January 18, 2010

TEAM UPDATE #3

GENERAL NOTICES

Servo usage/inspection clarification:

If teams wish to use servos on their ROBOT, per Rule **<R45-B>**, the burden of proof is on the team to show the inspector that the servo has a maximum power rating of 4W. Teams should use the most conservative specifications provided when using inputs to the power equation.

While the Maximum Power for DC motors is calculated as:

$$Max\ Power = \left(\frac{1}{2} \times Stall\ Torque\right) \times \left(\frac{1}{2} \times No\ Load\ Speed\right)$$

the servo industry rates servos using:

$$Servo\ Max\ Power\ Rating = (Stall\ Torque) \times (No\ Load\ Speed)$$

This "Servo Max Power Rating" formula should be used to evaluate servos.

As an example, the Hitec HS-322 servo has the following relevant specifications:

Speed (4.8V/6.0V):	0.19 / 0.15 sec @ 60 deg.
Torque oz./in. (4.8V/6.0V):	42 / 51
Torque kg./cm. (4.8V/6.0V):	3.0 / 3.7

The Servo Max Power Rating calculation is:

$$Servo\ Max\ Power\ Rating = Torque\ x\ Speed\ x\ unit\ conversion\ factor$$

$$Torque = 3.7\ \frac{kg}{cm} = 0.36\ Nm$$

$$RPM = 0.15s\ @\ 60° = 66.7RPM$$

$$0.36Nm\ x\ 66.7RPM\ x\ 0.1047 = 2.5W$$

This calculation, plus documentation from the manufacturer that details this servo is rated for 2.5W, indicate that the Hitec HS-322 is a permitted servo.

Section 1 – Introduction

Section 1 – Introduction, Rev B was updated to include the following edit:

DEPLOYMENT – the act of positioning a MINIBOT on a TOWER. DEPLOYMENT starts when the MINIBOT breaks the vertical projection of the TOWER BASE circumference ~~during the END GAME~~. DEPLOYMENT ends when the HOSTBOT is no longer in contact with the MINIBOT. (Related form, DEPLOY, verb)

KIT OF PARTS (KOP) – the collection of items listed in the ***2011 Kit of Parts Checklist*** provided on the *FIRST* website at http://www.usfirst.org/frc/competitionmanual and the items listed on the ***FIRST Choice list*** (http://www.usfirst.org/uploadedFiles/Robotics_Programs/FRC/Game_and_Season__Info/Email_

Archive/2011/2011FirstChoiceList.pdf).

Section 2 – The Arena

Section 2 – The Arena, Rev A was updated to include the following edits:

2.2.2. FIELD Markings

The FIELD is divided into several regions by 3-inch wide colored gaffers tape attached to the carpet. The regions are known as "ZONES" and "LANES." The color of the ZONES and LANES are indicated by the color of the gaffers tape used to mark them on the carpet (Pro Gaff Tape, "red", and "electric blue")…

There is one ZONE for each ALLIANCE, located immediately in front of the ALLIANCE WALL for that ALLIANCE. The ZONE is approximately 18 feet wide and 7 feet deep. There is a 2-inch wide yellow CAUTION LINE located 4 feet in front of the ZONE (Pro Gaff Tape, "yellow")…

TRACKING LINES are marked on the carpet with 2-inch wide grey gaffers tape (Pro Gaff Tape, "grey")…

2.2.5 The TOWERS

The BASE rests on a 48-inch by 76-inch floor protector made of 3/16-inch HDPE. The floor protector is velcroed to the FIELD surface, and covered with a piece of similar carpet. The edges of the floor protector cover are taped to the FIELD carpet (Pro Gaff Tape, "black", 2-inch)…

2.2.6 The ALLIANCE STATIONS

The ALLIANCE STATION extends back eight feet from the ALLIANCE WALL, and across the 18-foot wide center section of the wall. The ALLIANCE STATION includes the three identical PLAYER STATIONS. The STARTING LINE is marked on the floor four feet back from the ALLIANCE WALL, and extends across the width of the ALLIANCE STATION. The ALLIANCE STATION includes the area behind the STARTING LINE. All boundaries for the ALLIANCE STATIONS are marked on the carpet with white tape (Pro Gaff Tape, "white", 2-inch)…

The POST is constructed from a piece of 1.5" Steel Electrical Metal Tubing (EMT) with a nominal outer diameter of 1.74".~~1.75-inch diameter (O.D.) steel pipe.~~

Section 3 – The Game

Section 3 – The Game, Rev C was updated to include the following edit:

<G07> Items other than the ROBOTS and the GAME PIECES ~~UBERTUBES~~ shall not be placed on the FIELD prior to or during the MATCH.
Violation: PENALTY and YELLOW CARD

Section 4 – The Robot

Section 4 – The Robot, Rev C was updated to include the following edit:

<R20> The following items are *excluded* from the total cost calculation:

A. all items provided in the 2011 KOP,

B. the cost of any non-functional decorations,

C. the cost of individual fasteners, adhesives, or lubricants, unless any one component exceeds $1.00,

D. the costs of SPARE PARTS. A SPARE PART used as a direct replacement for a failed or defective ROBOT part (either KOP item or non-KOP item) that has already been included in the cost accounting is covered by the accounting for the original part, and

E. all costs for the construction of the OPERATOR CONSOLE.

F. all costs for the MINIBOT.

<R40> All active PD Board branch circuits shall be wired with appropriately sized wire:

Application	Minimum wire size
40A circuit	12 AWG (2.052mm)
30A circuit	14 AWG (1.628mm)
20A circuit	18 AWG (1.024mm)
between the PD Board and the Analog and/or Solenoid Breakouts if a common power feed is used	18 AWG (1.024mm)
between the PD Board and the Analog and/or Solenoid Breakouts if individual power feeds are used	20 AWG (0.8128mm)
between the PD Board and the cRIO-FRC	20 AWG (0.8128mm)
between the PD Board and the radio	20 AWG (0.8128mm)
pneumatic valves	24 AWG (0.5106mm)

The branch circuit may include intermediate elements such as COTS connectors, splices, COTS flexible/rolling/sliding contacts, and COTS slips rings, as long as the entire electrical pathway is via appropriately gauged conductors.

<R92> The following items are the only permitted materials for use on the MINIBOTS:

A. TETRIX components that are not in violation of any other rules,

B. no more than two motors (PN W739083/W739023) and an unlimited number of Tetrix servos,

C. ~~exactly~~ no more than one 12V rechargeable NiMH battery pack identical to those supplied in the FTC kit of parts (PN W739057)

D. No more than one HiTechnic DC motor controllers,

E. No more than one NXT controller with the Bluetooth functionality disabled,

F. Polycarbonate,

G. Polycarbonate glue,

H. Aluminum sheet, 90° angle, u-channel, tube, bar,

I. rivets,

J. non-metallic rope or cord,

K. wire nuts,

L. cable ties,

M. limit switches,

N. no more than two common household light switches,

O. electrical hookup wire,

P. non-slip pad,

Q. PVC or CPVC pipe,

R. PVC cement or cleaner,

S. Mechanical ~~hardware~~ fasteners (~~i.e.~~ e.g. screws, bolts~~, etc~~),

T. Loctite or similar thread-locking product,

U. Rubber bands,

V. Surgical tubing,

W. Electrical tape and shrink tubing,

X. PWM extension cables,

Y. Universal security clips to hold the PWM connectors together,

Z. Hook and loop fastener (may not be used as tape),

AA. Magnets, and

BB. NXT compatible sensors and related connectors/cables.

Tetrix components are defined by those that are included in this catalog: http://www.tetrixrobotics.com/Building_System/Downloads/default.aspx?moid=533. To get information about how/where to purchase components, please refer to the ***Where to get more*** document posted at www.usfirst.org/frc/kitofparts.

Please note that the Rule <R92> only allows Tetrix components. While Tetrix components are a subset of FTC components, it is essential to realize that not all FTC parts are Tetrix parts. As such, not all FTC parts are permitted on the MINIBOT. Please be sure to vet your components against the above list before constructing your MINIBOT.

The use of glues/cements may not be allowed in the pits at tournaments based on site-specific rules.

Please note that the FTC Samantha module is not considered a TETRIX component and is not permitted on the MINIBOT.

Section 5 – The Tournament

No change.

Kit of Parts

No change.