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MICROCHIP

PAINTBALL ROBOT COMPETITION

THEME & RULES

The Importance of Safety

Safety is one of the most important elements in the sustainable development of the MALAYSIA UNIVERSITY ROBOT COMPETITION. The safety of the robots themselves is the first and foremost issue for the safe holding of the contest. The participating teams, as the robot designers, are responsible for the safety of their robots. The teams must work and cooperate closely with the organizers to ensure the utmost safety of the contest. Safety must always be the top priority and it must be considered for all people involved in the contest as officials, participants or spectators in all circumstances. Teams are required to pay sufficient attention to the safety of their robots on this basis before applying to take part in the contest.

Outline of the Contest

Paintball Robot is a game based on an actual paintball competition. The basic rule of the games is approximately same with the paintball competition. The robots are considered **ACCOMPLISH** the task when the robots can bring back the competition flag to the starting zone.

Each match is contested by red and blue teams. A match lasts five minutes. Each team is represented by 3 operators responsible in controlling the robot via remote control, 3 pit crews responsible for setting up of the robots and an instructor.

Field: Structure and Specifications See Figure 1

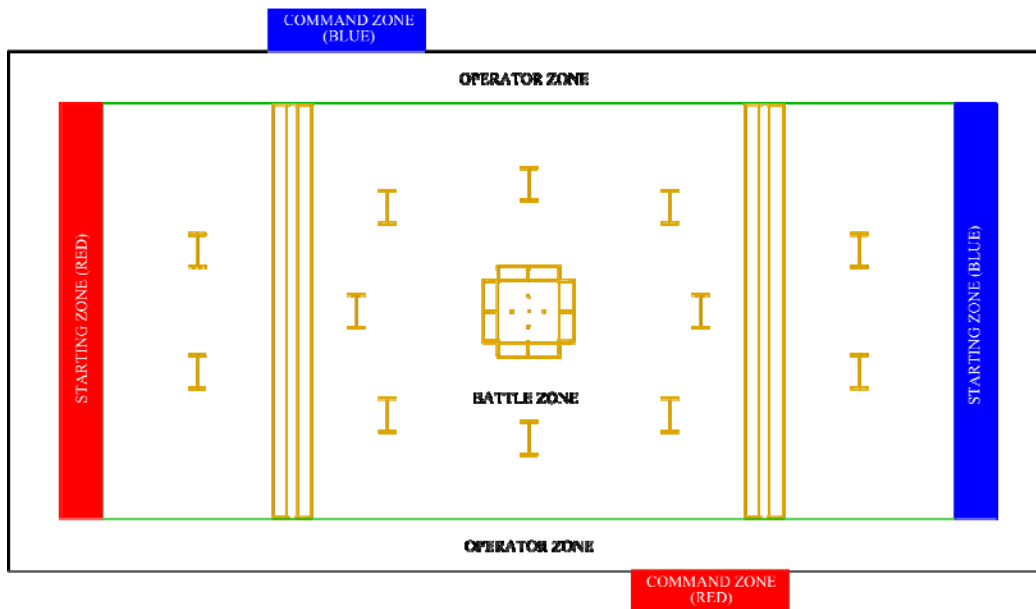


Figure 1

1. *Field* general dimension = 50' (long) x 140' (width)
2. The game field will be surrounded with high shelter.

Note: For detail of *field* dimension, kindly please download CAD files (AutoCAD compatible) from the website, www.unimap.edu.my/~muroc

Specifications for the *Flag* See Figure 2

1. The *Flag* pole is made from standard PVC pipe with diameter 0.8".
2. The length of the pole is 24".
3. The size of flag is 12" long and 8" width.

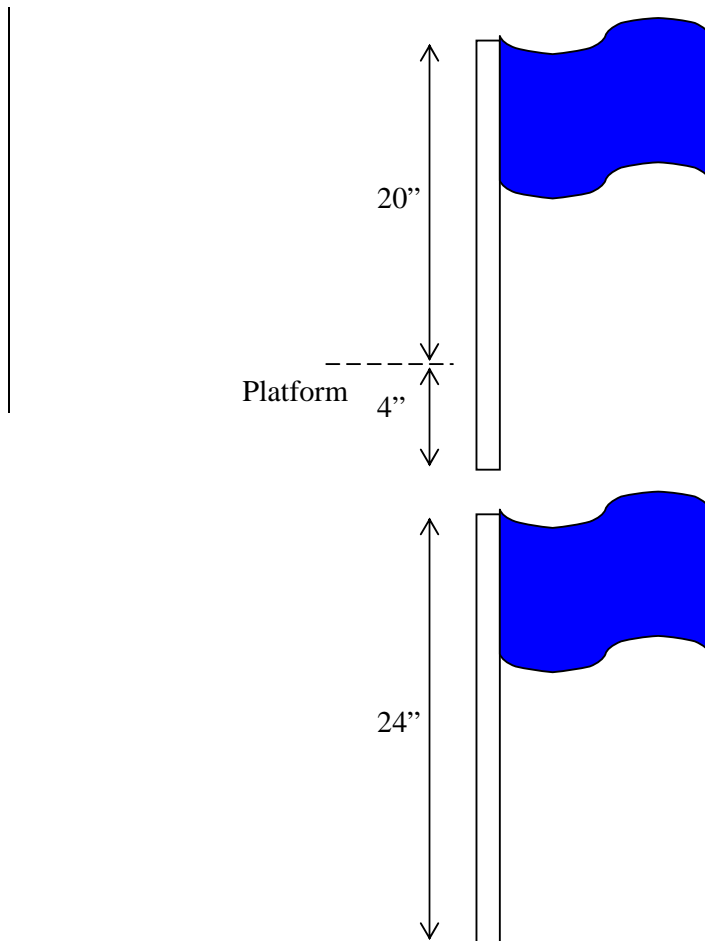


Figure 2

Game Procedure

Length of a match

1. Each match lasts **FIVE (5)** minutes.
2. In the following cases, a match ends even before the passage of five (5) minutes.
 - a. When the **ACCOMPLISH** is achieved.
 - b. In the event of disqualification.
 - c. When the referees judge that continuation of the match is impossible.

Setting of robot

1. Only three robots are allowed to enter the game field. However, reserve robots are allowed if the robot cannot work before the game (during the setting time) is started.
2. One minute is provided for setting of robot before the start of each match.
3. Three members (Pit crew) of each team may engage in setting of robot.

4. Any team that fails to complete setting of robots in one minute shall be able to resume the setting work once the match has begun.
5. Each robot will be given 30 pallets only. The balance of the pallets will be collected after each game.

Deployment of the robot and team members at the start of the match

1. The *Paintball Robot* shall be placed in the *Start Zone*.
2. Team member responsible for controlling the *Paintball Robot* shall wait at the operator zone. They are not allowed to start inside the *Field*.
3. The instructor must wait at the command center.

Starting the *Paintball Robot*

1. A team member shall start the *Paintball Robot* by a remote control operation.
2. After the robot leave the starting zone, the pit crew's member who performs the starting operation shall immediately leave the *Field*.

Competition Tasks

Once the match has begun, each team shall try to complete both of the tasks:-

1. The task of killing the enemy (The *Task of Kill*).
2. The task of seize the flag (The *Task of Seize*).

Task of Kill

1. The robot shall shoot the opponent robots. The robot can be assumed *decease* after been shot 2 times.
2. The field referees will decide which robot should be stopped and/or removed.

Task of Seize

1. The robot shall take hold of flag and bring back to the starting zone.
2. However, if the robot has been killed by the opponent robot on it way to the starting zone, the fields referees will take the flag and place it back at *flag zone*.

How to achieve the *Accomplish*

1. The *Accomplish* is achieved once a team's *Paintball Robot* brings back the command flag to the starting zone.
2. The referees shall judge whether the enemies has been killed or not.

Retries for Robots

1. In the case of a violation, the referees shall instruct the team to start again (*Retry*).
2. In the case of faulty robot movements, it is possible to start again (*Retry*) with the referees' permission.
3. Team members are permitted to touch the robots while preparing for a *Retry*.
4. *Retry* shall be made from the *Starting Zone*.
5. At the time of the *Retry*, team members shall switch the robot on to start it. After switching the robot on, the team member who performs the starting operation shall immediately leave the *Field*.
6. Only a single switch operation is permitted for each robot.
7. *Retries* can be made as many times as necessary.
8. Strategies premised on the use of *Retries* are banned.

Deciding the Winner

1. The team whose *Paintball Robot* has seize the flag to the starting zone shall achieve the *Accomplish* and be the winner. This ends the match.
2. If neither team has achieved the *Accomplish* at the end of the 5 minutes match, the winner shall be decided in the following order of priority:
 - a. The team that have greater marks is the winner
 - b. The team that has killed the greater number of enemies is the winner.
 - c. The team that has its robot closest the flag OR grasp the flag is the winner.
3. Points
 - a. Kill the opponent robot = 10 marks
 - b. Enter the flag zone = 5 marks
 - c. Pull out the flag and successfully exit flag zone = 15 marks
 - d. Return to the starting zone with flag (*Accomplish*) = 50 marks
4. If the winner has not been settled by any of the above, the winner shall be chosen by the judges.

Conditions and Points to Watch out for in Designing and Manufacturing Robots

1. Each team shall use only THREE robots. However, reserve robots (1 only) are allowed (during the setup time) if the main robots cannot work before the game started.
2. Each robot **MUST** use **AT LEAST ONE Microchip PIC® MCU** product, as the company is our Exclusive Technology Partner for this event. The construct of the robot should be design to enable easy inspection for the mentioned product at anytime.
3. The robots may not divide into sub-units.
4. The remote control (transmitter and receiver) between the robot and operator **MUST** use changeable frequency system to avoid any interference especially with the opponent robots. The frequency value to be used during the games will be decided and declared by the field referees.
5. All team must bring at least six different frequency value of crystal to be used during the games.

6. Radio communication between operators from the same team is permitted. But it is limited between the three operators and instructor.
7. The robot used in the contest must be handmade by students or staffs of the university to which the team belongs.

The *Paintball Robot*

1. The *Paintball Robot* shall switch ON (by a single switch operation) once it has been started by a team member.
2. The minimum dimensions of the robot **shall not less** than 300 mm (long) x 300 mm (wide) x 300 mm (tall).
3. The dimensions of the robot **shall not exceed** 800 mm (long) x 800 mm (wide) x 800 mm (tall). The robot cannot be expanded more than this dimension.
4. The body of the robot must be place with a circle metal plate with a minimum dimensions 100mm (height) x 250mm (diameter) x 1mm (minimum thickness) as shown in figure 3 below. The circle plate must be colored with white color.

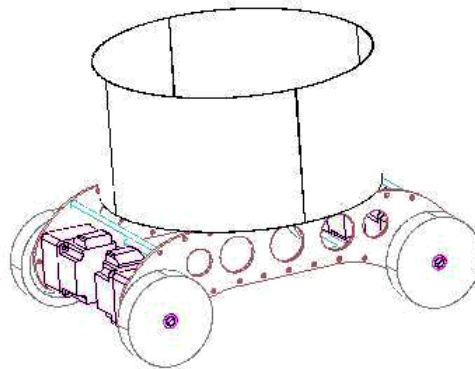


Figure 3: Circle metal plate

5. The robot must be powered not greater than 24 Volt.
6. To avoid any damages to the robot, all teams are advised to cover up their robot body as a shield from paintball.
7. The robot must be designed to operate under unexpected environment such as wet game field or high humidity ambience.
8. **The robot must use commercial paintball marker (gun) that available in the market only.** The use of handmade paintball marker is strictly prohibited.

Detailed rules on safety

1. The use of explosives, fire and dangerous chemicals is prohibited.
2. If a laser is used, it shall be of Class 2 or less. In designing and preparing the laser, full care must be taken to protect all persons at the venue from

harm during all procedures. In particular, the beams must be so oriented that they cannot shine into the eyes of the spectators.

Examination of the robots

1. Participating robots shall be examined prior to the test run on the day before the contest and again on the day of the contest before it begins. A team that fails an examination shall not be allowed to participate in the test run or contest.
2. Details of what will be examined will be provided at a later date.

Violations

1. If a violation occurs, a *Retry* shall be made by bringing the robot back to the *Starting Zone*. The place and method of the *Retry* is laid down in "Retries for Robots". 10 marks will be deducted from the final points. The following cases are violations:
 - a. Any part of robot or touch the opposing team robot.
 - b. Any part of robot enters onto the border line of field or into the space above it.
2. Other actions that infringe on the rules without producing disqualification.

Disqualification

A team shall be disqualified if it commits any of the following during the match:

1. The team damages or tries to damage the *Field* and/or facilities and equipment or opponent's robots.
2. The team performs any act that is not in the spirit of fair play.
3. The team fails to obey instructions and/or warnings issued by the referees.

On the Safety of the Robots

1. All robots shall be so designed and manufactured as to pose no danger of any kind to any person in the venue.
2. All robots shall be so designed and manufactured as to cause no damage to any robot of an opposing team or the *Field*.

Teams

1. Each participating university in the contest can be represented by one team only. UniMAP, as Host University, may be represented by two teams.
2. A team consists of three students and one instructor who all belong to the same university. The three students of the team are entitled to participate in the match itself. The organizer defines the term of 'student' is undergraduate and postgraduate student.
3. In addition, a three-member pit crew can adjust the robots in the pit room and help to carry the robots to the Field, but cannot participate in the

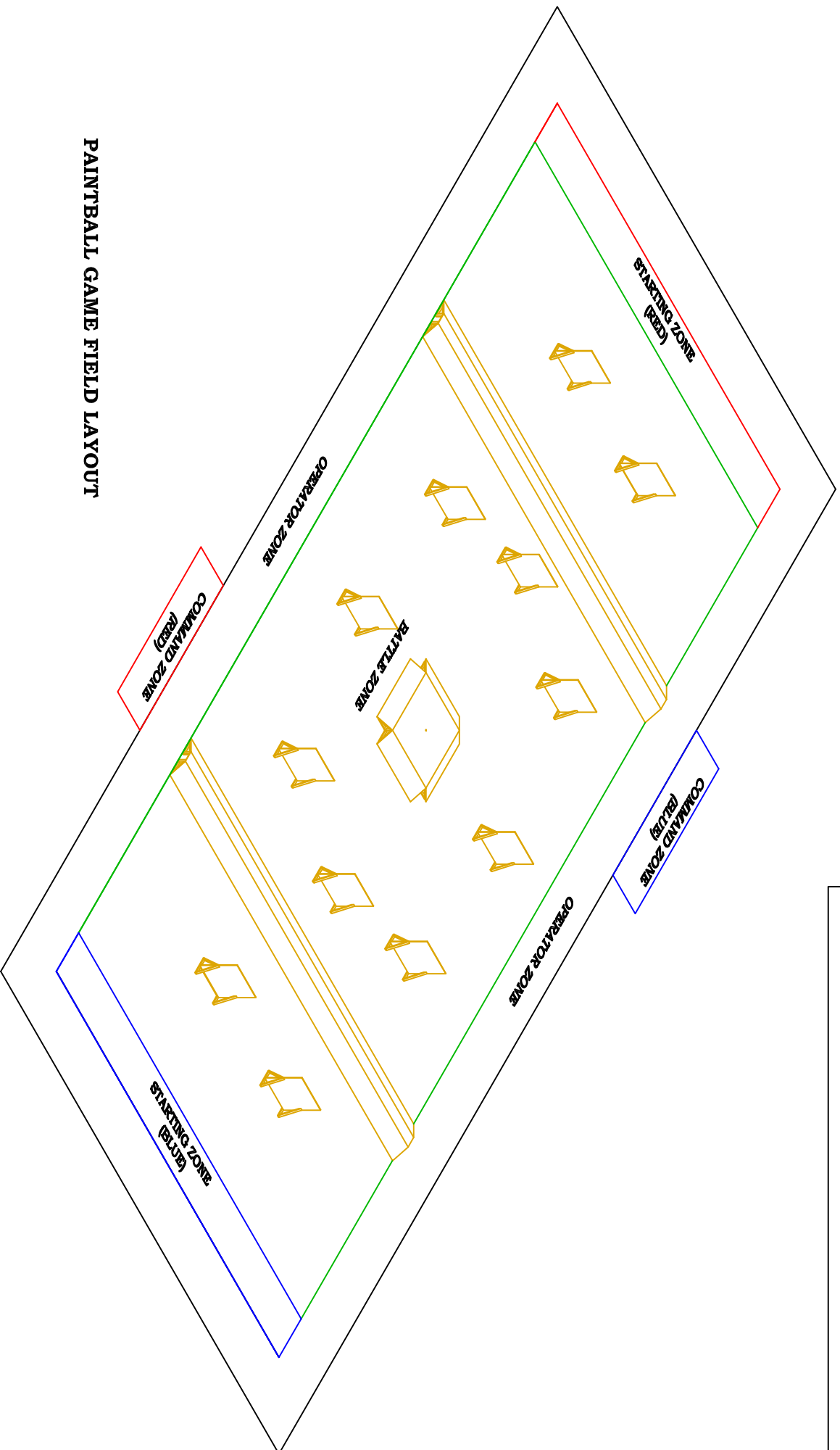
match itself. The members of the pit crew must be students of the same university as the team.

Others

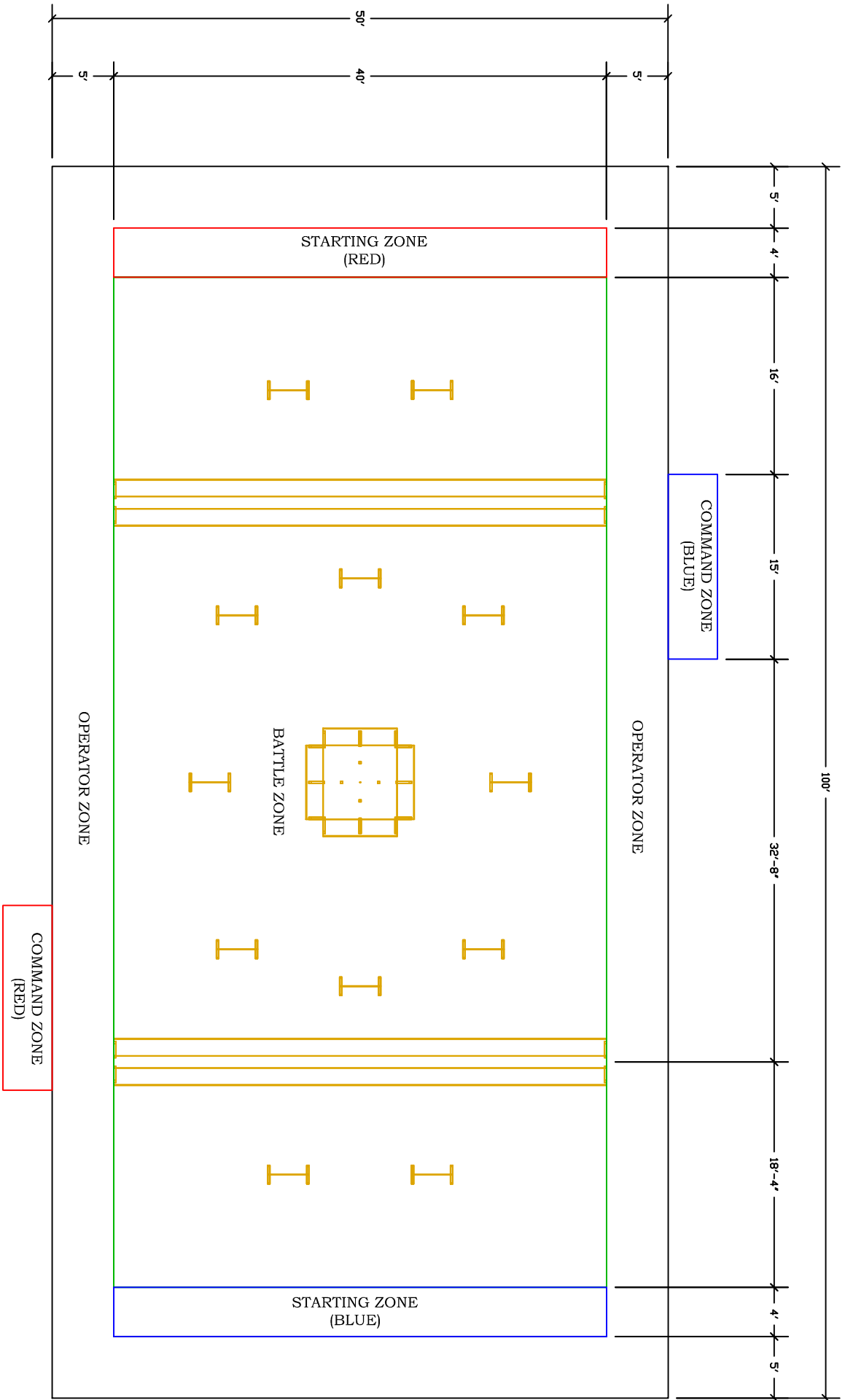
1. The legitimacy of any action not provided for in this rule book shall be subject to discretion of the referees.
2. The dimensions, weights etc. of the *Field* and other facilities and equipment described in this rule book have a margin of error of plus or minus 5% unless otherwise stated.
3. All questions should be addressed to the official website of the Malaysia University Robot Competitions (<http://www.unimap.edu.my/~muroc>). A Q&A section will be provided on the site.
4. Notification of any addition and/or correction to this rule book shall be made on the official web site.
5. The referees may demand additional explanations on safety issues when the safety of a robot is deemed to be in question.



MURROO 2012
MALAYSIAN UNIVERSITY ROBOT/COMPETITION



PAINTBALL GAME FIELD LAYOUT



PAINTBALL GAME FIELD LAYOUT
(ALL UNIT IN FEET AND INCHES)

