

January 19, 2010

TEAM UPDATE #3

GENERAL NOTICES

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No changes.

Section 0 - Introduction

No changes.

Section 1 - Communication

No changes.

Section 2 – Team Organization

No changes.

Section 3 – At the Events

No changes.

Section 4 – Robot Transportation

No changes.

Section 5 – The Awards

No changes.

Section 6 – The Arena

Each VISION TARGET, drawing GE10063, is centered horizontally and vertically on the Goal Plastic, drawing GE10001. This puts the center of the target at a nominal 56½” inches off of the floor.

As noted in **Section 6.1.1** of *The Manual*, "the exact dimensions and construction details of the ARENA are contained on the official ARENA drawings." If there are cases where the dimensions in the official drawings and narrative in *The Manual* are in conflict, please defer to the official drawings.

Section 6 – The Arena, Rev C has been updated to include the following edits:

Section 6.2.4 The TOWERS

A TOWER is located in the center of each BUMP. Each TOWER is composed of a base and a pipe superstructure. The PLATFORM is the horizontal surface of the base, and provides a solid surface to support ROBOTS during the game. The PLATFORM is approximately 41 inches wide by 32 inches deep, and is at a height of approximately 21 inches above the floor. A 36-inch wide by 18-inch tall TUNNEL under the PLATFORM, providing a passageway between the MIDFIELD and the adjacent end ZONES. The pipe superstructure is built of 1½-inch diameter steel pipe, and is 7 feet tall (at the center top of the horizontal pipe elements). The TOWER is designed to support the weight of several ROBOTS. The RETURN BARS are the two horizontal bars at the top of the rear of the TOWER (the side nearest the ALLIANCE WALL). The RETURN BARS support the lower end of the BALL RETURN and are covered in black tape.

Section 7 – The Game

Section 7 – The Game, Rev C has been updated to include the following edits:

<G30> ROBOT Volume – During a MATCH, no part of the ROBOT shall extend outside the vertical projection of the FRAME PERIMETER, except as follows:

- a. BALL Interaction Volume – Solely for the purposes of interacting with a BALL, MECHANISMS that are below the BUMPER ZONE may extend up to the BUMPER PERIMETER, for a period not exceeding two seconds. After returning inside the FRAMER PERIMETER, such MECHANISMS are not permitted to re-extend beyond the FRAME PERIMETER for at least two seconds.
- b. ROBOT Righting Volume - ROBOTS attempting to right themselves or their ALLIANCE partners may expand up to the FINALE CONFIGURATION maximum volume while, and only while, performing the righting operation. While beyond the NORMAL CONFIGURATION volume and righting, ROBOTS may not actively interact with BALLS or opponent ROBOTS.
- c. TOWER Contact ROBOT Volume - During a MATCH, ROBOTS in contact with their ALLIANCE TOWER may extend beyond their NORMAL CONFIGURATION volume but may not exceed the FINALE CONFIGURATION maximum volume.
- d. FINALE ROBOT Volume - During the FINALE, ROBOTS may extend up to the limits of the FINALE CONFIGURATION maximum volume.
- e. BUMPERS may extend outside the FRAME PERIMETER, within the constraints defined in Rule <R07>.

Violation: PENALTY and YELLOW CARD.

Section 8 – The Robot

Jaguar Firmware (for CAN use):

To download the most recent Jaguar firmware, please visit the [Jaguar website](http://www.luminarymicro.com/jaguar) (www.luminarymicro.com/jaguar) and click on the *MDL-BDC24 FRC2010 Firmware* link on the right side of the window (in the *MDL-BDC24 Black Jaguar* section).

Section 8 – The Robot, Rev C has been updated to include the following edits:

<R07> Teams are required to use BUMPERS on their ROBOTS. BUMPERS have several advantages, such as reducing damage to ROBOTS when they contact other ROBOTS or ARENA elements, and being excluded from the calculation of ROBOT weight and volume constraints specified in Rule <R10>. The BUMPER location and design have been specified so that ROBOTS will make BUMPER-to-BUMPER contact during most collisions. If implemented as intended, a ROBOT that is pushed against a vertical wall in any **normal** NORMAL CONFIGURATION will always have the BUMPER be the first thing to contact the wall. To achieve this, BUMPERS must be constructed as described below and illustrated in Figure 8 – 1.

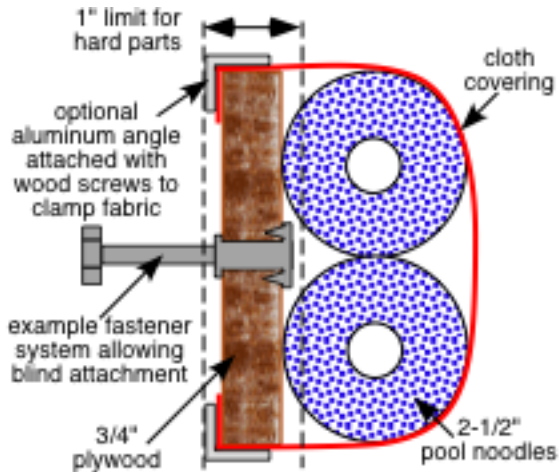
- A. BUMPERS must provide complete protection of the entire FRAME PERIMETER of the ROBOT (i.e. BUMPERS must wrap entirely around the ROBOT). The BUMPERS must be located entirely within the BUMPER ZONE when the ROBOT is standing normally on a flat floor, and must remain there (i.e. the BUMPERS must not be articulated or designed to move outside of the BUMPER ZONE).

Under Rule <R07-A> whenever the ROBOT is on a flat floor, the BUMPERS must remain entirely within the BUMPER ZONE. But when the ROBOT is driving over a BUMP or RAMP and/or ELEVATED or SUSPENDED (or in the process of being ELEVATED or SUSPENDED) on the TOWER

- it is no longer constrained by Rule <R07-A>, and
- it is expected and allowed that the BUMPERS will travel outside (typically above) the BUMPER ZONE, and
- if the ROBOT is "frozen" (i.e. all moving parts halted) and placed on a flat surface, the BUMPERS do not have to be within the BUMPER ZONE.

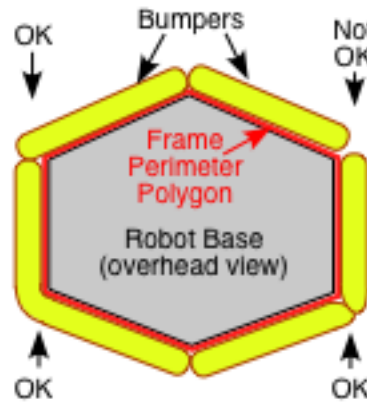
Note that these effects are only in force when the ROBOT is actually driving over the BUMP or RAMP and/or ELEVATED or SUSPENDED (or in the process of being ELEVATED or SUSPENDED) on the TOWER (i.e. the body of the ROBOT must not be in its normal flat-floor attitude and elevation). Simply touching the BUMP, RAMP, or TOWER is not a sufficient condition to avoid violating Rule <R07-A>.

- B. BUMPERS must be built in segments, with a minimum length of six inches, and a maximum length that does not exceed the maximum horizontal dimension of the ROBOT (except for the soft cushion in the corner, as permitted by Rule <R07-L>).
- C. BUMPERS must use a stacked pair of 2½ inch “pool noodles” as the bumper cushion material.
- D. Each BUMPER segment must be backed by a piece of ¾-inch thick by 5-inch tall piece of plywood. Each piece of BUMPER backing must be a minimum of 6 inches long. Small clearance pockets and/or access holes in the BUMPER backing are permitted, as long as they do not significantly affect the structural integrity of the BUMPER.
- E. The BUMPERS must be covered with a rugged, smooth cloth (1000 denier Cordura Plus® strongly recommended). The cloth must completely enclose **all exposed surfaces of** the BUMPER backing (plywood) and cushion (pool noodle) material. It is recommended that lengths of aluminum angle be used to clamp the fabric in place.
- F. The fabric covering the BUMPERS must be solid red or solid blue in color. Visually, the red or blue must be as close to the corresponding color in the *FIRST* logo as reasonable (i.e. to a reasonably astute observer, they appear similar). The only markings permitted on the BUMPER fabric cover are the team number (see Rule <R15>).



Cross-section View

Figure 8 - 1



Overhead View

Figure 8 - 2

- G. Each set of BUMPERS (including any fasteners and/or structures that attach them to the ROBOT) must weigh no more than 20 pounds.
- H. BUMPERS must be designed for quick and easy installation and removal, to aid in weighing and inspection (as a guideline, BUMPERS should be removable by one person in less than ten minutes).
- I. BUMPERS 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 (e.g. not attached with Velcro). The attachment system must be designed to withstand vigorous game play – nut and bolt fasteners are recommended. All removable fasteners (e.g. bolts, locking pins, pip-pins, etc.) will be considered part of the BUMPERS.
- J. If a multi-part attachment system is utilized (e.g. interlocking brackets on the ROBOT and the BUMPER), then the elements permanently attached to the ROBOT will be considered part of the ROBOT, and the elements attached to the BUMPERS will be considered part of the BUMPER. Each element must satisfy all applicable rules for the relevant system.
- K. As part of the 100% coverage, BUMPERS must protect all exterior corners of the FRAME PERIMETER. For adequate protection, a full segment of BUMPER must be placed on each side of the corner (see Figure 8 - 2).
- L. Joints between BUMPER segments and the radial projections of corners must be filled with “soft” BUMPER materials. This may be done with short pieces of vertically oriented pool noodle, by wrapping the pool noodles around the corners, or by beveling the ends between adjacent segments so they form a tight and complete protective surface (see Figure 8 - 2).
- M. The entire length of the BUMPER backing must be supported by the structure/frame of the ROBOT (i.e. the backing material must not be in “free space” between or beyond attachment points) (see Figure 8 - 3).
- N. “Hard” parts of the BUMPER (i.e. plywood backing, fastening system, and clamping angles) may extend up to a maximum of one inch beyond the FRAME PERIMETER. “Soft” parts of the BUMPERS (i.e. pool noodles and cloth covering) may extend up to 3½ inches beyond the FRAME PERIMETER.

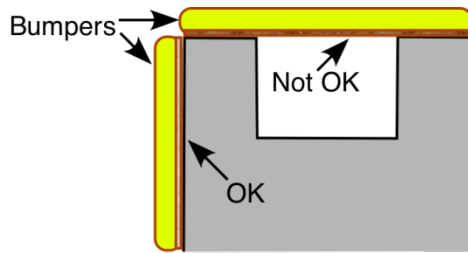


Figure 8 - 3

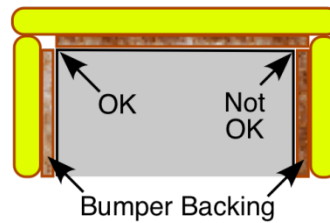


Figure 8 - 4

- O. The BUMPER backing must not extend beyond the “edge” of the ROBOT. The backing of adjacent BUMPER segments must not attach to each other if the attachment would require that the joint extend into the corner (see Figure 8 – 4).

Note: As bumper mounts are being designed, methods for carrying the ROBOT will have to be considered (BUMPERS typically do not make good handles!). Also, note that the use of BUMPERS may preclude the use of other technologies in their out-of-the-box configurations. Teams will need to carefully consider the interactions between BUMPER design options and other

<R72> In addition to the items included in the KOP, pneumatic system items specifically permitted on 2010 FRC ROBOTS include the following items. All included items must be “off the shelf” pneumatic devices rated by their manufacturers for pressure of at least 125psi, and used in their original, unaltered condition (except as required for assembly with other components).

- A. One or two additional Clippard air storage tanks (Clippard Part Number AVT-32-16), equivalent to those provided in the kit. This means that up to four, and no more, Clippard air storage tanks can be used on the ROBOT.
- B. Pneumatic pressure vent plug valves functionally equivalent to those provided in the KOP (Parker Part Number PV609-2).
- C. Solenoid valves. All such valves must have a maximum 1/8” NPT port diameter, and a maximum Cv of 0.32 (if non-KOP valves are used, the team will be required to provide part documentation validating that the valves meet these constraints).
- D. In addition to the pneumatic cylinders provided in the KOP and the “free” pneumatic cylinders available for order through the Free Pneumatic Components Order Form, additional air cylinders or rotary actuators may be used. Cylinders may be of any configuration, and may be of any size up to a maximum of 24-inch stroke and 2-inch diameter.
- E. Additional 0.160” inch inside diameter pneumatic tubing functionally equivalent to that provided in the KOP, with the pressure rating clearly factory-printed on the exterior of the tubing (note: alternate tubing colors are acceptable).
- F. Pressure transducers, pressure gauges, and connecting fittings.
- G. Pressure regulators with a maximum bypass pressure of no more than 60psi.
- H. For the purposes of the *FIRST* competition, a device that creates a vacuum is not considered to be a pneumatic device and are not subject to the pneumatic rules (although they must still satisfy all other appropriate rules). These include, but are not limited to, venturi-type vacuum generators and off-the-shelf vacuum devices (as long as they are powered by provided or permitted motors).

- I. For the purposes of the *FIRST* competition, closed-loop pneumatic (gas) shocks are not considered pneumatic devices, and are not subject to the pneumatic rules (although they must still satisfy all other appropriate rules).
- J. For the purposes of the *FIRST* competition, air-filled (pneumatic) wheels are not considered pneumatic devices, and are not subject to the pneumatic rules (although they must still satisfy all other appropriate rules).

Section 9 – The Tournament

No changes.

Section 10 – The Kit of Parts

No changes.