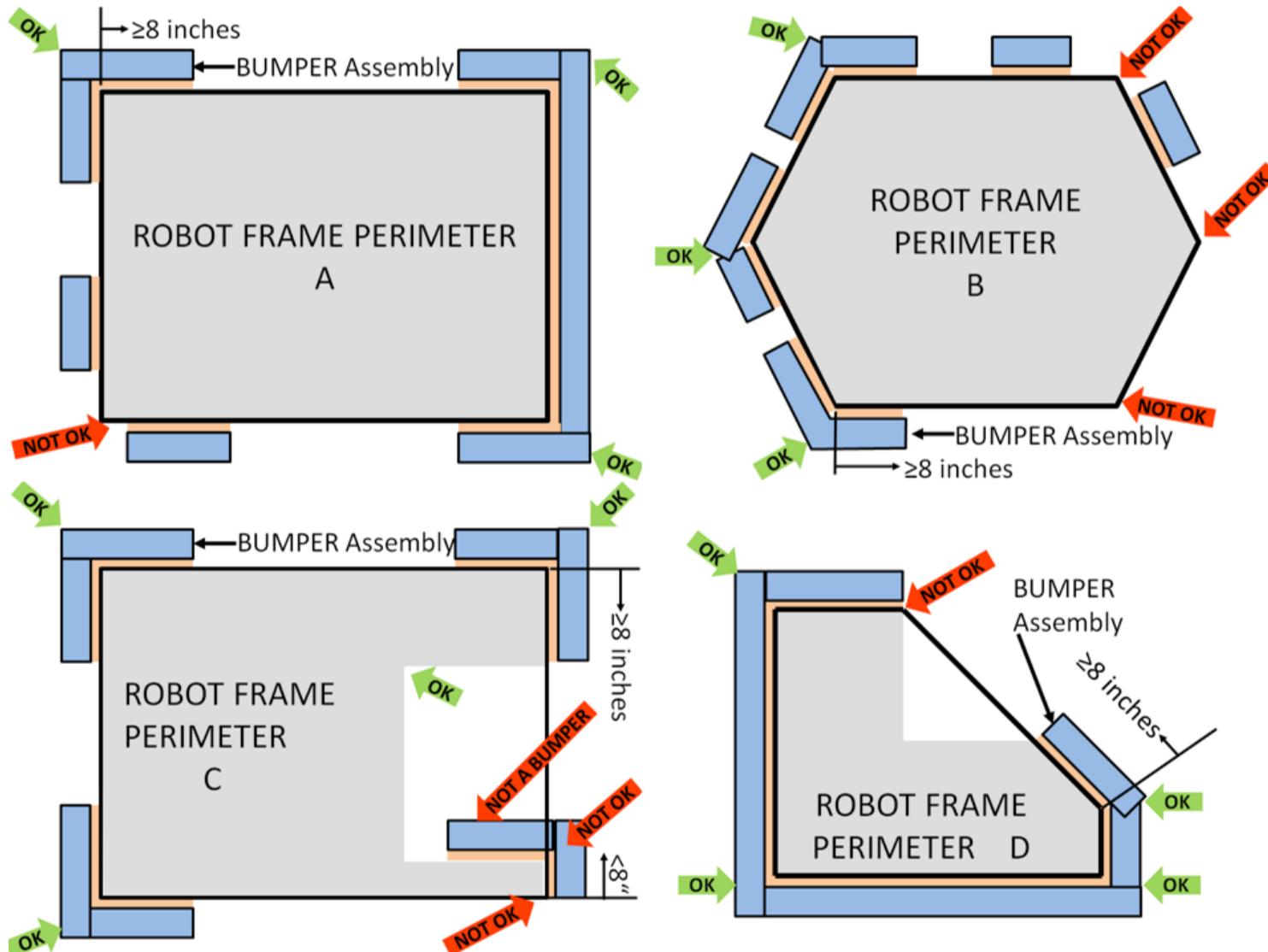
- G12-1** ROBOTS may not ~~deliberately~~ use FIELD elements, e.g. BOULDERS, ~~in an attempt to ease or amplify the challenge associated with~~ ~~interfere with the operation of~~ other FIELD elements, e.g. DEFENSES.

Example actions that violate G12-1 include, but aren't limited to the following: adding BOULDERS to your Moat to make it harder for your opponents to CROSS the Moat, using a BOULDER to prop up Cheval de Frise elements, propping open a DEFENSE door with a BOULDER.

Section 4.7 BUMPER Rules

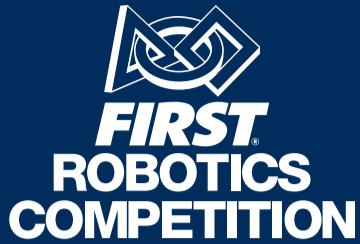
■ *Figure 4-3: BUMPER Corner Examples* includes an revised lower-left right corner in ROBOT FRAME PERIMETER C.

Figure 4-1: BUMPER Corner Examples



Section 5.5.9 Special Equipment Rules

■ The only equipment, provided it does not block visibility for FIELD STEWARDS or audience members or jam or interfere with the remote sensing capabilities of another Team, including vision systems, acoustic range finders, sonars, infrared proximity detectors, etc. (e.g. including imagery that, to a reasonably astute observer, mimics the Vision Guides), that may be brought in to the CASTLE are as follows:



Team Update 04

01/22/2016

GENERAL

- No changes.

ADMIN MANUAL

- No changes.

GAME MANUAL

Drawings

- GE-16170_REV_A: Mounting hole dimension added, 1.00
- GE-16080: Updated to incorporate GE-16081_REV_A
- GE-16081_REV_A:
 - Width: 4.50 5.25 (width references also changed; the 4.50 dimension was derived from two other dimensions, while the 5.25 dimension is specifically marked)
 - Height dimension reference changed from top of flange to bottom of flange
 - Material: 5 Gauge Aluminum Sheet, .1819 thick Steel Sheet, .125" Thick
- TE-16080_REV_B – Updated to incorporate addition of TE-16080-05, including location adjustment
- TE-16080-05: new part

Section 2.2.2 OUTER WORKS

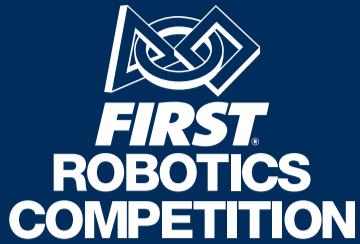
- The Rock Wall is a steel block that is 4 ft. 2 in. wide, 4 1/2 5 1/4 in. deep, and 4 1/2 4-5/8 in. tall. (For more information on the depth change, see [yesterday's blog](#). The height correction is to make the manual match the original, and current, drawing. The height of the Rock Wall has not changed from the originally published drawing.)

Section 4.8 Motors & Actuators

- Reformatted for clarity: Hard drive motors or fans that are: included in any Kickoff Kit, distributed via FIRST Choice, part of a legal motor controller (including manufacturer provided accessories), or part of a legal COTS computing device

Section 5.5.10

- The specific DEFENSES used during each MATCH are selected by a combination of the audience and the ALLIANCES. One (1) DEFENSE from each of the four (4) DEFENSE groups, A, B, C, and D are on the FIELD each Qualification and Playoff MATCH. During the Practice MATCHES, ALLIANCES select DEFENSES for positions 2 through 5 to fortify their opponent's OUTER WORKS and may select any four (4) DEFENSES from the four (4) groups. For example, each of the two (2) DEFENSES from groups A and B. ~~Also, OUTER WORKS DEFENSE positions 2 through 5 are selected by the opposing ALLIANCE, i.e. the Red ALLIANCE selects the Blue ALLIANCE DEFENSES.~~ This provides each ALLIANCE with a predictable set of DEFENSES on which to practice. During the Qualification MATCHES, ALLIANCES select DEFENSES to fortify their own OUTER WORKS (the OUTER WORKS closest to their TOWER).



Team Update 03

01/19/2016

GENERAL

- The Game Manual, Admin Manual, Team Updates, and *FIRST STRONGHOLD* videos are now available in the *FIRST* official app for iOS and Android devices.
- A recommended template for a *Cost Account Worksheet*, required by T16, is available [here](#) (and also linked from the [FIRST STRONGHOLD Game & Season Materials site](#)).
- The part number for the Denso window motor on the [2016 Motor Performance Data](#) sheet posted to the [Mechanical Resources site](#) has changed: ~~262100-3030~~ **5-163800-RC1**
- [Denso Window Motor Specification](#) has been posted to the [Mechanical Resources site](#).

ADMIN MANUAL

Section 6.2 Complete Awards List

- Description for the Judges Award: ~~Award recognizes the team that develops and implements the most outstanding digital experience, marketing strategy, and rationale for digital channels to disseminate content to its audience and further the FIRST mission.~~ During the course of the competition, the judging panel may decide a team's unique efforts, performance, or dynamics merit recognition.

Section 7.4.2.3 Multiple Awards

- 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 **each** at the District level.

GAME MANUAL

Official Field Drawings

- GE-16013 updated to specify that the marred side of the “DEFENSE RAMP” is installed down.

Section 2.2.3.1 CASTLE WALL (SCALING RUNGS)

- Image 2-33 dimension has been updated to match the dimension in GE-16006: ~~1 ft. 9 in.~~ **1 ft 8½ in.**

Section 3.1.4 TOWER

- A BOULDER is scored in a GOAL if it passes through the opening of a GOAL and exits into the CORRAL, and the points awarded for that BOULDER are assigned based on when the BOULDER passed through the opening of the GOAL.

Section 3.4.3 General Rules

- **G12** Blue Box: BOULDERS are expected to undergo a reasonable amount of wear and tear as they are handled by ROBOTS, such as scratching or marking. Gouging, tearing off pieces, or routinely marking BOULDERS will be considered in violation of this rule. Humans causing BOULDER wear and tear, e.g. cracking a BOULDER coating, are subject to a CARD per [Section 5.5.4](#).

Section 3.4.7 ROBOT Gameplay

- **G25-E** isolating BOULDERS in the opponent's SECRET PASSAGE from opponents while not contacting the carpet in the opponent's SECRET PASSAGE

Section 3.4.9 BOULDER Rules

- **G38, Blue Box-D** "launching" (shooting BOULDERS into the air, kicking across the floor, or throwing in a forceful way)
- **G40-B** the ROBOT completes its CROSSING (i.e. e.g. doesn't completely back out of the OUTER WORKS into the NEUTRAL ZONE)

Section 3.4.10 DEFENSE Rules

- **G43** ROBOTS on the same half of the FIELD as their ALLIANCE TOWER may not interfere with opponent ROBOTS attempting to traverse OUTER WORKS (regardless of direction). 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.

Section 4.2 General ROBOT Design

- **R7 Blue Box**

ROBOTS will not be re-enabled after the MATCH, so Teams must be sure that BOULDERS and ROBOTS can be quickly, simply, and safely removed. Before they arrive at events, Teams should practice removal of BOULDERS from their ROBOTS, and removal of their ROBOTS from FIELD elements such as the TOWER, with the ROBOTS in a powered-off state.

Section 4.3 Safety & Damage Prevention

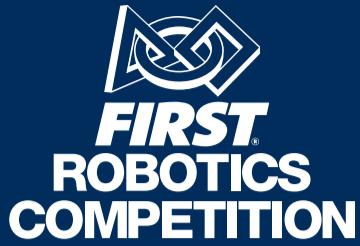
- **R9-L** tire sealant

Section 4.8 Motors & Actuators

- **R29:** Select Automotive Motors (Window, Door, Windshield Wiper, Seat, Throttle)

Section 4.9 Power Distribution

- **R54:** Servos must be connected **only** to the PWM ports on the roboRIO, either directly or through the PWM ports on a WCP Spartan Sensor Board. They must not be connected to the MXP, motor controllers, or relay modules.



Team Update 02

01/15/2016

GENERAL

- General copyright release has been added to the end of each Admin and Game Manual Section:

Official FIRST® Robotics Competition teams and Partners are permitted to make reproductions of this manual for team and Partner use only. Any use, reproduction, or duplication of this manual for purposes other than directly by the team or Partner as part of FIRST® Robotics Competition participation is strictly prohibited without specific written permission from FIRST.

- A recommended update to the C++ and Java Eclipse plugins has been released. This update fixes a number of WPILib, Eclipse Plugin, and RobotBuilder bugs discovered by teams after Kickoff which may cause program crashes . For complete details, see the [changelog page here](#). For instructions on updating the plugins, see the steps near the bottom of [this article](#).

ADMIN MANUAL

No changes beyond the added copyright release described above.

GAME MANUAL

Field Drawings

- GE-16030: Removed additional instance of this drawing from the package
- GE-16045_REV_A: Updated the drawing to specify part numbers for the springs in the Drawbridge Assembly
- GE-16155: Added drawing to package
- GE-16226_REV_A: Updated the material note from polycarbonate to Aluminum
- GE-16227_REV_A: Updated the material note from polycarbonate to Aluminum
- GE-16228_REV_A: Updated the material note from polycarbonate to Aluminum
- GE-16229: Added drawing to package
- GE-16230: Added drawing to package
- TE-16045_REV_B: Updated the drawing to specify part numbers for the springs in the Drawbridge Assembly

Section 1, Figure 1-1

- Images 1-1 has been updated to represent the Flag Flipper as depicted in Drawing GE-16215.

Section 2 (throughout)

- Images 2-1, 2, 3, 4, 22, 23, 24, and 36 have been updated to represent the Flag Flipper as depicted in Drawing GE-16215.

Section 2.1 Zones and Marking

- OUTER WORKS: an infinitely tall volume bordered by, but not including, the GUARDRAIL, the SECRET PASSAGE, and the bottom edges of its PLATFORM Ramps COURTYARD and the NEUTRAL ZONE. The OUTER WORKS is positioned 7 ft. 2 in. from the MIDLINE.

Section 2.2.2 OUTER WORKS

- The OUTER WORKS is an infinitely tall volume bordered by, but not including, the GUARDRAIL, the SECRET PASSAGE, and the COURTYARD and the NEUTRAL ZONE bottom edges of its PLATFORM Ramps. The OUTER WORKS is positioned 7ft. 2 in. from the MIDLINE. It hosts consists of a series of five (5) DEFENSES, five (5) PLATFORMS, and five (5) Shields arranged in a line across the FIELD and is designed to impede the passage of ROBOTS and BOULDERS in to the COURTYARD.

Section 2.3 BOULDERS

- Single balls and A six (6) packs of rainbow colored balls may be purchased at gophersport.com (6-pack Item Number: 47-121, Single ball Item Number: 99-634).

Section 3.4.5 ROBOT Rules

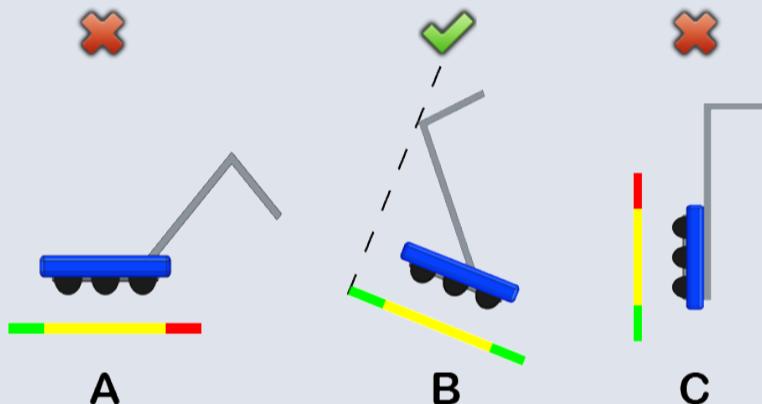
- G18** ROBOTS may not extend more than 15 in. beyond their FRAME PERIMETER.

Violation: FOUL. If repeated, offending ROBOT will be DISABLED.

Examples of compliance and non-compliance of G18 are shown in Figure 3-2.

Yellow bars represent the measurement of the FRAME PERIMETER and are drawn in the same orientation of the ROBOT'S FRAME PERIMETER. Green bars represent a measured extension from the FRAME PERIMETER that has not been exceeded. Red bars represent a measured extension from the FRAME PERIMETER that has been exceeded (violating G18). ROBOTS A and C violate G18, whereas ROBOT B does not.

Figure 3-2: Examples of G18 compliance and non-compliance.



Section 3.4.7 ROBOT Gameplay

- G25** D. blocking more than one of the opponent's HUMAN PLAYER STATION openings while not contacting the carpet in the opponent's SECRET PASSAGE
- G28** During the final twenty (20) seconds of TELEOP, ROBOTS in their COURTYARD may not contact an opponent ROBOT, regardless of who initiates the contact.

Section 3.4.9 BOULDER Rules

- G40-1** A ROBOT may not hold a Low Bar flap open for the purpose of allowing a DRIVE TEAM member to transfer BOULDERS into their opponent's COURTYARD.

Violation: TECH FOUL per BOULDER

Section 3.4.8 Human Actions

- G34** No more than six (6) BOULDERS may remain in a CASTLE at any time during TELEOP. If the BOULDER count ever exceeds six (6), excess BOULDERS must be introduced to the FIELD immediately.

Section 4.9 Power Distribution

- R52 A. v. Talon SRX Motor Controller (P/N: 217-8080, am-2854, 14-838288),
- R52 A. viii. Victor SP Motor Controller (P/N: 217-9090, am-2855, 14-868380)

Section 4.11 Pneumatic System

- R77 J. Pneumatic cylinders, pneumatic linear actuators, and rotary actuators,

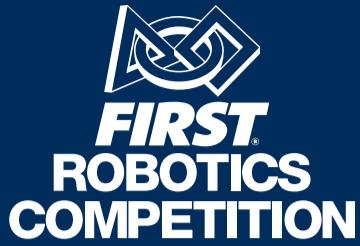
Section 5.5.9 Special Equipment Rules

- The language was assigned a “T” number as it’s actually a rule, **T26-1**, and edited to include Items B, C, E and F also apply to the DRIVE TEAM Member in the SPY BOX.

Violation: MATCH will not start until situation remedied.

Section 6 Glossary

- OUTER WORKS: an infinitely tall volume bordered by, but not including, the GUARDRAIL, the SECRET PASSAGE, and the bottom edges of its PLATFORM Ramps. ~~2 in. white gaffers tape~~ (The OUTER WORKS includes the white gaffers tape, but does not include the GUARDRAIL or SECRET PASSAGE). It ~~hosts~~ consists of a series of five (5) DEFENSES, five (5) PLATFORMS, and five (5) Shields arranged in a line across the FIELD and is designed to impeded the passage of ROBOTS and BOULDERS in to the COURTYARDS.



Team Update 01

01/12/2016

GENERAL

- The following resources have been posted:
 - » Unencrypted versions of the [Game Manual](#)
 - » Unencrypted versions of the [Field Drawings](#)
 - » Unencrypted versions of the [Kickoff Kit Checklists](#)
 - » Versions of the Admin Manual and the Game Manual will be posted in the *FIRST* app shortly. Additionally, the pdf versions can be viewed and searched using the Adobe Acrobat app.
 - » [Google Cardboard images](#) of the *FIRST STRONGHOLD* field from Kickoff
 - » [2016 Motor Spec sheet](#)
 - » [2016 Pneumatics Manual](#)
- The official Q&A opens tomorrow at noon (Eastern). Information is [here](#).
- General formatting and typo corrections were made (and probably will be made) throughout the Admin and Game Manuals. Such inconsequential edits will not be noted in Team Updates.

ADMIN MANUAL

Section 3.4.5 Technical Contact Responsibilities

- Use the Inspection Checklist that will be ~~posted listed~~ in the *FIRST* Robotics Competition Game Manual — Section 4 after Kickoff.

Section 6.4.8 Interview Process and Video Requirement

- **Returning this Year:** Written feedback forms. Teams desiring written feedback from Judges will be able to receive it upon request. ~~More details to follow soon.~~ To receive feedback, teams submitting for Chairman's Award must fill out their Team Number and Team name on the Chairman's Award [feedback form](#) and provide it to the Judges at the beginning of their Chairman's Award interview. Completed forms will be available at the end of the event. We are requiring teams to request feedback before they receive it to help ensure Judging resources are not invested in teams not interested in receiving feedback.

Section 6.4.7 Submission Process

- Important Note: Chairman's Award Judges also review the information entered in the Judges Information Page as part of the Chairman's Award submission. This information is entered as part of the Team Information Management System (TIMS) at <https://my.firstinspires.org/frc/tims/site.lasso>. Refer to Section 1 Communications for more details about the Judges Information Page.

Section 7 Team Advancement

- Published

GAME MANUAL

Section 2.2.2.1 DEFENSES

- The Cheval de Frise is a series of four (4) independently tilting, weighted polycarbonate HDPE platforms.
- The Moat is a 2-1/2 in. high, 4 ft. 2 in. wide, and 2 ft. 1 ft. 8 in. deep u-shaped channel, formed by vertical rectangular steel tubes.
- The Rough Terrain is constructed from thirty-one (31) pieces of square or rectangular steel tubing.

Section 2.2.2.2 SECRET PASSAGE

- BERMS consist of a the steel barrier, 1 in. tall and 3 in. wide that defines the border of the SECRET PASSAGE.

Section 3.1.3 DEFENSES and the OUTER WORKS

- Once a ROBOT CROSSES a DEFENSE in AUTO, any additional DEFENSES that ROBOT REACHES or CROSSES by that ROBOT during the AUTO period will not decrease DEFENSE STRENGTH nor contribute points to the ALLIANCE.

Section 3.4.3 General Rules

- **G11** Blue Box added:

G11 does not apply for strategies consistent with standard gameplay, e.g. a TEAM obtaining a BOULDER from their SECRET PASSAGE, CROSSING an opponent DEFENSE, etc. G11 requires an intentional act with limited or no opportunity for the TEAM being acted on to avoid the penalty. Examples include:

- A Blue ROBOT, with twenty (20) seconds left in the MATCH, is parked in front of the middle face of the Blue TOWER. A Red ROBOT, attempting to SCALE that face, runs into the blocking Blue ROBOT. This results in a violation of G28 by the Blue ROBOT. Because the Red ROBOT was not solely making an attempt to cause that Blue ROBOT to violate G28, but rather to complete a Game Action (a SCALE), they are not in violation of G11.
- A Red ROBOT is parked in the NEUTRAL ZONE near the Blue SECRET PASSAGE. A Blue ROBOT pushes the Red ROBOT into the Blue SECRET PASSAGE, then drives away. There is no violation of G21 by the Red ROBOT, as the Red ROBOT was forced by the Blue ROBOT into the SECRET PASSAGE. The Blue ROBOT has violated G11 by forcing the Red ROBOT into the SECRET PASSAGE for the sole purpose of causing them to violate G21.
- A Red ROBOT is parked completely within the Blue SECRET PASSAGE. A Blue ROBOT, attempting to reach the Blue BRATTICE, makes contact with the Red ROBOT. The Red ROBOT receives a G21 penalty. There are no violations of G11 because the Blue ROBOT was trying to access their BRATTICE and not solely trying to cause the Red ROBOT to violate G21.

- **G12-1** ROBOTS may not use FIELD elements, e.g. BOULDERS, to interfere with the operation of other FIELD elements, e.g. DEFENSES

Violation: FOUL. For every five (5) seconds in which the situation is not corrected, FOUL

Section 3.4.5 ROBOT Rules

- **G19-1** ROBOTS must be in compliance with Section 4.7: BUMPER Rules throughout the MATCH.

Violation: DISABLED

Section 3.4.6 ROBOT to ROBOT Interaction

- **G21** A ROBOT contacting carpet in the opponent's SECRET PASSAGE may not contact opposing ROBOTS, regardless of who initiates the contact.

Violation: TECH FOUL

TEAMS should take note that they are putting themselves at great risk for TECH FOULS if they choose to enter their opponent's SECRET PASSAGE

Section 3.5.10 DEFENSE Rules

- **G43** ROBOTS on the same half of the FIELD as their ALLIANCE TOWER may not interfere with opponent ROBOTS attempting to traverse OUTER WORKS (regardless of direction). A ROBOT is considered traversing the opponent's OUTER WORKS if any part of its BUMPERS are within the opponent's OUTER WORKS.

Violation: FOUL. For every five (5) seconds in which the situation is not corrected, FOUL

This rule protects a ROBOT so long as their BUMPERS are within the OUTER WORKS whether a traversal attempt is successful or not.

Section 4.7 BUMPER Rules

- R22 Blue Box added:

This measurement is intended to be made as if the ROBOT is resting on a flat floor (without changing the ROBOT configuration), not relative to the height of the ROBOT from the FIELD carpet.

Examples include:

- A. A ROBOT that is at an angle while traversing a DEFENSE has its BUMPERS outside the BUMPER ZONE. If this ROBOT were virtually transposed onto a flat floor, and its BUMPERS are in the BUMPER ZONE, it meets the requirements of R22.
- B. A ROBOT deploys a MECHANISM which lifts the BUMPERS outside the BUMPER ZONE (when virtually transposed onto a flat floor). This violates R22.

Section 4.8 Motors and Actuators

- **R29, Table 4-1:**

Table 4-1: Legal Motors

Motor Name	Part Numbers Available	Max Qty Allowed
BaneBots	M7-RS775-18 / RS775WC-8514 M5-RS550-12 / RS550VC-7527 / RS550	Unlimited

Section 4.9 Power Distribution

- **R52, Item A. ii:** SD540 Motor Controller (P/N: SD540x1, SD540x2, SD540x4, SD540Bx1, SD540Bx2, SD540Bx4)

■ R53, Table 4-4:

Table 4-4: Legal Power Regulating Device Use

Electrical Load	Motor Controller	Relay Module	Pneumatics Controller
CIM	Yes	No	No
AndyMark 9015			
WCP RS775 Pro			
VEX BAG/MiniCIM			
BaneBots motors			

Section 5.3.3 Ranking Score (RS)

- Exceptions to A-D are as follows...

Section 6 Glossary

- BACKUP TEAM - a Team used to replace an inoperable ROBOT on an ALLIANCE during Playoff Elimination MATCHES per [5.5.6 TIMEOUT and BACKUP TEAM Rules](#)
- SCALE: an act performed by a ROBOT, such that at the conclusion of the MATCH, it is ~~fully supported by the TOWER, is~~ in contact with ~~at least one~~ [a unique](#) RUNG, and has all of its BUMPERS fully above the height of the low GOALS. (~~update in manual and fix “at least one RUNG”~~)