

# Beyond Botball 2006 Rules & Game Review



# Rules Update History

- 12/14/2005 Game rules first released



# Robot Construction Rules

1. A team's entry (all materials placed on the gameboard) must mass less than 4.5kg (10 pounds).
2. A team's entry (all materials placed on the gameboard) must fit within the starting box which is 38cm long by 30.5cm wide by 38cm high (15" long by 12" wide by 15" high).
3. The team's entry may not contain or release pressurized materials at greater than 7 bar (100 psi).
4. The team's entry may not release any liquids during the game, or before, during, or after the game while the team is at the game table.
5. The team's entry may not release any gasses while at the game table that are considered hazardous by the judges, or are at a temperature below 0°C (32°F) or above 50°C (122°F).



# Robot Construction Rules (2)

6. Robots may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause damage or destruction to the game board or to a reasonably constructed opponent robot.
7. A team's entry may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause jamming or entanglement of a reasonably constructed opponent robot. Blocking and containing of opponent robots is allowed.
8. Robots must operate autonomously (no external power or control from outside of the game board area will be allowed).
9. Each team may only have a maximum of four independent structures on the game board at a time.
10. Each robot must have a name suitable for broadcast over a PA system.



# Robot Construction Rules (3)

11. The contents of the 2006 Botball kit and all previous Botball kits are all legal parts for the 2006 Beyond Botball competition, however participants are NOT limited to those parts.
12. Team entries may NOT contain parts that may reasonably be confused with game pieces (entries may not contain colored foam balls, etc)

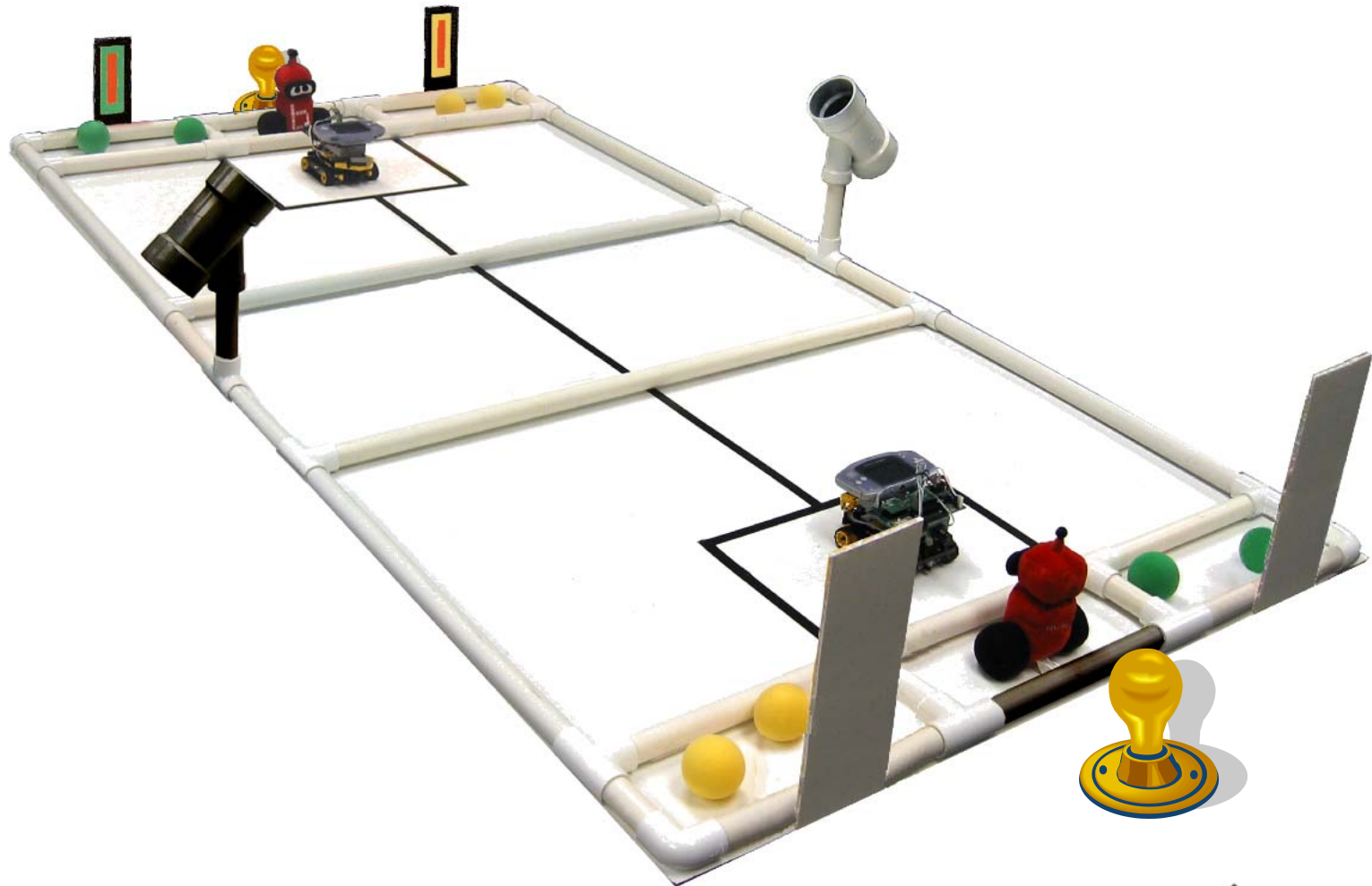


# The Story

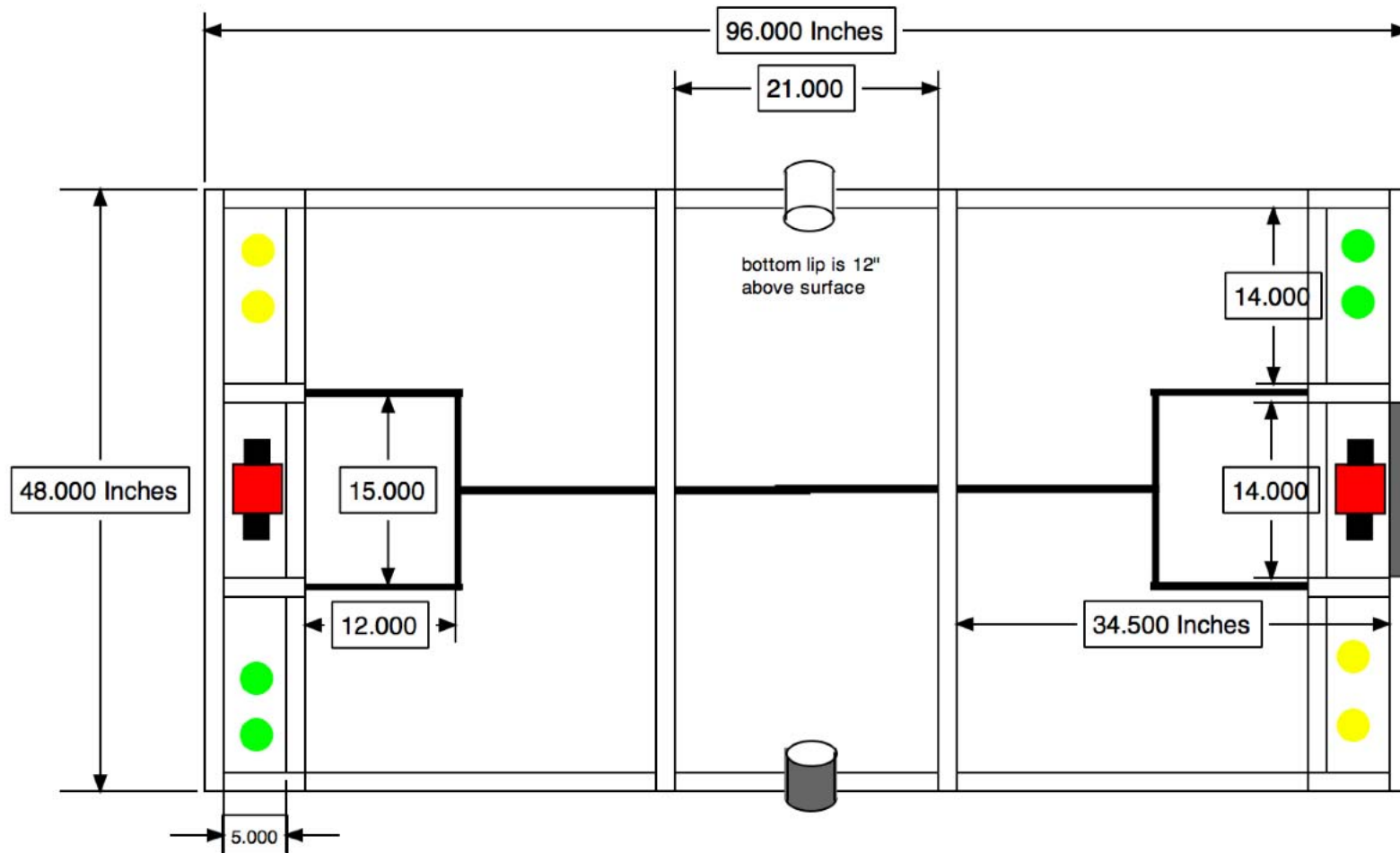
- Disaster has struck Botland. Billy & Betty have been placed in separate shelters, but yellow and green toxic loads are nearby, making the shelters unpleasant. Your job is to reunite Betty & Billy and put the toxic waste in the permanent disposal receptacle.



# The Game Board



# Game Board Layout





# Arena Construction Tools

- **Straight edge**
- **Measuring tape or other rule**
- **Pencil**
- **Rubber mallet (for PVC)**
- **Scissors**
- **Razor knife (for foam core)**
- **Screw driver (to attach targets to PVC)**
- **PVC pipe cutter** (a simple ratcheting knife that cuts PVC both cleanly and accurately)
- **Plastic handle for paint cans (Home Depot)**  
(keeps paint off fingers and reduces spatter)

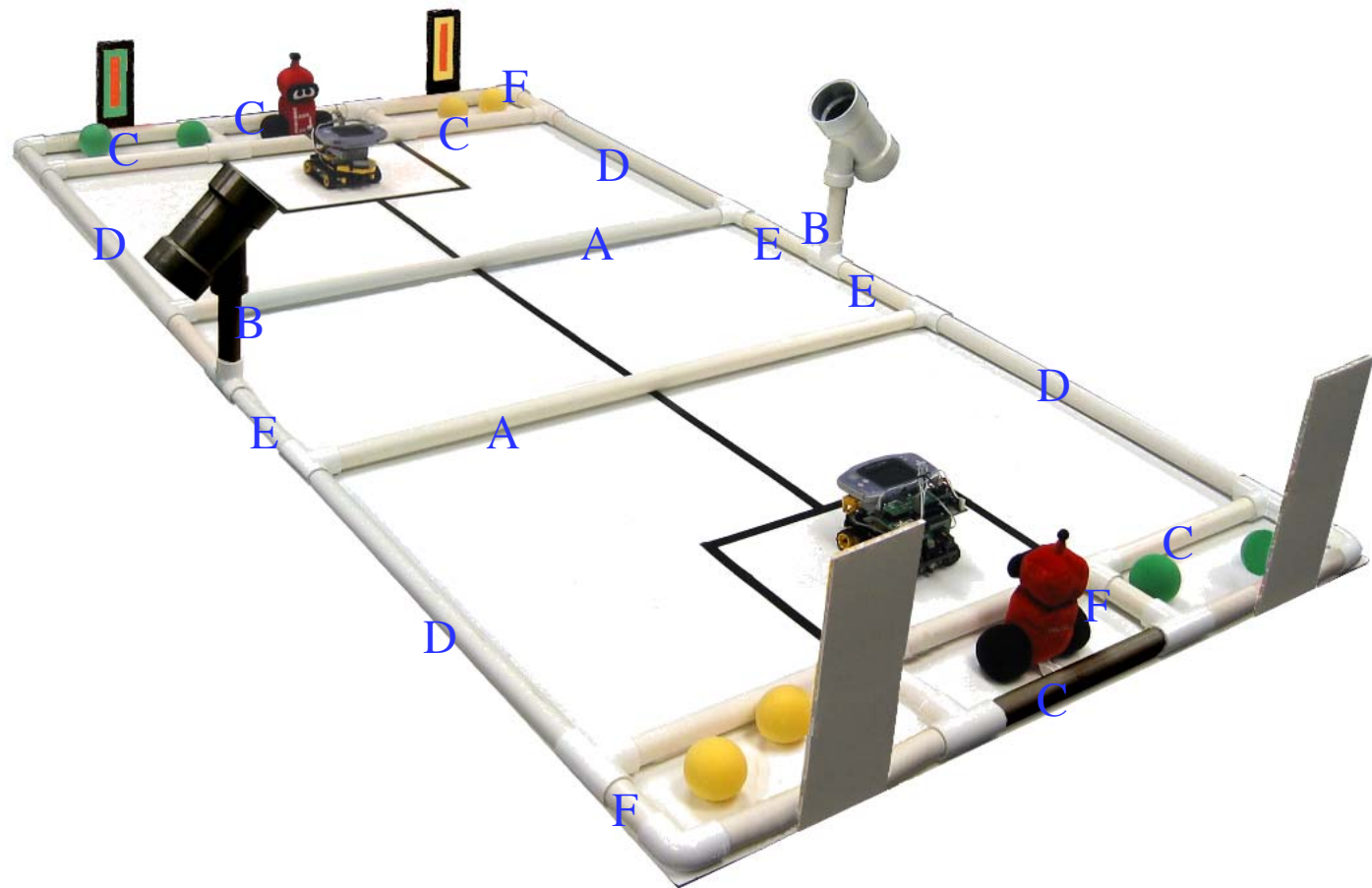


# PVC Parts

- 1" PVC Pipe Lengths
  - A: 45.0" X 2
  - B: 6.0" X 2
  - C: 14.0" X 12
  - D: 28" X 4
  - E: 9.75" X 4
  - F: 5.0" X 8
- 1" PVC Connectors:
  - 90°: X 4
  - T: X 18
  - coupler X 2
- 3.5" PVC
  - cleanout X 2



# PVC Placement



# Non PVC Supplies

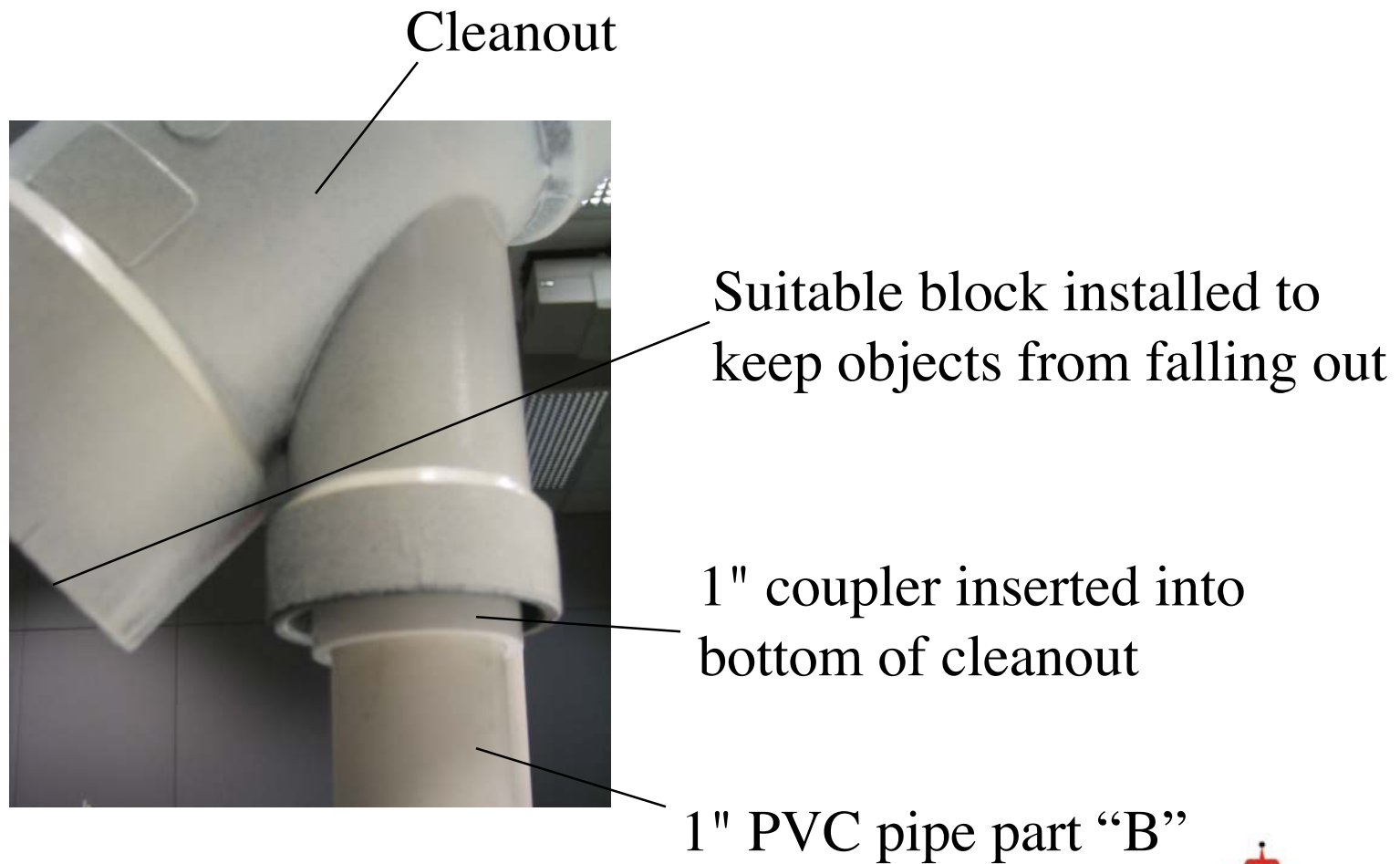
- Paper for targets (any brand: black, AstroBrite: cosmic orange, gamma green & solar yellow)
- 2 - 2.5" yellow foam balls
- 2 - 2.5" green foam balls
- 2 - BeanieBot plush toys

All of the above are available from the KIPR online store as the “2006 Beyond Botball Game Pieces Set”

- 3/4" black electrical tape for start box lines
- 1 – 4' x 8' sheet of smooth white tile board
- 2 – 60W lamps



# Basket Setup



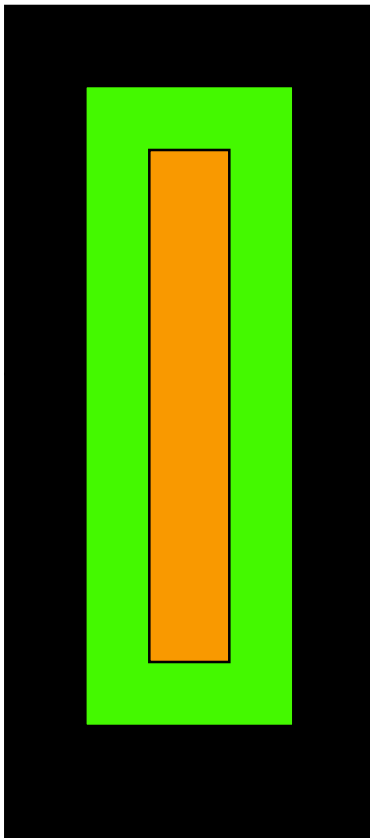
# Basket Height

12" (30.5cm)

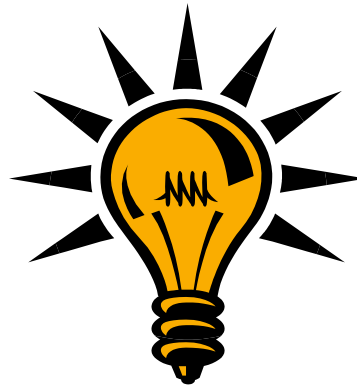


# Targets

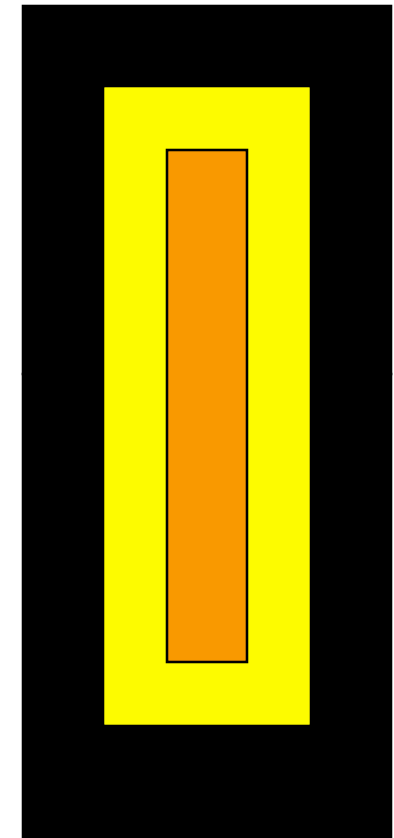
Green Zone



Red Zone



Yellow Zone



Black boxes are 5" x 11"  
(12.7 x 28cm)

Green/yellow boxes are 3" x 8.5"  
(7.6 x 21.6cm)

Orange boxes are 1" x 6.5"  
(2.5 x 16.5cm)

## Targets (2)

- Targets are mounted on a 12.5" x 5" piece of foam core or masonite
- Targets are mounted flush with the top of the mounting board
- The mounted targets are screwed into the PVC at the bottom so that the bottom of the black rectangle is flush with the top of the PVC tube (approx. 1.5")





# Game Board Setup

- The starting box is a 12" x 15" rectangle centered immediately in front of the three end zone compartments
  - the starting box is 12" W x 15" H x 15"L
- The starting boxes and end zones are determined by the inside edges of the tape and the PVC pipe
- The center line of the field is not marked.
- The bottom of the outside of the basket lip is 12" above the surface of the field.
- All measurements on official boards will be as specified within +/- 1/4 inch. Deal with it.



# Game Rules & Scoring

- After “Hands-Off” Robots must stay in starting box until the starting lights come on
- The center region of the field, including the PVC cross-members, is the no-bot zone. Items within the vertical projection of the no-bot zone, but not in a basket are not on either team’s side.
- Each item only counts for points in a single category
- Each team scores points by:
  - removing balls from their side of the field
  - placing balls (from either side) in their basket
  - Removing a single Botguy from their side of the board
  - Getting both members of the Botguy family on their side or in their red zone
- 22 points are added to each team’s score
  - Starting positions of each piece yield -22 points, so a team that does not move any pieces gets a score of 0)



# Black Scoring Summary

	Yellow Balls	Green Balls	Billy Botguy only	Betty Botguy only	Billy & Betty Botguy together
Correctly colored Zone	-4	-4	-6	-6	25 Both in red zone
Anywhere else on Black side	-1	-1	-3	-3	15 Both on same side but at least one not in red zone
Black Basket	10	10	0	0	0
No-bot zone	0	0	0	0	0



# White Scoring Summary

	Yellow Balls	Green Balls	Billy Botguy only	Betty Botguy only	Billy & Betty Botguy together
Correctly colored Zone	-4	-4	-6	-6	25 Both in red zone
Anywhere else on White side	-1	-1	-3	-3	15 Both on same side but at least one not in red zone
White Basket	10	10	0	0	0
No-bot zone	0	0	0	0	0



# Scoring: Balls

- A. Balls count for maximum negative points (-4 pts each) if they are in your color coordinated end zone
- B. Balls count for negative points (-1 pt each) if they are on your part of the field (within the positive vertical projection of your side)
- C. Balls count for maximum positive points (10 pts each) if they are in your basket
  - A ball is in your basket if the center of the ball is inside of the volume of the basket
  - A ball is on your side or in a particular end zone if its center is within the positive vertical projection of the inside edge of the PVC marking your side or zone.



# Scoring: Botguys

- A. A single Botguy in your red zone, with no other Botguy on your side (which remember, excludes the no-bot zone) is -6 points
- B. A single Botguy on your side, but not in the red zone is -3 points
- C. Both Botguys on your side yield 15 points
- D. If both Botguys are in your red zone then you score 25 points
- E. A Botguy is on your side or in your red zone if any part of the Botguy is within the positive vertical projection of your side or your red zone as marked by the inside edge of the corresponding piece of PVC



# Tie Breaking

Tie breaking (in order):

1. The team with both Botguys on their side
2. The team with the the most balls in the basket
3. The team with the fewest objects on their side
4. The team with the fewest objects in the correctly colored zone
5. The team with a robot's power switch closest to their basket



# Seeding/Performance Rounds

- S/P Rounds take place before the double elimination
- S/P rounds consist of best two out of three, unopposed rounds.
- All teams play Black-ball side
- Scoring = (black score) - (white score)
- Scores of less than -1 will be counted as -1
- Passing on a round gives a score of -1 for that round
- Seed Score = average of best two rounds





# Double Elimination Tournament

- A team is out of the tournament when it has lost two games
- Initial matches are decided by seeding round
- Matches are arranged using KIPR tournament software
- Judges' decisions are final



# Double Elimination

- A team's robot must have broken the border of the starting box sometime during the 90 seconds of game play or they will forfeit that round. If a team has two robots, only one is required to break the bounds of the starting box.
- Robots must stop all motors and other actuators at the end of the round. Failure to do so will result in loss of round (unless the other team never broke the starting box).
- If neither team's robots break the starting box bounds during game play, the round will be replayed once. If neither team moves out of the starting box during the replay, the round will be decided by coin flip.
- At least one robot from a team must be outfitted and programmed to respond to the starting light. A robot team that operates exclusively on a timer triggered by a hand operated switch is not allowed and will automatically cause that team to forfeit that round.



# Tournament Logistics

- No part of any non-team member, is allowed over the vertical projection of the outer edge of the pit area (with the exception of tournament staff)
- Robots may only leave the pit to go to the game tables
- Teams will know their side assignment (black or white) at least 1 minute before the match
- Up to 2 members from a team bring the robot to the tournament table and set it up



# Tournament Logistics (2)

- Teams shake hands and visually inspect each other's robots before calibration.
- If either team wants to challenge the validity of the robots they are facing, they have to do it then.
- Inspection is limited to a max of 1 minute unless a specific challenge is made.
- Challenges have to be of the form:
  - That robot contains high explosives
  - That robot's hardened steel spike is designed to damage other robots.
- Judges will be the final arbiter.
  - Judges can dismiss what they believe to be spurious challenges
  - Teams found in violation will (unless the judge decides there have been extenuating circumstances) forfeit that round.
  - In no case will a robot that is determined before the beginning of the round to be in violation of the construction rules be allowed to play while in that state.



# Tournament Logistics (3)

- The starting lights (located directly behind the starting boxes) are on for calibration, then turned off for final calibration
- When both teams are ready or judges decide adequate time has been allowed for calibration, robots are activated and then -- Hands off!
- After Hands off, no part of a team's robot(s) may leave the starting box until the starting lights turn on
  - If this happens, the judges will call a fault on the team
- If a team receives a 2<sup>nd</sup> fault in a round, they forfeit the round



# Tournament Logistics (4)

- When the starting lights turn on the robots must autonomously start
- Lights will remain on for 5 seconds, turn off for 15 seconds and turn back on for the final 60 seconds of the round, flashing the last 5 seconds
- During the first 20 seconds of the round, no portion of a team's entry may pass into or through the positive vertical projection of the opposing team's side (entry into the no-bot zone is allowed)
- Premature entry onto the opposing team's side will causing the offending team to immediately lose the round
- Once the starting lights have lit, the round counts unless a judge rules outside interference.



# Tournament Logistics (5)

- Robots may NOT send reprogramming commands before, during or after a round.
- Teams cannot use infrared links to program their robots within 10 yards of the game board
- Teams may not broadcast ANY physical or electromagnetic signals to their robots once the teams are in “Hands-Off”.
- Robots must cut power to their motors and turn off or stop issuing motion commands to servos by the end of the round or risk forfeiting the round
- Scoring is based on the location of pieces at the end of the round, not how the pieces got there.
- Judges may at any time, while a robot is on the table, decide that a robot is in violation of construction rules, and then disqualify that robot for that round. Judges will not accept challenges to robots from the peanut gallery. Challenges must come from the judges or the teams at the table.



# Tournament Logistics (6)

- Construction rules apply only to what is brought to the Game Table.
- There are no instant replays, we do not want to see videos of questionable decisions. If a team is unhappy with a judge's decision, they should challenge it then and there. Challenges to scoring after the teams have left the table, will not be considered.
- Teams cannot touch, borrow equipment, modify robots or computers, or beam commands to another team's stuff (including their pit table) without the permission and presence of a member of that team
- The security of a team's equipment is the responsibility of that team -- **don't leave valuables unattended.**



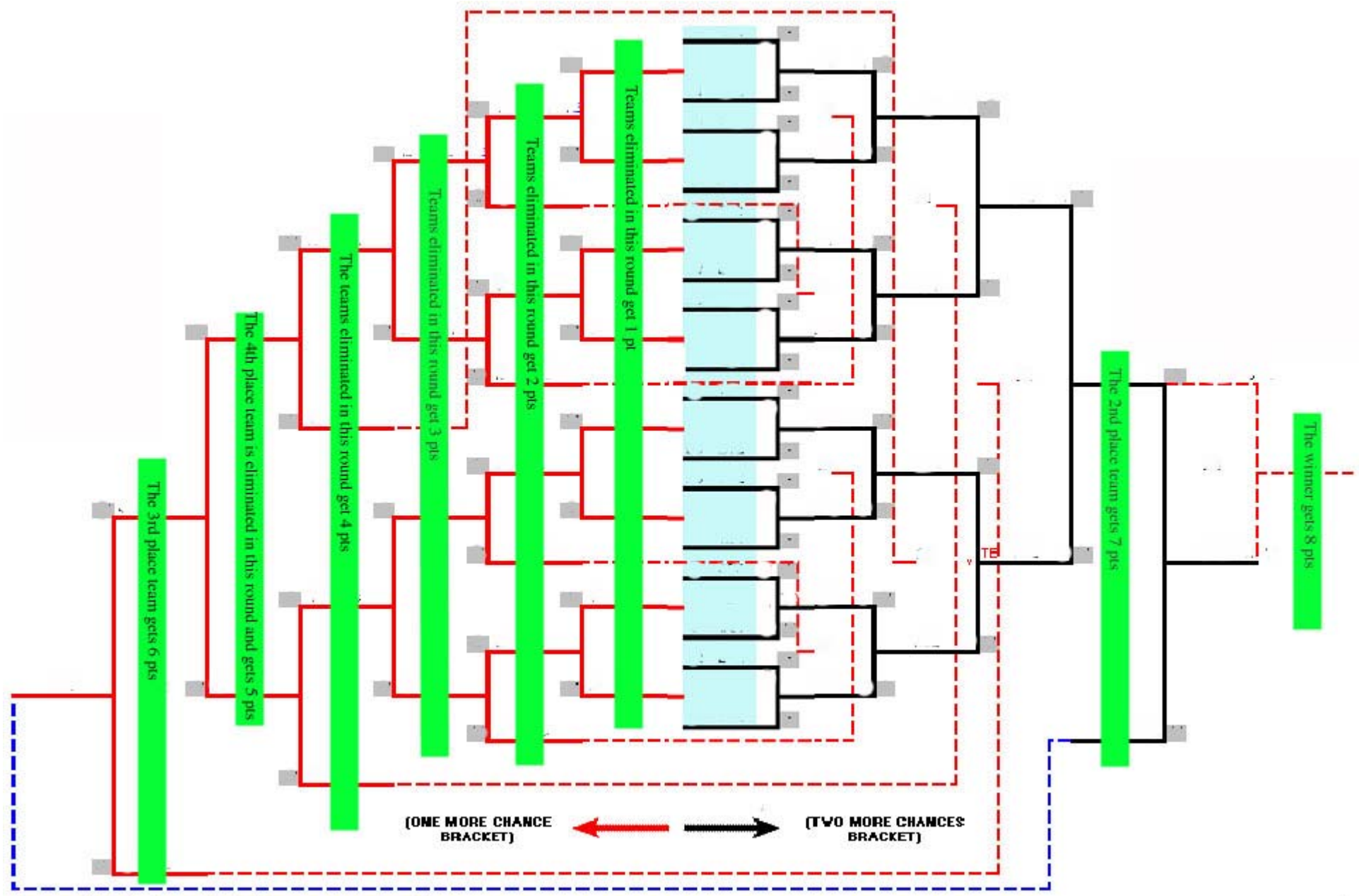


# Winner

- Trophy winners will be selected by summing their points in each of the two contests ( $N = \#$  of teams):
  - Seeding rounds:
$$\text{LOG}_2 (N/\text{rank}) + \text{LOG}_{10}(3 * (\text{seed\_score} + 2))$$
  - Double elimination:  
winner gets:  $2 * \text{Ceiling}(\text{LOG}_2 N)$   
(see next slide)



For  $8 < N \leq 16$ : Max score =  $2\text{LOG}_2 16 = 8$



# Scoring Example

- Winning the double elimination does not guarantee winning the tournament
- In a 16 team contest, a team that wins the seeding with a score of 59 gets ( $4+2.66=6.66$ pts) and then finishes 7th or 8th in the double elimination (3pts) would have 9.66pts
- A team that finishes 9th in the seeding with a score of 15 ( $.83+1.71=2.54$ pts) and wins the double elimination (8pts) would have a total of 10.54pts



# Team Membership

- Beyond Botball team members must be beyond High School in their educational careers
- College students, professional engineers, hobbyists, poets, and anyone else fulfilling the criteria above are all encouraged to participate



# Things to do Before You Come to the Tournament...

- Test your robots from start to end:
  - Go through the entire starting sequence
  - Make sure you can calibrate to the starting light
  - Make sure the robots stop when they are supposed to: verify with a stop watch!
- **Does the starting sequence work with very bright overhead lights** (tournament tables will have bright lights hung about five feet above the tables) - **Test the shielding of your sensors!**



Check  
[www.botball.org](http://www.botball.org)  
*regularly*  
Good Luck!

