TEAM UPDATE #3

GENERAL NOTICES

Modifications to rules are highlighted in <mark>yellow</mark>.

Note to FRC Teams: RoboCoaching and Use of the Signaling Device

There have been a number of questions about different implementation methods and options for the RoboCoach, and how the Signaling Devices may be used. We would like to expand a little on the information that has been provided, and see if we can clarify the intent behind the relevant rules. Note that this discussion is intended to provide some insight into the rules, what the members of the GDC were thinking when they were written, and how they will be interpreted. This discussion is NOT intended to replace or negate any of the existing rules.

For the sake of discussion, and since most questions are about this arrangement, we will assume that the desired Signaling Device is a standard off-the-shelf infrared television remote control, paired with one of the *FIRST*-provided IR receiver boards on the Robot.

The RoboCoach may use up to four different buttons on the TV remote to transmit up to four different messages to the Robot. To transmit "message #1" she would press Button #1, to transmit "message #2" she would press Button #2, etc. Only four buttons are available for use in this manner. All other buttons or combination of buttons should be ignored by the Robot. Pressing multiple buttons simultaneously, or in a sequence, also should not result in a valid message recognized by the Robot.

Note that only four messages can be sent by the RoboCoach, and only four actions can be initiated by the Robot in response to those messages. Each individual message can be sent to the Robot more than once (e.g. the RoboCoach can send the "turn left and drive forward" command many times) but the total number of available messages to send is limited to four.

The actions that the Robot takes in response to the messages received should be repeatable and predictable. In practical terms, this means that when the RoboCoach presses Button #3, Action #3 always occurs. Robot responses that are time-dependent or message sequence dependent are not allowed. For example, programming the Robot so that it initiates Action "A" if Button #3 is pushed during the first five seconds of the Hybrid Period, and it initiates Action "B" if button #3 is pushed during the second five seconds of the Hybrid Period, etc. would not be allowed. This time-dependent context for the message interpretation is equivalent

to the ability to send more than four single, unique messages, and is contrary to the intended RoboCoaching concept.

Similarly, if the Robot is programmed such that it initiates Action "C" when "Message #4" is sent and the previous message was "Message #2," but executes Action "D" when "Message #4" is sent and the previous message was "Message #3," then this forms sequence-dependent message interpretation. This is a form of sequence-based encoding of more than four single, unique messages, and would not be permitted. The same would also be true if pressing Button #6 and then Button #7 initiated one action, but pressing Button #6 and then Button #8 initiated a different action. This would be a form of high-level encoding, and is contrary to the intended use of the Signaling Device.

The litmus test would be "does sending the same message from the Signaling Device result in the same action on the Robot every time the message is sent?" If the answer is "no" then it is probably not allowed.

What can be contained in the message(s) sent to the Robot? The message should contain a single command that directs the Robot to do something, or provides a single "snapshot" of information about the state or condition of the field that the Robot can use to determine what action to take.

Examples of single commands might be "turn left," "turn right," "stop," etc. The Robot can then immediately execute these commands. The commands can also initiate the execution of more complex routines, as long as the routines rely only upon input from sensors and systems on-board the robot (i.e. not using information from the RoboCoach and/or Signaling Device other than "start routine xx"). Sending "Message #1" that equates to "start subroutine E" would be perfectly acceptable, presuming "subroutine E" executes every time "Message #1" is received. There is no limit to the complexity of "subroutine E." It may be as simple as "stop right now and wait," or as complex as "turn left, drive forward, raise the arm, grab the Trackball, lower the arm, race across the Finish Line, feed the hamster, complete my calculus homework, then stop."

Note that executing a routine that waits for input from the RoboCoach to step through a sequence of more than four actions would not be allowed. For example, consider a programmed sequence of actions such as "start driving forward," "stop in place," "turn left," "raise arm," "open gripper," "close gripper," etc. Each time Button #8 is pressed, the Robot advances one step through the sequence of actions. This would not be allowed. Even though the message sent by the RoboCoach might be "step to the next command in the routine" it is functionally equivalent to a much larger set of sequence-based commands.

Examples of field states sent by the Signaling Device might include messages that mean "Red trackball in location 1," "obstacle one robot length ahead," "Home Stretch currently unoccupied," etc. The Robot can be programmed to use this information to determine what it should do next (go to the Trackball location, maneuver around the obstacle, head for the Home Stretch, etc.).

Finally, we would like to address the issue of "sharing" the command opportunities between RoboCoaches. Each team has one RoboCoach. With three teams on an Alliance, that means three RoboCoaches per Alliance. It is permissible, presuming that all the teams on the Alliance agree, that a RoboCoach could send messages to more than one Robot in the Alliance. Likewise, a Robot could receive messages from more than one RoboCoach. The requirements that each RoboCoach send no more than four types of messages, and that each Robot respond to no more than four types of messages, all would remain in effect. But the four messages sent by the RoboCoach could be sent to multiple Robots. Each Robot can only respond to four unique message types. But those messages can source from multiple RoboCoaches.

For example, consider the case where two RoboCoaches on the Red Alliance were both using the same type of Signaling Device, and two Robots on the Red Alliance were both programmed to respond in the same way to the same four received messages. In this situation, the two RoboCoaches could send "Message #2" to a Robot and provide information that would help the Robot make its way around the Track. This would be permitted, and might be an excellent partnership opportunity for the teams within the Alliance.

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

No changes.

Section 7 – The Game

Trackballs

If a Trackball becomes damaged or completely deflated, it will be replaced by a new one at the next safe opportunity. Once the new ball enters the field, the damaged ball is invalidated, considered field debris, and is no longer scorable.

Section 7 – The Game, Rev D has been modified to include the following change:

Rule <G20>

After all ROBOTS participating in the MATCH are in their starting positions and TEAM members are standing behind the PLAYERS LINE within their ALLIANCE ZONE and/or ROBOCOACH STATIONS, four TRACKBALLS will be placed on the OVERPASS. On each side of the OVERPASS there are three TARGET LOCATIONS for TRACKBALLS. The field management system will randomly choose an initial starting location for the TRACKBALLS before the start of each MATCH. One red and one blue TRACKBALL will then be positioned in the chosen TARGET LOCATIONS on each side of the OVERPASS. After this point in time no ROBOT may be moved or repositioned until the MATCH starts.

Section 8 – The Robot

Section 8 – The Robot, Rev C has been modified to include the following change:

Rule <R87>

In addition to the items included in the Kit Of Parts, pneumatic system items specifically permitted on 2008 FRC ROBOTS include:

- 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.
- Pneumatic pressure relief valves identical to those provided in the Kit Of Parts (Parker Part Number PV609-2).
- Prior year *FIRST* Kit Of Parts solenoid valves, and pneumatic tubing may be used in addition to those provided in the 2008 Kit Of Parts. Their costs must be accounted for as explained in ***Section 8.3.3 Budget Constraints.***
- Additional 0.160" inch inside diameter pneumatic tubing functionally equivalent to that provided in the Kit Of Parts, with the pressure rating clearly factory-printed on the exterior of the tubing (note: alternate tubing colors are acceptable).
- Pressure transducers may be used as long as they are rated to at least 125psi.
- For the purposes of the *FIRST* competition, a device that creates a vacuum is not considered to be a pneumatic device and is allowed. This includes, but is not limited to, venturi-type vacuum generators and off-the-shelf vacuum devices (as long as they are powered by provided or permitted motors).
- For the purposes of the *FIRST* competition, closed-loop pneumatic (gas) shocks are not considered pneumatic devices, and are permitted additions to the ROBOT.

Section 9 – The Tournament

Section 9 – The Tournament, Rev C has been modified to include the following change:

Section 9.3.2

All teams will play the same number of qualifying matches except if the number of team appearances (number of teams multiplied by number of rounds) is not divisible by six; in that case the scoring system will randomly select some teams to play an extra match.

Example: 32 teams playing 8 rounds requires 4 surrogates, but 32 teams playing 9 rounds does not require any surrogates.

Section 10 – The Kit of Parts

FIRST IR Board

Schematics for the *FIRST* IR can be found on
http://www.usfirst.org/community/frc/content.aspx?id=482

FIRST Guidelines, Tips and Good Practices