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THE 2001 FIRST ROBOTICS COMPETITION MANUAL

1. THE GAME

1.1 Introduction

The Game section of the 2001 FIRST Robotics Competition Manual provides a comprehensive description of the game, playing field layout and construction, match scoring, and competition rules.

1.2 Game Description

Section 1.2 provides an overview of the 2001 FIRST Robotics Competition Game. See Appendix A for the complete list of rules.

1.2.1 Competition Structure

The competition is composed of two phases: Qualification Matches and Elimination Matches. In each match, four teams work together as an alliance to try to achieve as high a score as possible. All teams in an alliance share the alliance score. However, during the qualification matches some teams may earn additional bonus points that apply only to their team.

PHASE I: Qualification (Seeding) Matches

During qualification matches, randomly assigned teams are partnered to form alliances just prior to the start of each match. Alliances last only for the duration of a match. *At regional events*, teams may be randomly allied with any other team at the event. *At the National Championship*, each team is assigned to one of four divisions and participates only with other teams in the same division. All teams are ranked after playing an equal number of qualification matches. Following the conclusion of the qualification matches, the top ranked teams form alliances and go on to compete in the elimination matches. *See the Tournament Rules in Appendix A for details.*

PHASE II: Elimination Matches

Alliances formed for the elimination matches stay together for the remainder of the event. Each alliance is composed of five teams. The fifth team serves as an alternate and can be used if a robot in the alliance is damaged or for reasons of scoring strategy.

At regional events, four alliances compete in a series of elimination matches until one alliance is declared the event champions. *At the National Championship*, eight alliances compete in a series of elimination matches, resulting in four Division Champion alliances and one National Champion alliance. *See the Tournament Rules in Appendix A for details.*

1.2.2 Basic Gameplay

Points: During a match, the alliance scores points by:

- Placing balls into goals.
- Positioning the robots in the End Zone at the end of the match.
- Moving the goals onto a semi-stable bridge. The bridge must be balanced at the end of the match.
- Ending the match prior to the two minute time limit.
- Carrying a robot across the field by using a stretcher if the stretcher is in the End Zone at the end of the match.

See section 1.2.4 for more information on scoring.

Each alliance competes using four (4) team-built robots, twelve (12) students, and eight (8) mentors. There are forty (40) small balls, approximately thirteen (13) inches in diameter. There are four (4) balls approximately thirty (30) inches in diameter. ***Balls will be inflated to size not pressure.*** There are two (2) seven (7)-foot high goals with caster wheels around the bases that may be moved around the playing field. One goal starts near the Start Zone, the other starts near the End Zone. Dividing

the field in half is an eighteen (18)-inch high railing with a central bridge. Robots may pass over the bridge or rails to access the opposite end of the field. The bridge is centrally supported on a beam approximately six (6)-inches wide, such that it may tilt toward either end or remain level. Information on construction of the playing field is included in the field parts list documentation which is supplied with the manual at the Kick-Off Workshop.

The robots must compete within the bounds of the playing field, while the students are located at stations just outside the playing field. Only students and robots may score points with the balls. See Section 1.2.3 for information on playing field layout.

1.2.3 Playing Field Layout

At the start of each match, the alliance station contains twenty (20) small balls. Twenty (20) small balls and four (4) large balls will be located at the far end of the playing field. All balls may be used to score points.

Placement of the alliance stations, goals, bridge, start zone, end zone, and robots as well as the starting locations of all balls is shown in Figure 1.1. Please note that Figure 1.1 may not be drawn to scale and is not intended for use during playing field construction. For playing field dimensions, please refer to the field parts list documentation supplied with the manual at the Kick-Off Workshop.

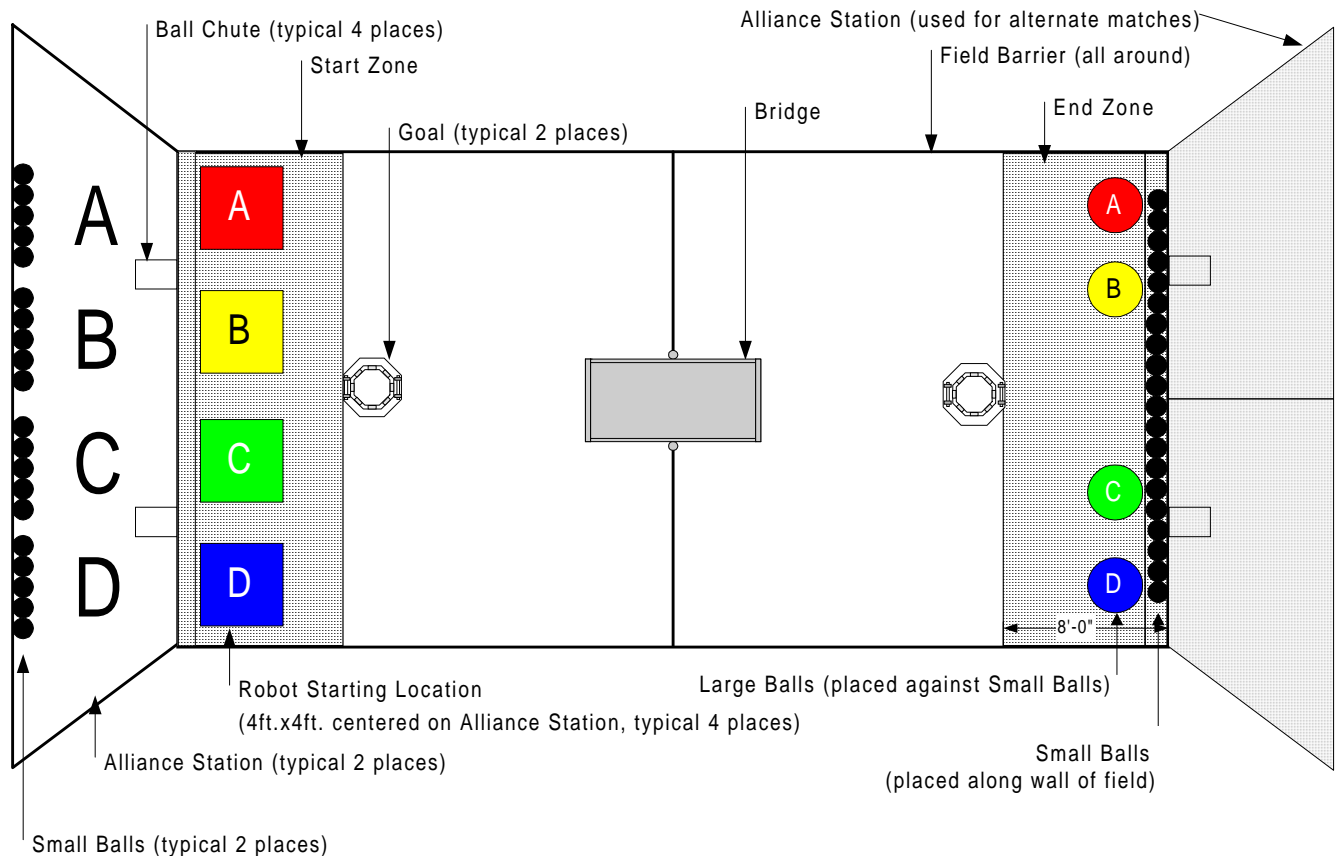


Figure 1.1: Playing Field Layout

Teams may opt to use a stretcher, on which a robot may be conveyed around the field. If the stretcher is used, it must start in the same position as the robot on the stretcher would normally start.

1.2.4 Match Scoring

At the end of each match, points are awarded as outlined below. The complete list of scoring rules is contained in Appendix A.

a) *The alliance receives:*

- One (1) point for each small ball in the goal, and *not in contact with or supported by a robot.*
- Ten (10) points for each large ball in the goal, and *not in contact with or supported by a robot.*
- Ten (10) points for each robot in the End Zone.
- Ten (10) points if the stretcher is in the End Zone.
- The alliance doubles its score for *each* goal that is on the bridge if the bridge is balanced. *See Figure 1.3.*
- The alliance multiplies its score by a factor of up to three (3) by ending the match before the two minute time limit -- *See Rule SC7 for details.* Each team receives the alliance score.

b) A team multiplies its score by 1.1 if its large ball is on top of a goal.

c) Scores are rounded up to the nearest whole point after applying all applicable multipliers.

Figure 1.2 below illustrates balls in a scoring position within the goal structure. See Appendix A for the complete list of game rules.

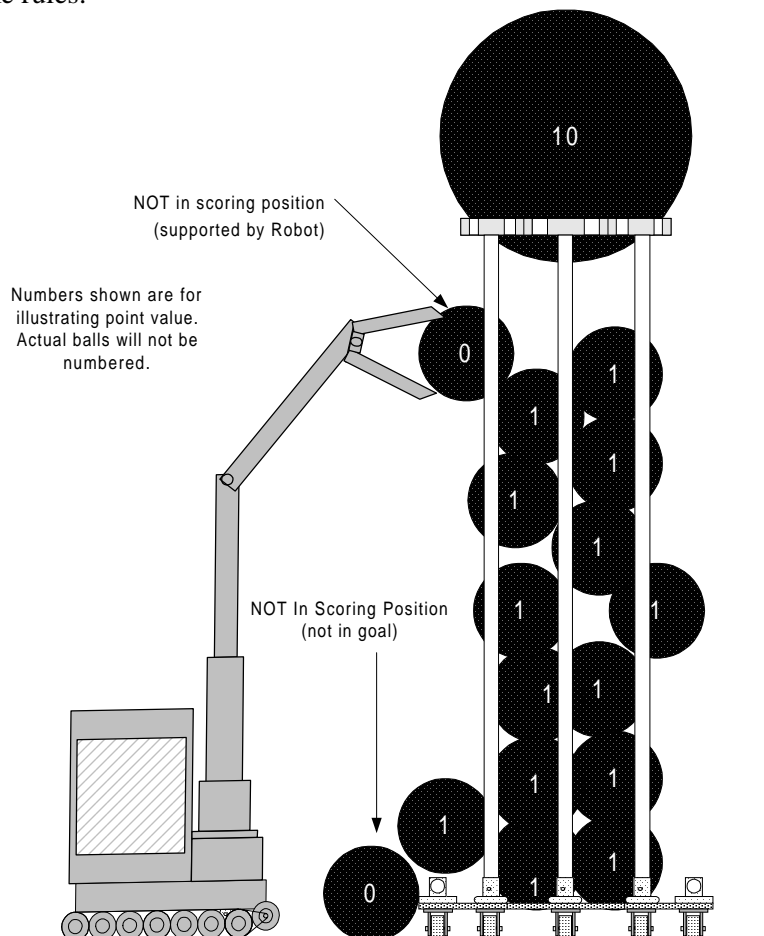


Figure 1.2: Ball Positions and Values

1.2.5 Point Accumulation and Qualification

In each qualification match, the teams in the alliance receive scores which are added to their running total for the event. At the conclusion of the qualification matches, each team drops its lowest match score and the teams are then ranked according to total points. Please read Appendix A for the complete list of game rules including team ranking and ranking tie breakers.

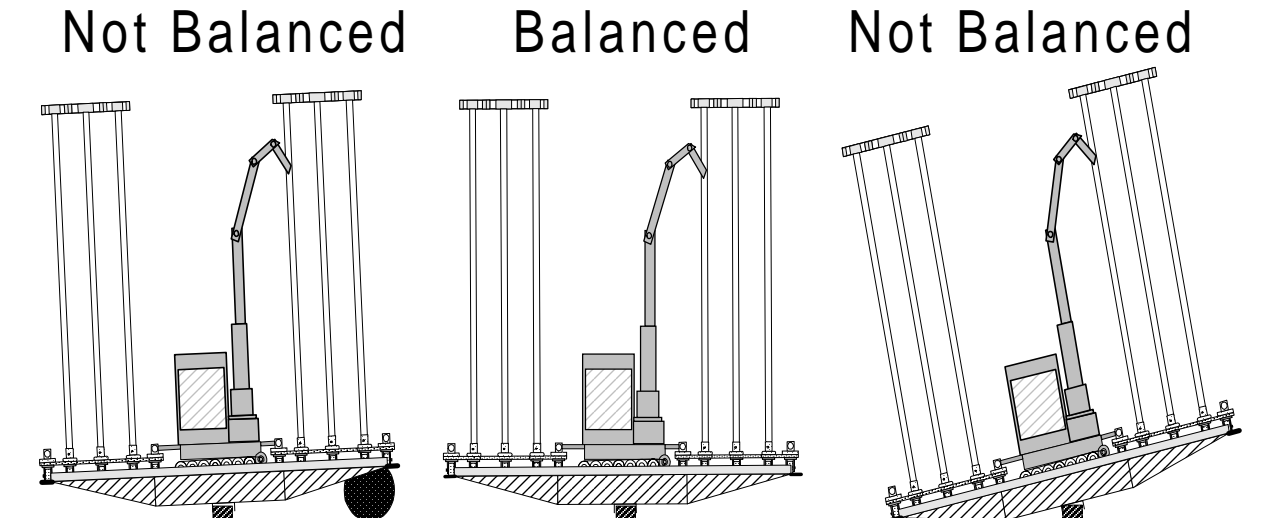


Figure 1.3: Bridge Balanced

1.3 Playing Field Construction

1.3.1 Playing Field Description

The playing field is a carpeted, rectangular area with two goals, a dividing rail, and a pivoting bridge mid-field. At one end of the field is the alliance station for the students and mentors. Prior to the start of each match, balls are placed in specific starting locations on the playing field and in the alliance station, as shown in Figure 1.1.

1.3.2 Playing Field Border

The perimeter of the field is defined by a rectangular curb made of 4x4 lumber. The border assembly rests directly on the carpet. A barrier is constructed from 1-1/4 inch diameter schedule 40 aluminum pipe and connecting fittings, and is mounted to the top of the 4x4 border with pipe flanges.

The exact dimensions and locations of the various sections, the assembly, and special hardware required are shown in the field parts documentation supplied with the manual at the Kick-Off Workshop.

1.3.3 Alliance Station

Although only one station is used during a match, the field is built with an alliance station at each end to allow for alternating use and better match throughput. The alliance stations are located outside the perimeter of the playing field as shown in Figure 1.1. There are two openings in the alliance station wall for small ball return chutes. The alliance station wall is comprised of a transparent safety shield mounted on top of a diamond plate sheet on the field side of the station and serves as protection for the alliance members. The back border of the alliance station consists of a 1/2-inch EMT conduit resting directly on the carpeted floor held in place by colored tape. There is a 1-foot by 12-foot shelf made of 1/4-inch Aluminum Diamond Plate, 3-feet off the carpeted floor where the robot control equipment may be placed. Each alliance station shelf has a set of 15 pin cables which provide power and control signals to the Operator Interfaces (OI), and are plugged into

the competition port of the OI. A pocket for the radio modem is mounted 3-feet above the shelf. Teams must bring their own control systems, including radios, to the field. No power outlets will be available.

The students and mentors are permitted free movement within the alliance station. All alliance members are allowed contact with the balls. Mentors are not allowed to return balls to the playing field.

If a student or mentor has a special need (i.e. requires the use of a wheelchair, etc.), please contact FIRST prior to the events. A raised platform will be made available at events as required.

1.3.5 Bridge Description

The bridge is approximately 4-feet wide and 8-feet long with 5-inch wide metal plates mounted at each end and diamond-plate on the sides. The structure consists of 4 2x8 lumber set 14-inches on apart from the edge and ¾-inch plywood. The surface of the bridge is covered with carpet (Brassfield 20, Color- Pewter), except where the 5-inch metal plates extend from the end. The bridge rests on a two 2x6 lumber beams sandwiched with a 3/8-inch plywood with angle-iron used as load bearing surface and to prevent the bridge from sliding off-center. There are two 1-¼-inch steel pipes mounted on the sides of the bridge with weights at the top.

1.3.6 Stretcher Description

The stretcher is approximately 50-inch wide by 44-inch long ¾-inch plywood with four 3-inch swivel casters. There is a pipe border with fittings approximately 3-inches from the platform. (In the blueprints this is referred to as the medic.)

1.3.7 Playing Field Notes

The carpet used for the playing field surface and bridge is available from S.S. Mills, Inc. in Dalton, Georgia. The carpet used on the playing field surface is: Brassfield 20, Color-Black Coal. Contact information for SS. Mills, Inc. is included in the supplier contact listings in “The Robot” section of the manual.

APPENDIX A: RULES

S Safety Rules

Safety comes first. Because of the event in which electrical equipment, springs and tools are used, safety will not be compromised.

- S1. **ALL TEAMS ARE RESPONSIBLE FOR PROVIDING THEIR OWN SAFETY GLASSES AT EVERY EVENT.**
- S2. All team members must wear Safety glasses in the alliance stations during matches (Students and Mentors).
- S3. Team members must wear safety glasses when working on their robot in the pit area. They are also highly recommended if adjacent neighboring team(s) are working on their robot(s).
- S4. The Students and Mentors must remain in the alliance stations during the match. They may not reach over the playing field.
- S5. Robots are not allowed to extend into the ball chute of the alliance station. Incidental contact with the ball chute is acceptable.
- S6. If at any time the referees determine that a robot is likely to cause safety hazards in future matches, the robot must be modified to the head referee's satisfaction or it will not be allowed to compete.
- S7. Balls are the only projectiles that may be launched by a robot. Latex tubing may be used for the purpose of storing energy to launch balls as long as no more than 5' is used for this purpose.
- S8. **Do not tamper with the power supply, batteries, chargers, speed controllers, joysticks, or any other control system component except as noted in the control system rules.** Tampering could result in failure or malfunction of the control system, and lead to a safety hazard or damage to the robot.
- S9. Turn off the 60A main circuit breaker while making adjustments to your robot. Since the motors provided in the Kit are quite powerful, it is important to keep all body parts away from all robot mechanisms while your robot is connected to the battery.
- S10. The battery can deliver more than 200 Amperes. Do not let the wires come into contact with any metal surfaces. Route wires carefully to avoid damage and short circuits, which may cause serious burns, fire, and/or permanent damage to the batteries.

T Tournament Rules

- T1. Competition at each FIRST Robotics Competition event is composed of two phases, Qualification (Seeding) Matches and Elimination Matches. The qualification matches are open to all teams which pass robot inspection. They consist of a series of matches in which teams are randomly allied with each other. Based on the results of the qualification matches, teams are ranked. The top seeds automatically qualify to advance to the elimination matches. Additional teams are chosen as alliance partners by the top-seeded teams and also advance to the elimination matches.
- T2. All teams start each event with zero points and accumulate the points as they score in each of their qualification matches. At the conclusion of the qualification matches, each team's lowest match score is dropped. See the SC rules for scoring rules.
- T3. In general, all teams compete in the same number of qualification matches. However, at some events it may be necessary for up to three teams to compete in one additional match in order to guarantee that all other teams compete in an equal number of matches. If this occurs, any points scored by teams for whom it is an additional match are not counted for ranking purposes. In the spirit of Gracious Professionalism, all teams in such a match are expected to do their best.
- T4. After the qualification matches are over, teams are ranked using the following hierarchy of criteria (in order from most to least important):

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1. Highest point total.
 2. Highest match score.
 3. Flip of a coin.
- T5. During qualification matches at *regional events*, teams may be randomly allied with any other team at the event and will be ranked relative to all other teams at the event.
- T6. Due to the large number of teams at the *National Championship*, teams will be evenly distributed into four “divisions.” Teams will participate in qualification matches only with other teams in the same division and will be ranked relative to the other teams in their division.
- T7. Four (4) alliances at a regional event and Eight (8) alliances at the National Championship qualify to advance to the elimination matches. Alliances for the elimination matches are formed as follows:
1. **For the Regional events:** Starting in descending rank order, the top four seeded teams are automatically be partnered with the 5th through 8th seeded teams (i.e. 1 & 5, 2 & 6, 3 & 7, 4 & 8).
 - For the National Championship:** Teams are evenly divided up into 4 “divisions.” Within each division, starting in descending rank order, the top two seeded teams are automatically partnered with the 3rd and 4th seeded teams (i.e. 1 & 3, 2 & 4).
 2. Starting in descending rank order, a pre-college student representative from the highest seeded team in each alliance selects a third alliance partner from among the remaining unpartnered teams.
 3. After all of the third alliance partners have been chosen, the selection process will start again and each alliance selects their fourth alliance partner.
 4. After all of the fourth alliance partners have been chosen, the selection process will start again and each alliance selects their fifth alliance partner.
- T8. Teams may decline an offer when asked to ally for the elimination matches. However, if a team declines, they are no longer eligible to be chosen as an alliance partner. In the event that there are not enough eligible teams to complete the number of alliances needed for elimination matches, teams which have declined may only be chosen after all eligible teams.
- T9. Alliances formed for the elimination matches may not be changed for the duration of the event.
- T10. Prior to the start of the elimination matches, one Student member of the highest seeded team from each alliance must be identified as the alliance captain. Alliance captains must be part of the field crew for the team. Each alliance captain must wear a badge supplied by FIRST to indicate their special role in the alliance.
Alliance Captains are responsible for selecting which four of the five alliance teams will compete in each match. Alliance Captains are the final arbiters within the alliance.
- T11. Alliances competing in the elimination matches are paired as follows:
For Regional Events: The alliance led by the 1st seed competes against the alliance led by the 4th seed in a series of semi-finals matches. The alliance led by the 2nd seed competes against the alliance led by the 3rd seed in a series of semi-finals matches. The winners of the semi-final matches compete against each other in a series of finals matches, with the winning alliance becoming the Regional Champions.
For the National Championship: Within each division, the two alliances formed for the elimination matches compete against each other in a series of quarter-final matches to determine the divisional champions. Next, there are two sets of semi-finals matches between the four divisional champions. The winners of the semi-finals then compete in a series of finals matches, with the winning alliance becoming the National Champions.

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T12. Each series of matches for the quarter-finals (division finals), semi-finals, and finals will be conducted as follows:

1. Each alliance will have at least two chances to achieve the highest match score of the series. At the end of each series, the alliance with the highest match score of the series advances to the next series of finals matches or is declared event champion, as appropriate.
2. When advancing from one series of finals matches to the next, scores from the previous series are not considered.
3. In series where divisional champions are competing against each other, the “higher seeded team” is determined by the same method that is used to rank teams within divisions. Only points from qualification matches are considered. See Rule T4.
4. The series of matches is played as follows:

Match 1: The alliance led by the higher seeded team will play a match.

Match 2: The alliance led by the lower seeded team will play a match.

Match 3: The alliance that scored the higher of matches 1 & 2 will play in Match 3. If there was a tie between Matches 1 & 2, then the alliance that competed in Match 1 will play in Match 3.

Match 4: The alliance that scored the lower of matches 1 & 2 will play in Match 4. If there was a tie between matches 1 & 2, then the alliance that competed in Match 2 will play in Match 4. If, after Match 4, the highest match score of the series for the alliance in Match 4 is greater than or equal to the opposing alliance’s highest match score for the series, then the series continues with Match 5. Otherwise, the opposing alliance is the winner.

Match 5: If necessary, the alliance that competed in Match 3 will compete again. If, after Match 5, their highest score for all matches in the series is greater than or equal to the opposing alliance’s highest match score for the series, then the series continues with Match 6. Otherwise, the opposing alliance is the winner.

Match 6: If necessary, the alliance that competed in Match 4 will compete again. After Match 6, the alliance with the highest match score for the series is the winner of the series. In the event of a tie, the following tie breakers will be used in descending order:

1. The alliance with the highest average match score for the series wins.
2. The higher seeded alliance wins.

Examples

Two alliances, A & B, are competing in the finals. A is seeded higher than B, so they always go first. The tables below demonstrate several scenarios and the outcomes:

Scenario 1:

Match	Alliance	Score
1	A	100
2	B	90
3	A	65
4	B	99
Alliance A wins with a high score of 100 points.		

Scenario 2:

Match	Alliance	Score
1	A	90
2	B	100
3	B	110
4	A	115
5	B	118
6	A	120
Alliance A wins with a high score of 120 points.		

Scenario 3:

Match	Alliance	Score
1	A	100
2	B	90
3	A	105
4	B	110
5	A	109
Alliance B wins with 110 points because Alliance A did not score at least 110 points in Match 5.		

GM General Match Rules

- GM1. Referees have ultimate authority during the competition—**THEIR RULINGS ARE FINAL!** *No recorded replays will be reviewed by the referees.*
- GM2. Teams are allowed at least 4 minutes between scheduled matches.
- GM3. At least 2 minutes prior to the start of each qualification match, teams will be randomly assigned to alliances and given a unique color by FIRST. This color is used to determine the placement of each teams' robots, human players, robot operators, and coaches around the playing field. *Figure 1.1 in Section 1.2.3 shows the layout of the playing field including starting positions.*
- GM4. Teams are allowed a maximum of 1 minute to set up their robots on the playing field and a maximum of 1 minute to remove all robot parts from the field following a match. *Robots will not be re-enabled after a match, so mechanisms which clamp to the field or store balls must allow for easy release without power.*
- GM5. Each match lasts for a maximum of two minutes. Matches begin when the robot control systems are enabled and end when they are all disabled, unless the match is whistled dead by the referees. Teams may end a match before the two minute time limit has been reached by pressing "Stop" buttons located at the alliance stations. A match ends once all four Stop buttons have been pressed or at the end of the two minutes.
- GM6. Four Stop buttons are located in each Alliance Station, one for each team. Pressing a Stop button will cause the corresponding team's robot to be disabled. If all four Stop buttons are pressed during a match, it will immediately and irreversibly end the match. Teams may only press the Stop button corresponding to their own robot. Before all four Stop buttons have been pressed, a team that has pressed its Stop button may release it, thus re-enabling their robot prior to the end of a match.
- GM7. **ABSOLUTELY NO REMATCHES WILL BE AWARDED.** FIRST reserves the right to **re-play** a match due to *obvious catastrophic failure* of FIRST-provided field materials.
- GM8. **THERE ARE NO TIME-OUTS.**
- GM9. Each team is given three "coupons" which may be redeemed during the course of the qualification matches in order to place their robot onto FIRST's "stretcher" prior to the start of a match. The stretcher is designed to carry non-functioning or partially functioning robots so that they may participate in a match for the purposes of scoring. A maximum of one stretcher may be used in a match. All coupons unused at the conclusion of the qualification matches are forfeited. Teams participating in the elimination matches receive two coupons each for use during the elimination matches. **Teams may not give their coupons to other teams.**
- GM10. A robot placed on a stretcher must be wholly supported by the stretcher at the start of the match.
- GM11. A robot which starts the match on a stretcher may not provide its own locomotion by directly pushing or pulling on the playing field surface, but may otherwise interact as normal with the balls, goals, and other robots. Incidental contact between the robot and the surface of the playing field, such as when attempting to pickup a ball, is acceptable. Movement from handling a ball, goal, or other robot is acceptable. If a robot which starts the match on a stretcher ends up off the stretcher, it still may not provide its own locomotion by directly pushing or pulling on the surface of the playing field. The stretcher may be pushed or pulled

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by other robots on the field in order to move it around the field. It is suggested that teams utilizing the stretcher temporarily disable their robot's main drive mechanisms by disconnecting the appropriate PWM and/or Relay cables in order to prevent accidental violation of this rule.

- GM12. During setup for each match, robots may be placed in any orientation within their designated starting area, but may not touch the field border. During the qualification matches, teams will be randomly assigned to specific field starting positions by FIRST. During the elimination matches, teams may select their own starting positions within the starting area.
- GM13. During a match, five members per team (3 "Students" and 2 "Mentors") are allowed in the alliance station at the end of the field. The Students must be pre-college students from a team partner school, while the Mentors may be adults or students from a team partner. Special badges are supplied by FIRST at each event and must be worn by these team members for field access.
- GM14. At the beginning of a match, each team starts with five (5) small balls in their section of the alliance station. Twenty (20) small balls and four (4) large balls start on the playing field. The small balls are all black, while the large balls are uniquely colored to match each team's field position. The playing field balls start arranged as shown in Figure 1.1 in Section 1.2.3.
- GM15. During a match, the robots may be operated only by the students and/or by software running in the on-board control system.
- GM16. Any balls which leave the playing field or alliance station, such as by rolling, bouncing or being pushed out of the boundaries, will be not be returned to the playing field until the next match.
- GM17. Students may use only their bodies to interact with the balls. Special clothing and/or equipment will only be allowed for those who demonstrate a need based on a physical disability.
- GM18. Contact with the balls by all alliance members in the alliance stations is acceptable, but only the Students may return balls to the playing field. Balls may only be returned to the playing field by passing them over the front safety shield.
- GM19. Referees or field staff are not responsible for damage to robots while attempting to retrieve balls. Please design your robot so that balls may be retrieved quickly and easily after a match is over.
- GM20. **Robot collisions, falling from the bridge, being pinched by the bridge, and having goals tip over onto robots is expected to be quite common.** It is very common for machines to run into each other, the goals, the bridge, and the playing field borders at full speed, and for arms and various other mechanisms to experience the resultant forces. Please design your robot for these conditions.
- GM21. The outer field barriers are safety features of the playing field. Robots should not be designed to react against them. Incidental contact with the barriers is acceptable. Pushing a ball against a barrier to allow pickup of the ball or passage of the ball to the human player through the ball chute in front of the player station, is acceptable if the forces applied are not sufficient to damage the barrier or otherwise deform the playing field.
- GM22. Robots may react against the pipe and the bridge which divides the playing field.
- GM23. Robots which become entangled in the barriers or goal will not be freed until after the match has finished, unless the entanglement represents a safety hazard.
- GM24. At the start of each match, the bridge will be tilted so that the end nearest the Start Zone is down.

SC Scoring Rules

- SC1. Final scoring begins when all balls, robots, goals, and the bridge come to rest or approximately 10 seconds after the match ends, or upon a referee's decision. Prior to this, the referees may not see all final positions and cannot make accurate scoring decisions. If, while waiting for objects to come to rest, an object on the field changes position once a match ends and the power is turned off (i.e. the bridge tilts, a goal tips over, a robot coasts into the end zone, etc.), and such movement causes a change in the score, the post-movement score is recorded.

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- SC2. All decisions regarding scoring are made by the referees. Referees have ultimate authority during the competition—**THEIR RULINGS ARE FINAL. No recordings of the match will be reviewed by the referees.**
- SC3. The alliance receives one (1) point for each small black ball that is supported by a goal and not in contact with a robot or the surface of the playing field. The alliance receives ten (10) points for each large ball that is on top of a goal and not in contact with a robot or the surface of the playing field. *Refer to Figure 1.2 Ball Positions and Values.*
- SC4. Any robot in the end zone adds ten (10) points to its alliance score. A robot is considered “in” the end zone if contact between the robot and the playing field is completely on or past the line bordering the end zone.
- SC5. The stretcher is considered to be a robot for purposes of scoring in the end zone. A robot on the stretcher counts as “in” the End Zone as long as it is wholly supported by the stretcher and the stretcher is “in” the End Zone. Therefore, it is possible to get 50 points for having all four robots plus the stretcher in the end zone.
- SC6. Each goal which is “on” the bridge doubles the alliance score if the bridge is “balanced.” A goal is defined as “on” the bridge if it is wholly supported by the bridge and/or any robots which are in turn wholly supported by the bridge. The bridge is defined as “balanced” if neither end of the bridge is in contact with the surface of the playing field and the bridge is supported exclusively by the central pivot structure underneath the bridge.

Goals on Balanced Bridge	Multiplier
1	2
2	4

- SC7. The alliance receives an additional score multiplier for using the Stop buttons to end the match prior to the two minute time limit. The multiplier is based on time remaining and is as follows:

Time Remaining (sec)	Multiplier
120-91	3
90-61	2.5
60-31	2
30-1	1.5
0	1

- SC8. Each team receives the total points scored by the alliance. However, during the qualification matches only, each team whose large ball is on top of a goal and not in contact with any robot receives a 10% bonus to their score (i.e. team score = final alliance score multiplied by 1.1). The large ball whose color matches the team’s starting position color is considered the team’s ball.
- SC9. Any fractional points are rounded up to the nearest whole point after applying all applicable multipliers.
- SC10. In the event that a robot is damaged to the point where parts become detached from the robot and are left on the playing field, the detached parts are not considered when determining whether or not the robot is completely in the end zone and when evaluating whether or not balls in the goals are “in contact” with a robot. In the event that large sections of the robot break apart, the section containing the Robot Controller is considered “the robot.” Any part that is still connected to the robot, no matter how tenuously, is considered part of the robot. Any part of the robot, detached or not, is considered when evaluating whether or not the bridge is being supported exclusively by its central pivot structure.

V Game Violations

- V1. All alliance members must remain in the alliance station during play. If an alliance member steps out of the alliance station for reasons of personal safety, no penalty will be imposed. If an alliance member inadvertently steps over the line, and it does not affect the outcome of the match, then they will receive a minor penalty.
- V2. Repeated minor infractions will result in increasingly severe penalties. Penalties are indicated by referees throwing down flags color coded to the alliance receiving the penalty. Penalties are given to the alliance and not the individual team.

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Minor Penalty #1: Warning

Minor Penalty #2: Lose one (1) point (prior to any multipliers)

Minor Penalty #3: Lose additional three (3) points (prior to any multipliers)

Minor Penalty #4: Lose additional five (5) points (prior to any multipliers)

Minor Penalty #5 Major penalty: Disqualification of the alliance (score is 0)

Disqualifying Violations:

If a team is disqualified by a referee, all robots in the alliance will be turned off and the match immediately ends. The alliance members must cease interacting with balls at the alliance stations, and any points scored by the disqualified alliance during that match are forfeited.

DQ1. An alliance may not gain points by breaking a rule, even accidentally.

DQ2. If stepping over the line affects the outcome of the match, such as when throwing a ball that scores or otherwise affects the outcome, then the alliance will be disqualified.

DQ3. Strategies aimed solely at the destruction, damage, tipping over, or entanglement of robots are not in the spirit of the FIRST Robotics Competition and are not allowed. Accidental tipping over of a robot is not considered damaging and may be allowed at the discretion of the referees. Intentional stabbing, cutting, etc., is illegal. If a breach of this rule occurs, the alliance will be disqualified for that match.

DQ4. Deliberately damaging the playing field, controls, or balls is strictly illegal and will result in disqualification of your alliance. Robot wheels must not, for example, damage the field carpet. Rounded screw heads implanted in rubber wheels may be OK but screw points are clearly not acceptable. This will be checked during robot inspection at registration on the first event day and throughout the competition. Bunching up or puckering the carpet is considered damage to the field.

DQ5. During a match, no team member may intentionally touch any robot, except for reasons of personal safety. If intentional contact is made, the alliance will be disqualified.

DQ6. **No remote communication devices, such as air phones, walkie-talkies, etc., may be used by team members at anytime during a FIRST Robotics Competition event.** These devices may cause interference to the remote control signals and malfunction of robots. Teams found to violating this rule will be subject to the following penalties.

1. First offense, you will be asked to turn off and store the device.
2. Second offense, the device will be confiscated for the remainder of the event and the offender will not be able to participate in his/her team's next scheduled match.
Cell phones and pagers are allowed, but not in the Alliance Station. Remote cameras mounted to a robot are allowed if specific permission is granted by FIRST.

Disabling Violations:

If a robot is disabled by a referee, the robot is turned off for the remainder of the match, and any points scored during that match count. The Students may continue to interact with balls at the alliance station. Their allies may continue to play as normal. If all four robots are disabled, the match immediately ends.

DA1. If a robot accidentally damages the playing field, barriers, balls, or another robot, the referees may disable it for the remainder of the match. If the referees feel that further damage is likely to occur, corrective actions (such as eliminating a sharp edge) will be required to allow the robot to continue competing.

DA2. Robots and/or team members may not contaminate the playing field, balls, bridge, or another robot with lubricants. If this happens, the robot and/or team member will not be allowed to compete until corrective action and approval is given by the head referee.

DA3. Referees may disable any robot that causes a safety hazard during a match.

DA4. A robot may not release any separate part of itself during a match. It must remain whole. If the referee determines a robot has released a part of itself intentionally, the robot will be disabled.

DA5. If a robot goes out-of-bounds to the point that it has to apply force to any out-of-bounds surface to rejoin play, its control system will be disabled. A machine should not be designed to react with an out-of-bounds surface for any reason.

- DA6. For safety reasons, no part of a robot may touch the team members. If this occurs by accident, the robot may be disabled.

F Notes on Playing Field Construction

- F1. All field dimensions listed under playing field construction are specified on the drawings provided with the Manual.
- F2. The playing field carpet rests directly on the floor or a protective floor covering except where otherwise noted.