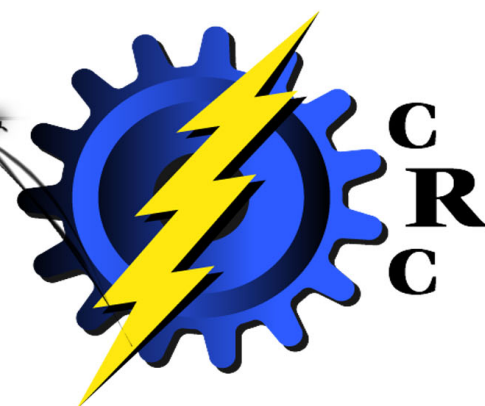




VELISTIC
2013



12th Annual CRC Robotics Competition

Full Rulebook



Welcome to the CRC Robotics Competition

On behalf of the Educational Alliance for Science and Technology and the CRC Robotics Organizing Committee, welcome and congratulations to all the participants on joining your school robotics team and embarking on the CRC Robotics journey!

Take it from some of the current leaders of the CRC Robotics Organizing Committee who were former student participants in the CRC: you will remember this unparalleled experience for many years. In fact, many of the over five-thousand CRC Robotics Competition alumni will tell you that participating in the CRC was the most memorable, useful, important and fun part of their high school and Cégep lives.

This is now our 12th competition and we are very excited about the game this year. We are also very excited to announce that we have an amazing new group of volunteers this year. They have already been active in helping us out to create this rulebook, the playing field, and graphic design and you will certainly get to know them over the course of this next year.

We announce with regret that Bjorn Dawson has stepped down from the CRC, though he remains a part of the CRC family. We would like to thank Bjorn for his immense contribution to the CRC as one of the four main CRC coordinators over the past two years, and wish him the best as he continues to pursue his studies. We are very happy to welcome Michael Sanford, who has been our website and social media guru for the past year and a half, as our new Coordinator of Communications and Judging.

We wish to welcome and thank the many teachers, parents, mentors and volunteers for embarking on this journey, and for all the hard work you will put into enriching your students' lives with this activity.

We also wish to thank Ms. Josée Côtée and Mr. Richard Mason, principals of Laval Liberty and Laval Junior High School respectively, and their teams, as well as the Sir Wilfrid Laurier School Board for hosting the 12th Annual CRC Robotics Competition.

We also wish to acknowledge all of our partners without whom the CRC could not exist.

Good luck to all, and see you at Velistic 2013 from February 21st to 23rd 2013 at Laval Liberty and Laval Junior High School!



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Goals, Objectives and Roles within the CRC and EAST Organization

Our non-profit organization has set up this competition with the following goals in mind:

- 1) To set up a student-oriented and student-directed activity.
- 2) To create a project that integrates robotics, science, math, multimedia, language arts, public speaking and computers.
- 3) To develop a hands-on approach to help our students link the classroom to the workplace.
- 4) To help to encourage girls to head into fields in science and technology.
- 5) To put into practice the education reform and its cross curricular competencies.
- 6) To provide a positive and rewarding experience to help reduce the dropout rate among young men.
- 7) To foster and build teamwork and communication skills.
- 8) To promote the idea of working together to accomplish a common goal.
- 9) To instil the concept that achieving team goals is more important than winning.

In this competition there are three different types of people; students, teachers and mentors. We have laid out the following roles for each:

- 1) **Students are to do all of the planning and building.** They should be creating the strategies, designing the critical paths, and controlling all aspects of the team. Any work done on the robot, video, website and kiosk must be done entirely by the students.
- 2) **Teachers are there to provide the support that the students might need.** They should not be directing the students, but instead acting as an advisor. If a student has a question, the teacher may point the student towards the answer, or show the student how to find the answer. If a student is unsure how to accomplish a specific task, the teacher may demonstrate, but any pieces attached to the robot are to be touched only by students. We do realize that there may be times when an educator must step in for academic reasons. We believe that every teacher is a professional that can differentiate between teaching and doing.
- 3) **Mentors are outside professionals who may be consulted. Their job is to help with questions that are on a level that exceeds the students and the teachers' knowledge.** An engineer would have more practical experience. However, the engineer may not direct the students; he/she is acting only as an advisor.

We are very excited about your school's participation in this project, but always remember that it is a project for the students. Give them the opportunity to show you what they can do.

Velistic 2013 Participating Schools

Welcome and good luck to all!

Bialik High School
 Bishop's College School
 Cégep de Lévis-Lauzon
 Cégep Vanier College
 Centennial Academy
 Collège de Bois-de-Boulogne
 Collège Jean-de-Brébeuf
 Collège Laval
 Collège Montmorency
 Collège Sainte-Marcelline
 École secondaire Curé-Antoine-Labelle
 École d'éducation internationale de Laval
 Dawson College
 Lake of Two Mountains High School
 LaurenHill Academy

Laval Liberty High School
 Lester B. Pearson High School
 Lower Canada College
 Macdonald High School
 Marianopolis College
 Riverdale High School
 Pierrefonds Comprehensive High School
 Rosemount Technology Centre
 Royal West Academy
 Selwyn House School
 St. George's School of Montreal
 The Sacred Heart School of Montreal
 The Study
 West Island College

CRC Robotics Partners

The entire CRC Robotics team would like to offer a hearty thank-you to our partners!

CE PROJET A ÉTÉ FINANÇÉ DANS LE CADRE DE L'ENTENTE SPÉCIFIQUE EN MATIÈRE DE CULTURE SCIENTIFIQUE ET TECHNIQUE



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Velistic 2013

Game Rules

Have fun with this, and good luck!

Goal:

1. Robots must obtain balls scattered in their half of the playing field and throw them to hit targets on the other side of the field in order to score points.
2. Special red targets serve as score multipliers.
3. Robots may score extra points, including some individual points, by catching balls thrown by the opposing team.

Teams:

4. Robots are grouped into pairs. Two robots will form the Yellow Team, who will play against the two other robots that form the Blue Team. Each robot will have a different partner from heat to heat. **Each pair of robots will attempt to score as many points for their team as possible.**

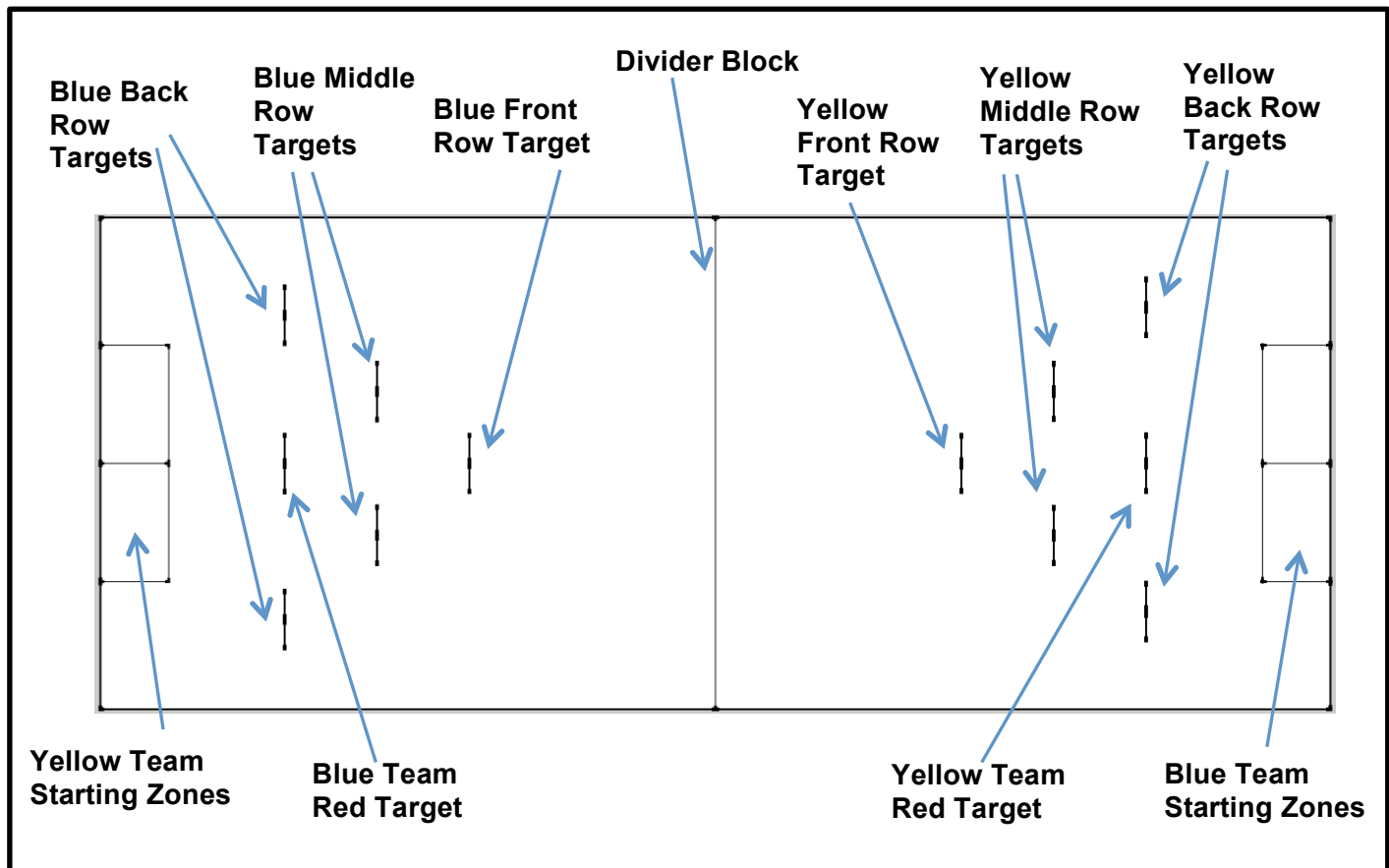
Playing Pieces:

5. Playing pieces are balls. The game will start with an equal number of balls scattered throughout each side of the playing field. Teams will also be allowed to start the game with four balls preloaded in their robots.

Playing Field:

6. The playing field is a large rectangle.
7. The two robots of the Yellow Team must start in the Yellow Team starting area, and the two robots of the Blue Team must start in the Blue Team starting area.
8. There are two defined robot starting bays in each starting area.
9. Robots must stay in their half of the playing field, with two robots on each side of the field.
10. There are six targets located in each half of the playing field.

Diagram of the Playing Field:



PLAN VIEW
 (Diagram not to scale)

Play:

11. On deck:

- 11.1. School spotter, driver and robot must be in the On Deck Circle when the buzzer sounds to end the previous heat. Failure to do so results in a penalty being assessed to the offending school.

If a school's spotter, driver and robot are not ready to start, the heat will begin without that school.

- 11.2. All robots must be labelled with the school name and number, which must be clearly visible to the crowd. Adding your robot's name is optional.

12. Starting Play:

- 12.1. The drivers and spotters must remain seated in the designated areas on each side of the field. They may not interfere in any way with any items on the field. This includes having any contact with the robots or any of the playing pieces once the heat has started. They must take all necessary safety precautions.
- 12.2. Robots are brought to their designated starting bay. If robots arrive after a heat begins, they will not be permitted to play.
- 12.3. Robots must start within their designated starting area. All components of the robot must be within the airspace of the outside edge of the paint outlining the starting area.
- 12.4. Each robot may preload four balls once they get onto the playing field.

13. In Play:

- 13.1. Time is called by the head referee.
- 13.2. If a robot leaves the playing field for any reason it will be replaced by the referees at the point nearest to where it left the field.
- 13.3. Robots may pick up and use any of the balls on their end of the playing field that are in play.
- 13.4. If a ball leaves the field, it is considered to be out of play.
- 13.5. Once a ball falls into the ball-collecting nets under the red targets that ball is considered to be out of play. Robots may not touch the ball-collecting nets under the red targets or tamper with them in any way. If a ball hits the red target but falls back onto the playing field rather than in the net, the ball is still in play.
- 13.6. When a target is successfully hit, it will trigger a visual cue to indicate that the target has registered the hit. Only those points that have been registered by the target will

count.

The target has an approximate downtime of 1 second after a hit to reset before it can register the next hit. The visual cue will turn off when the target is ready to register the next hit. Any balls that hit the target while it is resetting cannot be registered.

- 13.7. The target mechanism requires a certain minimum force in order to register a hit. Ensure that the thrown ball hits the target with enough force to register the hit.
- 13.8. Robots may not damage the playing field, targets, balls or other robots in any way.
- 13.9. Robots may not enter or violate the airspace of the opposing team's side of the floor.

A robot is considered to be in violation of this rule at the moment when a robot encroaches the airspace of the opposing team's side of the floor, described by the outside edge of the divider block at the center of the playing field. A robot that violates this rule may be given an unsportsmanlike conduct penalty at the discretion of the referee (see rule 22).

- 13.10. Robots may only launch balls towards the targets. They may not deliberately launch a ball at another robot. This may be considered unsportsmanlike conduct and penalties may apply (see rules on unsportsmanlike penalties).

However, if a robot is between a robot and the targets, it may inadvertently be hit by a ball. Ensure that your robot can withstand being hit inadvertently by a ball. The referees will rule whether a ball was launched deliberately at another robot, or whether a robot was hit inadvertently.

14. End of Play:

- 14.1. The heat will be 5 minutes long. When the heat ends, a buzzer will sound and all robots must stop moving. Any playing piece that has already left a robot at the moment when the buzzer sounds will remain in play until the piece stops moving.
- 14.2. Following the buzzer signalling the end of play, nobody may enter the playing field until the head referee indicates that they may.

15. Scoring:

- 15.1. In order to share points with their paired robot for that heat, a robot must throw a ball across center field towards a target. This means that a robot will not be allowed to share points if all that the robot does is drop a ball.
- 15.2. Teams will score points based on how many times their designated targets register a hit.
- 15.3. A team will receive points if they hit a target of their colour. If a team hits a target of the opposing team's colour, then the opposing team will receive the point.
- 15.4. The number of points scored when a target registers a hit will depend on which target was hit, according to the following point scheme:

- 15.5. A team will receive **10 points** each time a target in the **front row (closest to the dividing barrier in the center of the playing field)** registers a hit.
- 15.6. A team will receive **20 points** each time a target in the **middle row** registers a hit.
- 15.7. A team will receive **40 points** each time a target in the **back row (furthest from the dividing barrier in the center of the playing field)** registers a hit.
- 15.8. There is also a special red target in the back row of targets. The team that hits their red target the most will **double their points**. In order to obtain the multiplier, a team must be the first to hit the red target, or they must surpass the opposing team's red target hit count (as long as the count is not zero). For example: The red target for Team A registers a single hit, so Team A's red target counter will be 1. The red target for Team B registers a hit, so team B's red target counter will be 1. If this is the count for each of the red targets at the end of the heat, then Team A will receive the score multiplier because Team A hit the red target first and Team B's red target count did not exceed Team A's red target count. If Team A takes possession of the multiplier by registering 3 hits on the red target, Team B will need to register 4 hits on their red target to take possession of the multiplier.
- 15.9. A team will receive **10 points** for each ball that the robots on that team catches. An individual robot will receive an **additional 10 points** for each ball that the individual robot catches.
- 15.10. A ball is deemed to be "caught" at the moment when a robot gains control of a ball that was thrown directly by a robot on the opposing team. This means that in order for the catch to count, the ball in question **must be in contact with the robot that "caught" the ball**, and the ball may **not** be in contact with anything other than the robot that "caught" the ball.
- Furthermore, only those balls that are caught directly from the opposing team will count, meaning that the ball will **not** count as a catch if it has come into contact with any other robot or any part of the playing field since it left the opposing team's robot.
- 15.11. A robot that has caught a ball may choose to throw that ball back into play, once they are certain that the catch has been counted.
- 15.12. Robots can catch as many balls as they want.
- 15.13. If a robot throws a ball and it is caught by another robot on the same team, the ball will **not** be counted as having been caught. Only balls that have been launched by the opposing team will count.
- 15.14. A robot may only play defensively and block a target once it has met the criteria to share points

16. Scoring Example:

Robots A and B form the Yellow Team.

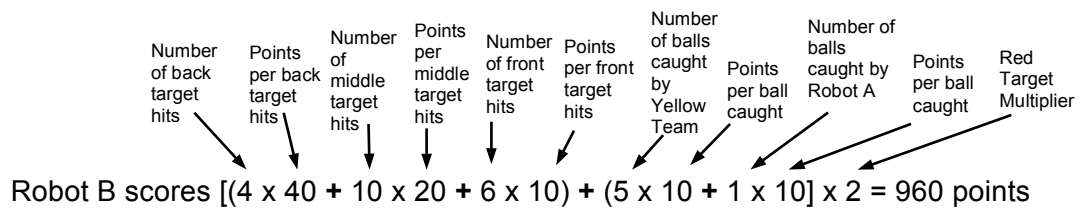
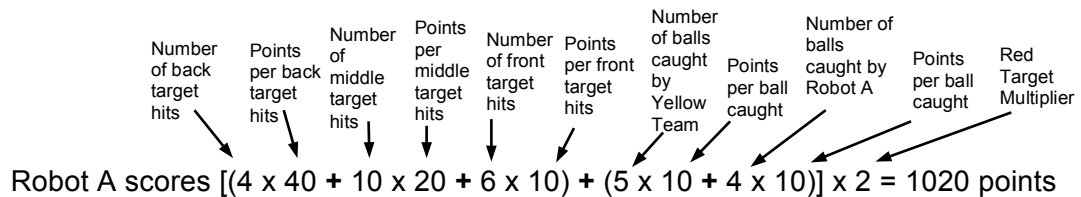
The Yellow Team’s targets have registered a total of 20 hits, as follows:

- Back row: Four yellow target hits (4 x 40 = 160 points)
- Middle row: Ten yellow target hits (10 x 20 = 200 points)
- Front row: Six yellow target hits (6 x 10 = 60 points)

The Yellow Team has also caught a combined five balls, as follows:

- Robot A has caught four balls.
- Robot B has caught one ball.

At the end of the heat, the Yellow Team’s red target has registered 3 hits.
 The Blue Team’s red target has registered 2 hits.
 Therefore, the Yellow Team has obtained the multiplier.



17. Preliminary Round Final score:

- 17.1. After all the preliminary heats are done, individual robots will cast out their two lowest scoring heats. The total of all other heats will be added to determine their final score for the preliminary rounds.

18. The schedule of playoff and Repechage Rounds will be published at a later date.

19. Contact:

- 19.1. Bumping and blocking may occur as robots attempt to acquire, transport and shoot their balls. However, you are not allowed to intentionally hit other robots. Should the referee decide you have intentionally hit another robot, you will receive a penalty.

- 19.2. Our referees are experts in calling and assessing penalties and have **the final word** at all times on the playing field.
- 19.3. Build your robot to withstand being hit by balls. Our referees will penalize teams for intentional hits. Throwing and catching balls is part of the game, so expect that your robot will be hit.

Penalties:

20. Good penalties vs. bad penalties

- 20.1. Sometimes it may be advantageous to take a penalty to improve your score. This strategy is acceptable as long as the penalty isn't taken at the expense of others. See unsportsmanlike conduct penalty.

21. Junk penalty:

- 21.1. Various devices may be placed about the playing field by any robot only if they are removed from the playing field by the robot before the heat ends. If devices are left anywhere that are no longer in contact with the robot at the end of the heat, the robot that dispensed them will be liable to receive a 10 point individual penalty for each item left. The item(s) must be lifted and held entirely off the floor by a robot in order to avoid this penalty. (If you can't clean them up, don't use them. Don't drop nuts, bolts, wheels or tie raps by accident. Liquids count as many items of junk-- don't leak!)

22. Unsportsmanlike conduct penalties:

- 22.1. While we trust that all participants will have the best of intentions, it may happen that, in the heat of battle, certain conduct may occur that requires sanctions. (To avoid such penalties, remain courteous.)
- 22.2. These penalties have a series of escalating consequences depending on the seriousness of the penalty. Some examples of the types of behaviour that signal a lapse of sportsmanship are:
 - 22.2.1. A deliberate attempt to disable another robot.
 - 22.2.2. A deliberate attempt to ram another robot.
 - 22.2.3. Inappropriate behaviour directed at either an official, another competitor or a spectator.
- 22.3. An unsportsmanlike conduct penalty is taken from the individual school's final total and cannot be 'tossed out' with 2 lowest heat scores.
- 22.4. If a referee deems a team to be engaging in unsportsmanlike behaviour, they will first warn the offending school with a yellow card. Should the team continue to engage in unsportsmanlike behaviour, they will be shown a red card and the referee will either deactivate their robot. This robot will receive a 0 score for that heat.

Robot Safety, Power, Motors and Control Rules

23. Size:

- 23.1. **Robots are limited to a 75cm x 75cm x 65cm footprint (Length x Width x Height) at the beginning of each heat. Robots' dimensions will be verified upon certification.**
- 23.2. **Once the heat has begun, robots may extend to a 1.2m x 1.2m x 1.2m maximum footprint. Robots will be asked to extend all components to their maximum extents upon certification.**
- 23.3. **Robots that do not comply with the rules on dimensions will not be allowed to compete.**

24. Certification:

- 24.1. All robots must be certified before the first heat to ensure that the motor, control, power and safety rules have been respected.
- 24.2. Schools may make as many modifications as they would like between heats, but each modification requires that the robot be re-certified. Any robot that has not been re-certified after a modification will have all of its heats since the last certification annulled.
- 24.3. Any robot that is deemed dangerous runs the risk of being disqualified.

25. Safety:

- 25.1. Your robot must have an easily identifiable and easily visible ON/OFF kill switch, **clearly showing the OFF position.**
- 25.2. Your robot must have a fuse between the Makita batteries and the robot.
- 25.3. **Your robot must have a fuse to limit the total output of all batteries to 30 A.**
- 25.4. **If your robot uses any pneumatics, your robot must also have an easily identifiable and easily visible ON/OFF pneumatic kill switch.**

26. Power:

- 26.1. All energy used by the robots must come from the exact same model of batteries provided in your kit or from gravity. There is no restriction with regards to gravity. Any battery may be used to power the transmitter.

- 26.2. This means that if spring systems are used, they must begin the heats in relaxed states, or they must be compressed or stretched somehow by the batteries and motors used in the heat before the heat begins.
- 26.3. This implies that if springs are used as a way to store energy and then release energy, and then store energy again and release energy again in an oscillating manner, this is permitted. The only time that springs are not allowed is when the heat begins with them in a non-relaxed state and which are then released during the heat with the robot unable to recoil them.
- 26.3.1. A legal example: your motor is unable to lift an arm by itself. Schools may add a pre-stretched spring to help it. When the motor moves it adds energy to the spring system and then releases it. This is permitted; it's like using a counter-weight.
- 26.3.2. An illegal example: A loaded spring system is used to shoot an arm out at the beginning of the heat but is unable to draw it back in. This is not permitted.
- 26.3.3. Spring suspension systems and springs that are built into switches and relays are permitted.

Note: 26.1, 26.2 and 26.3 do not apply to the pneumatics.

- 26.4. If other systems are to be powered, like flashlights, they must be modified to draw their energy from the batteries provided as well. **LASERS are not permitted.**
- 26.5. Teams should be aware that great energy drains from the batteries of your robot system might leave you powerless. Learn how to handle your batteries properly. You may have to play several heats in each round.
- 26.6. Teams may purchase more batteries, as long as they are identical models to the ones in the kit provided. It is important to note that the robot may not be touched or modified in any way during a heat. Teams may not change batteries during the heat.

27. Motors:

- 27.1. Drive motors and auxiliary motors must be chosen from the motors supplied in your kit. You may purchase a new motor if something goes wrong with the ones you have, but you may never use more than the number of each supplied in your kit. (e.g. You may only use 2 drill motors on your robot.)
- 27.2. There is no limit to the number of servo motors that you may use. Caution: There is a limit to how much current the VEX CPU can handle safely. You do not have to use all of the motors in the kit.
- 27.3. No major modifications may be made to the motors.
- 27.4. The two Banebots motors provided in your kit have planetary gearboxes installed on them. However, you are permitted to use **any** gearbox you choose for the Banebots motors.

- 27.5. Solenoids and muscle wires are not permitted as they are considered linear motors unless they are not used for propulsion, such as to activate a switch, then they are permitted.
- 27.6. The pneumatics kit may be used as long as all safety requirements are met. For example, your robot must have an ON/OFF kill switch between the reservoirs and the rest of the system.

28. Control:

- 28.1. You will be receiving a RC unit in your kit. This frequency is allowed for practicing and working on your robot.

You may **not** use this frequency at the competition. You must use the tether option to practice at the competition.

In order to use the tether feature, you will need to purchase a cable. Any telephone handset extension cable will work (the coiled cable that goes from the handset to the base of a corded phone, not the cable that goes from the phone to the wall).

- 28.2. Only RF transmissions from the VEX transmitter are allowed to control the robot. The VEX CPU must mediate all control signals and is limited to the 6 channels of the VEX transmitter.**
- 28.3. You are allowed to use the VEX CPU to then control any other controller board or relay switches to turn motors on and off, or use proportional control systems, such as the Sabertooth provided in your kit. You may use any sensors and/or microprocessors to help with this control. We encourage you to take advantage of the programming capabilities already available in the VEX CPU.**
- 28.4. You may not use any other RF transmitters that will allow the use of more channels or block other robots from using theirs.**
- 28.5. Cameras may be used on your robot, but may not transmit any live data.**

For more info:

<http://www.vexrobotics.com/docs/inventors-guide/main-2008/06-control-06272008.pdf>

and

<http://www.vexrobotics.com/docs/inventors-guide/main-2008/13-e-transmitter-menus-06272008.pdf>

Programming Competition

With the goal of encouraging competitors to program their robots, there will be a programming competition again this year which will be **independent of the main game**. However, robots that participate in the Programming Competition **can gain bonus points towards the CRC Overall Trophy**.

Here are the rules for the Programming Competition:

- P-1. Participation in the Programming Competition is optional
- P-2. In order to participate in the Programming Competition, you must indicate that your robot will be participating by submitting the online submission form by **Wednesday, February 13th, 2013** here: <http://robo-crc.ca/submit>
- P-3. * **Rules 1 to 28 from the Game Rules and Robot Safety, Power, Motors and Control Rules set-forth in this rulebook that are not specifically addressed in this section (Programming Competition Rules) will also apply in the Programming Competition.**
- P-4. The Programming Competition Rules override the rules in the other sections of the Rulebook during the Programming Competition in the case of any conflicting rules.
- P-5. This competition will take place between heats during the Main Competition.
- P-6. The robot used in the programming competition must be the same robot as the one used in the main game. However, the programming that is loaded on the robot's VEX microprocessor for the programming competition **may be different** from the programming loaded for the main game.
- P-7. Each robot will play one or two heats, depending on what the schedule permits.

Goal:

- P-8. Robots must autonomously complete as many of the defined tasks as possible within the rules of the programming competition. Human input is only allowed in order to activate the program, and to place the robot on the playing field.

Playing Pieces:

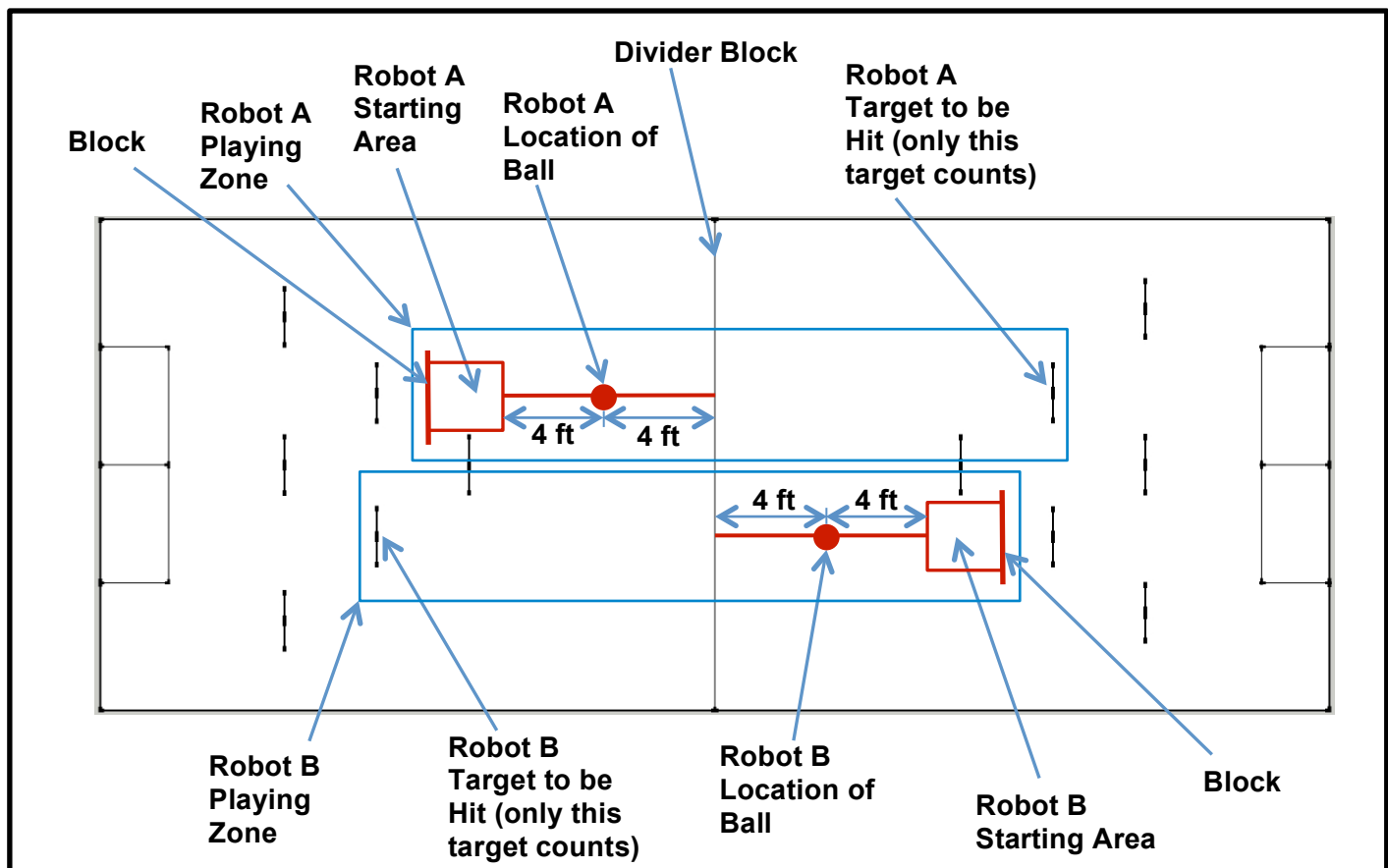
- P-9. Playing pieces are balls. Balls will be placed one at a time at the halfway mark of a straight line between the robot starting area and the divider block at the center of the playing field. Robots will also be allowed to start the heat with one ball preloaded in the robot.

Playing Field:

P-10. The playing field is the same as in the main game with the following differences:

- P-10.1. Robot A must start in the Robot A starting area, and Robot B must start in the Robot B starting Area as shown below, which will be applied for the programming competition only.
- P-10.2. Each robot plays independently of the other. Robots must stay and must shoot within their playing zone only to ensure that they do not interfere with the other robot.
- P-10.3. Each robot only has one target in play in the programming competition (as shown).

Diagram of the Playing Field (for Programming Competition only):



PLAN VIEW
(Diagram not to scale)

Programming Play:

P-11. Starting Play:

- P-11.1. Robots are brought to their designated starting area. If a robot arrives after a heat begins, they will not be permitted to play.
- P-11.2. Robots must start within their designated starting area. All components of the robot must remain within the airspace of the outside edge of the paint outlining the starting area.
- P-11.3. Each robot may preload one ball once on the playing field. This is the only pre-loaded ball for the entire heat, regardless of how many full sets are completed.

P-12. In Play:

- P-12.1. Each robot will receive points for completing any of the following tasks (see scoring section for point breakdown):

- P-12.1.1. Picking up a ball.

- A ball is deemed to be “picked up” at the moment the ball is in contact with the robot, and is not in contact with anything other than the robot. In order to pick up a ball, a robot will need to drive autonomously from the starting zone to the location of the ball.

- P-12.1.2. Shooting at the target.

- In order for a shot to count, the robot must throw a ball across center field towards the target. The shot will not count if all the robot does is drop a ball.

- P-12.1.3. Hitting the target.

- In order for a hit to count, the target must register the hit, just as in the main competition.

- When a robot successfully hits the target it automatically meets the requirements for shooting at the target, and both tasks are considered to be completed.

- P-12.1.4. Returning to the Robot Starting Area.

- This task is completed the moment a robot that has completely left the starting area returns to the starting area, and all components of the robot are within the airspace of the outside edge of the paint outlining the starting area.

- Bonus points will be awarded if any of these tasks are accomplished in series without the aid of additional driver input.
 - The point total will be multiplied by one more than the number of times a robot completes a full set of tasks.
 - Completing a full set: for a full set to be completed a robot must leave its starting area, pick up a ball, hit the target at least once, and return to their starting area, in that order.

- A robot may only begin to attempt the next full set of tasks once they have met the criteria for completing the previous full set of tasks.

P-12.2. A single ball will be placed at the halfway point of the straight line between the robot starting area and the divider block at the center of the playing field, as shown on the diagram of the playing field.

P-12.3. A new ball will be placed at the same point each time a robot completes a full set of tasks.

P-12.4. A robot may only complete the same task once per full set, except shooting and hitting the target which can be done twice per set because the robot may possess up to two balls in one of its sets (one pre-loaded ball and one ball that the robot can pick up).

P-12.5. **You may only press a button on the transmitter a maximum of 3 times in total during the 2-minute heat, no matter how many full sets you complete.**

P-12.6. When the driver activates a program, they must do so by pressing and releasing the part of the remote that activates the program. The driver must release the remote as soon as the program has been activated (at the instant that the robot begins performing an action).

P-12.7. Robots may complete as many full sets as they are able to before the heat ends, respecting the preceding rule.

P-13. End of Play:

P-13.1. Each Programming Competition heat will last 2 minutes.

P-13.2. A buzzer will sound to signal the end of the heat.

P-13.3. Only tasks completed before the buzzer sounds will count towards that robot's final score for the programming competition.

P-14. Scoring:

P-14.1. A robot will receive ten (10) points for each of the tasks completed, listed in P-12.1

P-14.2. A robot will receive twenty (20) bonus points if two (2) actions are completed in series without additional driver input.

P-14.3. A robot will receive thirty (30) bonus points if three (3) actions are completed in series without additional driver input.

P-14.4. A robot will receive forty (40) bonus points if four (4) actions are completed in series without additional driver input.

P-14.5. A robot will receive fifty (50) bonus points if five (5) actions are completed in series without additional driver input.

P-14.6. A robot will receive fifty (50) bonus points if six (6) actions are completed in series without additional driver input.

P-14.7. A robot's point total will be multiplied by one more than the number of times it has completed a full set of tasks listed in P-13.1.

P-15. Each driver's controls will be watched by two judges

P-16. To score points, the drivers must explain to the judges exactly what actions the robot will attempt to perform and how this series of actions will be triggered **before** the driver completes the last input that triggers the robot's actions.

Example 1. Robot A would like to complete the "picking up a ball" task to score points. They tell the judge: "we are about to pick up a ball. By pressing the right joystick to the left, our robot will drive out of the starting area and will scoop a ball into our robot." Robot A can then press the right joystick to the left. If the operation is successfully completed as described and the judges agree that only the right joystick was touched for this series of actions to take place, the robot has completed the task, and will receive ten (10) points for this completed task.

Example 2. Robot A would like to complete a full set consisting of "leaving the starting area, picking up a ball, shooting at the target, hitting the target and returning to the robot starting area". They tell the judge: "we are about to complete a full set, shooting at and hitting the target with both balls". By pressing the right joystick to the right, our robot will complete all 6 tasks in the set." The driver then presses the right joystick to the right. If the operation is successfully completed as described and the judges agree that only the right joystick was touched one time for this entire series of actions that took place, the robot has completed a set. The robot receives 10 points for picking up a ball, 10 points for shooting at the target, 10 points for hitting the target, 10 points for shooting at the target a second time, 10 points for hitting the target a second time, and 10 points for returning to the robot starting area. The robot also gets 60 bonus points for completing 6 tasks in series. At the end of the heat it is determined that one full set was completed, so the point total is multiplied by two.

If Robot A neither completes any other tasks nor completes any sets other than what was described, the Programming Competition Final Score for Robot A is: $[(10 \times 6) + 60] \times (1 + 1) = (60 + 60) \times 2 = 120 \times 2 = 240$ points.

P-17. Robots will be ranked by their final scores and Programming Awards will be given based on these scores.

P-18. The Programming Competition **does not** count towards the points for the main Velistic 2013 Game.

P-19. **Each of the robots that fully leaves the starting zone and successfully completes at least one task in the programming competition will receive bonus points that will be added to that school's other points for the CRC Robotics Competition Overall Trophy.**

P-20. A robot has fully left the starting area at the moment that none of the components of the robot encroach the airspace of the outside edge of the paint outlining the starting area.

P-21. Each robot that is eligible for bonus points will receive an equal amount of points towards the Overall Trophy, regardless of their ranking in the programming competition.

P-22. The programming competition rankings only apply to the awards for this category.

P-23. Programming Software Rules and Resources:

You may use any programming software that works with the VEX microcontroller. You will be provided with easyC and RobotC licences so you can download and use these two programs.

RobotC can be downloaded for free for 30 days here:

<http://www.robotc.net/download/cortex/>

easyC can be downloaded here:

<http://intelitekdownloads.com/easyCV2/>

EasyC is very...wait for it...easy to use.

EasyC uses a graphical programming interface similar to the one included with LEGO Mindstorms.

You can follow the tutorials and examples included with the software.

There are many tutorials online which are easy to follow, such as:

http://www.youtube.com/watch?v=ZC_lzM9frGo

<http://www.youtube.com/watch?v=yg6g7RvIaPM>

http://www.youtube.com/watch?v=1YejKhFV_s8&feature=related

There are even more PDF presentations as to how to use easyC such as:

http://www.engr.sjsu.edu/E10/E10pdf/EasyC_environment.pdf

If you have any experience with any of RobotC, C, C++, C# or Basic, or if you want to learn any of these, you may prefer using RobotC.

Requirements and Judging Criteria for the Video, Web Design, Web Journalism and Kiosk Components of the Competition

In accordance with the CRC's goal to create a project where science, math, multimedia, language, arts and computers are integrated, the robot is only one of the four main components of the competition.

As the world requires people to be more diversified rather than singularly specialized, the CRC wishes to give students with varied interests not only in science an opportunity to develop and discover their skills through the creation of a video, a website and a kiosk.

The following are the rules and requirements as well as the judging criteria for the video, website and kiosk components.

Note: Any components not arriving by the due date will be assessed a late penalty of 20% deducted from the total score of each component received within 24 hours of the deadline for that component. **A component received more than 24 hours after the deadline will not be judged.**

VIDEO Competition Requirements

The purpose of the video component is to give your team a place to showcase their filming and editing skills, as well as their storey telling and acting talents. Specifically, this is the place for you to create a great video that presents your team, your school, your robot, and the steps you took in creating it, problems encountered and solved along the way. Equally importantly, it's a place for you to be creative.

V-1. Required Format:

- V-1.1. Your video must be no less than 4 minutes and no more than 5 minutes. If it does not, your entry cannot place in the top 3.
- V-1.2. Your video must play on YouTube and it is your responsibility to make sure that YouTube does not mute your soundtrack due to copyright infringement of the songs that you use. If it does not, your entry cannot place in the top 3.
- V-1.3. Your video may have a fictional storyline, or be of a journalistic or documentary style. (If a fictional storyline is chosen, make sure to relate the story to the building of the robot, school description *etc...*)

V-2. Required Content:

- V-2.1. An explanation of the game.
- V-2.2. A description of your school including the school location and type of school.
- V-2.3. Explanations of the different steps involved in the building of your robot.
- V-2.4. The video must present both English and French equally through dialog, commentary or subtitles. If it does not, your entry cannot place in the top 3.

V-3. Important Remarks and Suggestions:

- V-3.1. Develop a theme or a storyline that is consistent throughout the entire video.
- V-3.2. Try to make it as entertaining as possible to a general audience not familiar with robotics and the CRC.
- V-3.3. A 5-minute video usually requires lots of raw footage and planning. Start **planning** and **filming now!**
- V-3.4. Work closely with all of the other groups (Robot, Web Design, Web Journalism and Kiosk) since all components are related.
- V-3.5. Do not use profanity, violence or inappropriate material in your videos. Be mindful of sensitive material. If a video is deemed to have inappropriate content it will not be shown at the competition, even if it ranked well otherwise.

V-4. Due Date:

- V-4.1. Your video must be uploaded to YouTube **on or before February 8th, 2013**.
- V-4.2. The URL must be submitted using the following submission form online **before 11:59 p.m. on Friday, February 8th, 2013** <http://robo-crc.ca/submit>
- V-4.3. Please follow all other submission instructions and requirements as described on the submission page above.
- V-4.4. You may select the option on YouTube to make your video private (non-searchable) and submit that private URL in the form at the link above, but your video must be made

public by February 21st, 2013 so that other teams may see your video once the competition has begun.

V-4.5. Please submit your Video Permission Form as soon as possible.

V-4.6. If your school does not allow you to upload your video onto YouTube please notify us as soon as possible.

V-4.7. If you are unable to upload your video onto YouTube you must send an explanation to michael@robo-crc.ca before Friday, February 1st, 2013 at 11:59 p.m., and we will do our best to accommodate your team based on your explanation.

V-4.8. If your video is not uploaded to YouTube before the deadline, and we do not receive an explanation before February 1st, then your video may not be judged.

Video Judging Rubric

Rubric Context:

Given a *familiarity with the rulebook*, and given a band grading schema of the form:

- 1 Unacceptable / Missing
- 2 Below Average
- 3 Average
- 4 Above Average
- 5 Excellent

Video Judging Rubric

1. Does the video follow the minimum requirements: is between 4 and 5 minutes long, has no copyright claims, and is fully bilingual? **[Y/N]**
2. Rate the description of the school and team, the explanation of the game, and the explanation of the steps involved in building the robot. **[1-5]**
3. Rate the quality of the picture, sound, editing, from a technical standpoint. **[1-5]**
4. Rate the quality of the acting and narration. **[1-5]**
5. Rate the video's entertainment value and the integration of entertainment and information in a logical and clear way. **[1-5]**
6. Rate the level of creativity in camera shots and angles, in editing and in choice of music. **[1-5]**
7. Rate the strength, creativity, originality and engagement of a central theme and storyline, and the consistency with which it is maintained throughout the film. **[1-5]**

WEB SITE :

Web Design and Web Journalism Contests

A web site is an essential communication tool in almost all disciplines. The web site component of the competition is an opportunity for your team to design a fully bilingual site showcasing your team and its members, mentors and teachers, your experiences preparing for the competition, your robot, and to explain the game in your own words.

This year, we have decided to split the web site into two components: a web journalism contest, rewarding the language arts, and a web design contest, recognizing technical merit and visual design. Remember that those designing the site will have to work closely with those creating content for the site.

Due Date:

The web site must be submitted **no later than 11:59 pm on Friday, February 8, 2013.**

Be sure to follow the submission instructions here: <http://robo-crc.ca/submit>

Judging will commence immediately after the submission deadline.

Web Journalism Contest Requirements

The purpose of the journalism component is to give your team a place to showcase their written communication talents. Specifically, this is the place for you to document the whole process your team took to arrive at the competition with a working robot, from design to testing to building. Remember, when writing content for your web site, write it for someone who knows nothing at all about the competition or your team, or your process. Explain it all in as much detail as possible, including images, schematics, and whatever else you want to include to inform and engage your audience.

We respect the privacy of students. Students who do not wish to put their name, photograph, or any personal information on their team's web site *may omit it with no penalty*.

Required Content:

- J-1. The web site must be fully bilingual. If it is not, your entry cannot place in the top 3.
- J-2. Each team member's:
 - a. name
 - b. picture
 - c. sub-team(s)
- J-3. Each teacher and mentor's:
 - a. name
 - b. picture,
 - c. area(s) in which they provided help.
- J-4. An explanation of the game in your own words.
- J-5. A description of:
 - a. your school,
 - b. your school's location, and
 - c. your school's type (e.g., high-school, CÉGEP, vocational training institute, etc.).
- J-6. Description of the robot including:
 - a. the steps in the conception and building of the robot,
 - b. the problems that were encountered along the way,
 - c. the solutions to those problems.
 - d. conception and prototype plans/drawings,
 - e. final design plans/drawings, and
 - f. photos of your robot.
- J-7. Student experiences, especially:
 - a. what your team learned,
 - b. what they enjoyed,
 - c. what they struggled with,
 - d. sacrifices made for the team, etc.
- J-8. Your web site must not use copyrighted material which you do not have permission to use.

Web Journalism Judging Rubric

Rubric Context:

Given a *familiarity with the rulebook*, and given a band grading schema of the form:

- 1 Unacceptable / Missing
- 2 Below Average
- 3 Average
- 4 Above Average
- 5 Excellent

Journalism Judging Rubric:

1. Is the web site fully bilingual **[Y/N]**
2. Rate the quality of the language used **[1-5]**
3. Rate the creativity, originality and engagement of the content. **[1-5]**
4. Rate the description of the school, including the identification of all team members, sub-teams, teachers and mentors, as well as their contributions. **[1-5]**
5. Rate the quantity and quality of the students' experiences. **[1-5]**
6. Rate the description of the game. **[1-5]**
7. Rate the description of the steps involved in building the robot, including diagrams, plans, photographs, etc. **[1-5]**.

Web Site Design Contest Technical / Design Requirements

The purpose of the technical / design award is to reward a web site's technical merit, good design and a favourable user experience. How would they find information they're looking for easily? How would you impress your users and make them want to tell others about your web site? Remember that your beautiful design will require great content.

We strongly recommend that you visit the Resources section of the CRC web site for more information, examples and tutorials for creating your first web site even if you're completely new to web site design.

Judges may view your web site in *any major browser*.

- W-1. The web site should look professional and your design's colour scheme, font choice and layout should be balanced, pleasant and interesting. Please consult the Resources section of the CRC web site for examples of good and bad design, with explanations.
- W-2. The pages and menus should be organized in a way that helps the user easily find all of the required information.
- W-3. The content on individual pages should be clearly organized.
- W-4. You should include some aspect of social interaction, such as surveys, a Twitter feed, a Facebook page, a YouTube channel, a puzzle or game, etc.
- W-5. Your site should be bug-free (no script errors, no broken links or broken images, etc).
- W-6. The web site should validate against *any one* of the following HTML standards you choose, with as few errors as possible (warnings can be ignored):
 - a. HTML5 (<http://www.w3.org/TR/html5/>); **or**
 - b. HTML 4.01 Transitional (); **or**
 - c. XHTML 1.0 Transitional (<http://www.w3.org/TR/xhtml1/>).
- W-7. Your web site should also validate against CSS 1.0 or better with as few errors as possible (<http://www.w3.org/TR/REC-CSS1/>).

Web Design Judging Rubric

Rubric Context:

Given a *familiarity with the rulebook*, and given a band grading schema of the form:

- 1 Unacceptable / Missing
- 2 Below Average
- 3 Average
- 4 Above Average
- 5 Excellent

Web Design Judging Rubric:

1. The overall design, choice and combination of colours, fonts, and layout are appealing and conducive to a pleasant user experience. **[1-5]**
2. The site structure, page structure and menu design makes finding information easy. **[1-5]**
3. There is some aspect of user / social interaction. **[1-5]**
4. There are no uncaught exceptions, broken links or broken images. **[1-5]**
5. The site's code is well-formed and validates. **[1-5]**

Because we would like to reward technical merit, where two sites have comparable ranks, the site that employed the fewest pre-made modules should receive the higher rank

KIOSK

Rules and Requirements

The kiosk component requires the organization of an information kiosk and presentation of accomplishments to visitors and judges. This is each school's chance to show everyone what their school, their team and their robot is all about, and to develop presentation and arts skills.

Remember that the kiosk is also the school's only functional pit area for repairs, maintenance and modifications to the robot during the competition. The kiosk is not intended as a central lounge for team members. One part of the kiosk must be organized as a functional pit area to work on the robot, and store materials and tools, and the rest of the kiosk is a showcase for other schools and the public to visit. We recommend that you plan for a restricted area of your kiosk for pit only.

K-1. Format:

- K-1.1. Space given: 12 foot by 12 foot square, 4 foot high separators to the left and right of the square.
- K-1.2. Objects provided by the CRC: 1 2x5 foot table, 1 electrical outlet with 2 plugs, 120V, 15Amp.

K-2. Required Content:

- K-2.1. Distinct and delineated pit area for robot maintenance, modifications and repairs
- K-2.2. School and Robot demonstration and presentation area (description of the robot: including the steps in the construction, the problems that were encountered along with the solutions to those problems, the workings of the final version of the robot)
- K-2.3. Fully bilingual reception and interaction with the public.

K-3. Rules and Requirements:

- K-3.1. Only students are permitted to be in the pits and working on the robot. **Teachers and mentors may only provide advice and guidance from the sidelines; they may not be in the pits touching/working on the robots.** There will be referees present in the pits. Repeat offenders run the risk of being disqualified from the kiosk competition.
- K-3.2. You are not permitted to have any liveable space on a second level due to safety concerns.
- K-3.3. **Your kiosk will be required to pass a safety inspection in order to be judged. There is a safety checklist attached to the end of the rules.**
- K-3.4. Please respect the surrounding kiosk areas as you run the risk of being penalized for any behaviour that has a negative impact on other kiosks. (Ex. Loud music, extending beyond your kiosk footprint, the kiosk should be visually appealing all around (inside and outside), not only in its façade if the outside walls can be seen from neighbouring kiosks. You may be required to **paint or cover the outer sides and back of your kiosk** during certification if it is not already done so, so plan accordingly!)

K-4. Suggestions:

- K-4.1. Plan adequate space for tools, maintenance and repair materials and adequate work space for the robot.
- K-4.2. Remember that because the kiosk is also the pit area for the robot, there must be clear access for the robot and a few selected student team members from the school who will be coming in and out of the pit area, sometimes in a hurry and on short notice.

- K-4.3. Make sure to have at least 1 bilingual student speaker for the school giving presentations and answering the public and judges questions at all times in the kiosk.
- K-4.4. Make sure you bring lighting equipment to ensure adequate lighting in the pit area for safety and for aesthetics.
- K-4.5. Create an attractive, aesthetic environment that entices and encourages the public to inquire about the school, team and the robot.
- K-4.6. You may bring a television, DVD/Blu-ray, PC, laptop or other audio-visual equipment remembering that the CRC only supplies each school with 2 power connections (bring adapters, and extensions as necessary), but make sure to be respectful for other kiosks in terms of noise, visual pollution and proper behaviour.

K-5. Due Date:

- K-5.1. **The kiosk must be fully mounted and ready for judging by 5:00 p.m. on Thursday February 21st, 2013.**
- K-5.2. **Kiosks may not be dismantled until instructed to do so on Saturday, February 23rd, 2013.**
- K-5.3. Dismantle and clean kiosk area and ensure that no damage was done to area or property by 6:30 p.m. Saturday, February 23rd, 2013. Any team leaving any debris will be subject to a \$200 fine, as well as any cleaning costs incurred by the host school. Repeat offenders may be subject to further penalties.

Kiosk Judging Form

School: _____ Total mark = _____

Section A : Required Content (31%)

The Kiosk must fulfill the following required content:

| | | |
|-----------------------------------------------------------------------------------|----------------------------|----------------------|
| Inviting the public (Approachable, welcoming...) | (worth 6 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Level of bilingualism (Use & quality of French and English...) | (worth 6 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Interaction with the public (Friendly, Polite, Cooperative...) | (worth 8 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Respect for others (Respect for other kiosks, noise & visual pollution) | (worth 6 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Showcase/Description of your school and team (worth 5 % overall) | | 1 2 3 4 5 6 7 8 9 10 |

Judges comments: _____

Section B : Technical Aspects (31%)

Technical aspects relate to organization, functionality, safety measures, neatness... This section is not related to creativity, presentation or aesthetics.

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------|
| Kiosk design, layout and practicality (Organization, plan, functionality...) | (worth 9 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Engineering and Construction of Kiosk (How well is the kiosk designed and physically built, how structurally sound is it) | (worth 7 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Safety measures (Proper and safe layout of tools and materials) | (worth 5 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Security measures (Public safety, number of people inside the school's Pit area...) | (worth 5 % overall) | 1 2 3 4 5 6 7 8 9 10 |
| Respect for the surroundings (Cleanliness and damage to area or property...) If any damage is done to the property or area, added penalties may be deducted from the kiosk component's total mark. | (worth 5 % overall) | 1 2 3 4 5 6 7 8 9 10 |

Judges comments: _____

Scoring Scale:
 1 = Poor / Criteria not met
 10 = Exceptional

(Kiosk Judging Form continued)

Section C : Presentation (38%)

The presentation section relates to the creative, aesthetic and logical flow of the kiosk.

| | | |
|------------------------------------------------|------------------------------------|----------------------|
| Creativity of presentation | <u>(worth 10 % overall)</u> | 1 2 3 4 5 6 7 8 9 10 |
| Visually attractive to the public | <u>(worth 10 % overall)</u> | 1 2 3 4 5 6 7 8 9 10 |
| Use of light and sound | <u>(worth 10 % overall)</u> | 1 2 3 4 5 6 7 8 9 10 |
| Organization of content and information | <u>(worth 8 % overall)</u> | 1 2 3 4 5 6 7 8 9 10 |

(Does the information flow together in an easy to follow and logical manner.)

Judges comments: _____

Kiosk Certification Form

Robotique CRC Robotics 2013

1. Electrical

| Wiring & Outlets | Acceptable | Not acceptable | Not applicable |
|------------------|------------|----------------|----------------|
| Gauge | | | |
| Layout | | | |
| Protected | | | |
| Grounded | | | |
| Anchored | | | |

2. Structural Integrity

| | Acceptable | Not acceptable | Not applicable |
|-------|------------|----------------|----------------|
| Walls | | | |
| Roof | | | |
| Floor | | | |

3. Safety

| | Acceptable | Not acceptable | Not applicable |
|---------------------------------------------------------------------------------|------------|----------------|----------------|
| Tools properly stored | | | |
| Proper Fastening / Anchoring (Accessories, equipment, shelves, objects ...) | | | |
| Public access | | | |
| Manoeuvrability inside kiosk (Ability to move around without hitting things) | | | |
| Safety equipment (First Aid Kit , Goggles, gloves...) | | | |

4. Aesthetics

Respects Neighbouring kiosks (sound, paint /cover back and outer sides)

| Acceptable | Not acceptable |
|------------|----------------|
| | |

CRC Signature

Team Signature

Robot Design and Construction Evaluation Guidelines

This year, we have decided to split the robot design award into two separate awards: a robot design concept award, rewarding the concept of the robot regardless of the finished product, and a robot construction award, recognizing the robots with the highest quality of construction and durability, regardless of the quality of the design.

Engineering judges will meet with you at your kiosk at the competition to evaluate you for these two awards.

Robot Design Concept Judging Rubric

Rubric Context:

Given a *familiarity with the rulebook*, and given a band grading schema of the form:

- 1 Unacceptable / Missing
- 2 Below Average
- 3 Average
- 4 Above Average
- 5 Excellent

Robot Concept Judging Rubric:

1. Design Objective:

- 1.1. Adaptation of concept to meet Game objectives. **[1-5]**
- 1.2. Appropriate efficiency and functionality. **[1-5]**
- 1.3. Innovation / Ingenuity. **[1-5]**

2. Design Flexibility:

- 2.1. Flexibility of design to varying Game strategies. **[1-5]**
- 2.2. Flexibility of design to component failures. **[1-5]**

3. General Concept:

- 3.1. Originality of concept. **[1-5]**
- 3.2. Creativity in the use of VEX components. **[1-5]**
- 3.3. Simplicity of concept. **[1-5]**
- 3.4. Functionality / Feasibility. **[1-5]**

Robot Construction Judging Rubric

Rubric Context:

Given a *familiarity with the rulebook*, and given a band grading schema of the form:

- 1 Unacceptable / Missing
- 2 Below Average
- 3 Average
- 4 Above Average
- 5 Excellent

Robot Construction Judging Rubric:

1. The overall quality of construction, regardless of quality of design. **[1-5]**
2. Structural strength and durability of the robot base/frame, and each mechanical and electrical component. Is the robot built to last? **[1-5]**
3. Ease of serviceability and maintenance. **[1-5]**
4. How well were the design concepts implemented into the completed robot? **[1-5]**
5. Is the robot aesthetically pleasing? **[1-5]**