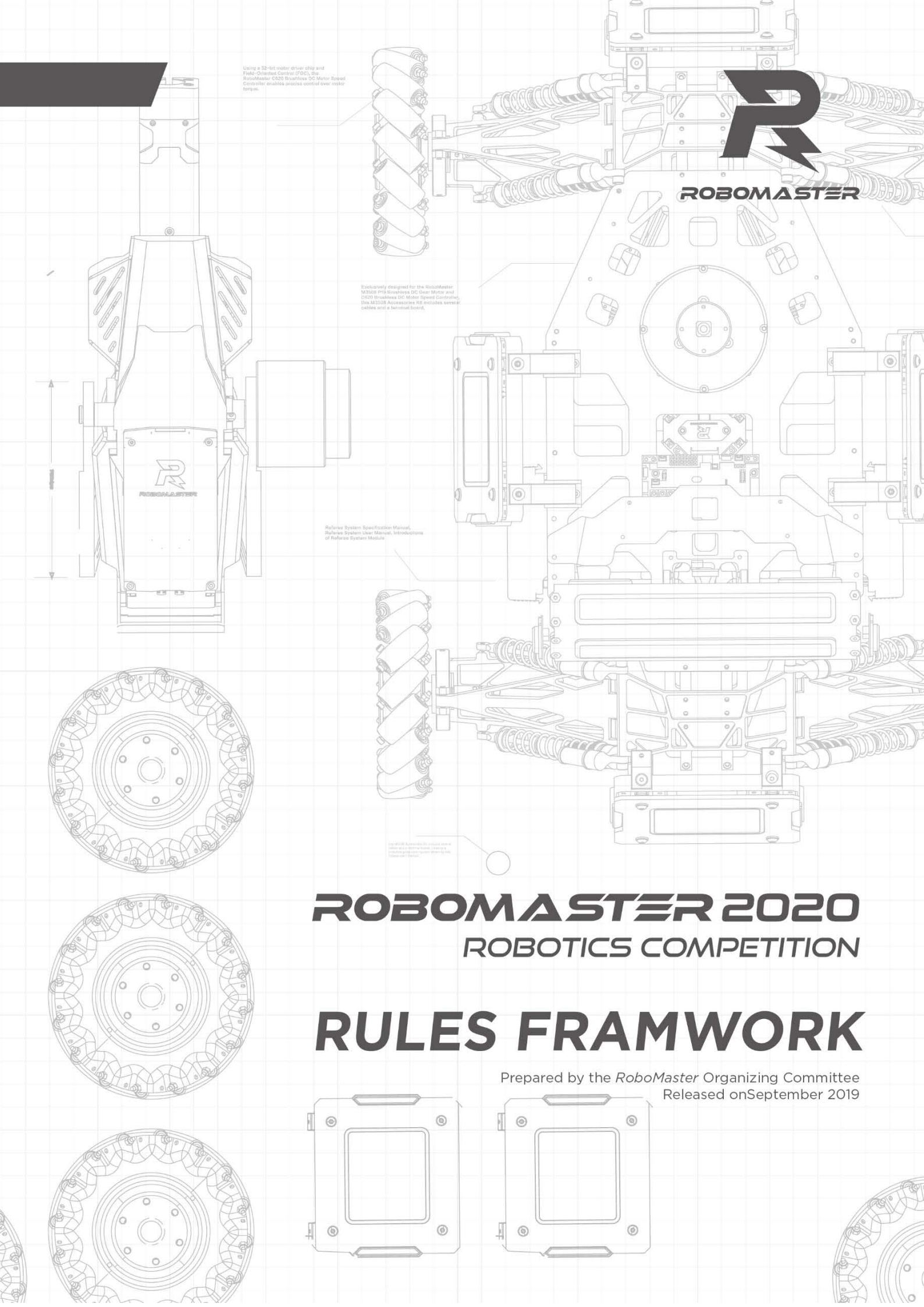

ROBOMASTER 2020
ROBOTICS COMPETITION

RULES FRAMWORK

Prepared by the *RoboMaster* Organizing Committee
Released onSeptember 2019

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Using This Manual

Content of this Rules Framework hasn't been determined yet. More information is subject to the latest announcement released by the RoboMaster Organizing Committee (hereinafter referred to as "the RMOC").

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Foreword

All RoboMaster 2020 Robotics Competition participants should abide by the rules and the relevant documents of the competition. Three main entry specification documents are required for the RoboMaster 2020 Robotics Competition. They are RoboMaster 2020 Robotics Competition Rules Manual, RoboMaster 2020 Robotics Competition Robot Building Specification Manual, and RoboMaster 2020 Robotics Competition Participants Manual. All documents are subject to the latest version released by the RMOC).

1. Introduction

The core form of RoboMaster 2020 Robotics Competition is a shootout between robots that can be either remotely operated or fully-automated. To win the competition, one must attack the opposing team's robots with projectiles or destroy the opponent's Base. To participate in the competition, teams must design, develop and build multiple robots that meet the requirements.

Compared with the 2019 Season, the 2020 Season has the following changes:

Robot

- Cancel the top Armor Module and adjust the Level Up Mechanism of Hero and Standard
- Engineer can revive Standard and Hero by swiping the RFID card and can supply projectiles via the Projectile Supplier
- Sentry is vested with 100% defense status and a mechanism related to Outpost
- Adjust Base’s defense status and add a mechanism related to Outpost
- Add new robots: Missile Launching System, Radar Station

Competition Area

- Drop height of the Competition Area is higher with Highlands
- Add Outpost

2. Competition Area

2.1.1 Base

The maximum HP of Base is 5000 and each team has its own Base.

If robot stays at the designated area near Base of its own side, it can obtain 50% defense bonus and the barrel cooling value per second is increased to 3 times.

After hitting by Missile, gain nearby Base will disappear for 30 seconds.

For mechanism between Base and Sentry, please refer to 3.1.6.2 Mechanism related to Base. For mechanism between Base and Outpost, please refer to 2.1.2 Outpost.

2.1.2 Outpost

The maximum HP of Outpost is 2500 and each team has its own Base.

If robot stays at the designated area near Outpost of its own side, its barrel cooling value per second is increased to 3 times.

After hitting by Missile, gain nearby Outpost will disappear for 30 seconds.

When Outpost is destroyed, the 100% defense status of Sentry and the invincible status of Base of this side will be removed.

2.1.3 Power Rune

The rotate speed of Power Rune will change with the strike process.

3. Technical Specification

3.1 Robot Technical Specification

Under the premise that each robot meets its specification requirement, an extra 17mm Launching Mechanism can be configured onto any one of the ground robots except Sentry. The extra Launching Mechanism should meet the corresponding demands like the initial firing speed limit for projectiles and can only be equipped with one laser sight.

e.g.: According to specification stated in 3.1.4 Standard, Standard can be configured with one 17mm Launching Mechanism. Under such premise, teams can configure the extra 17mm Launching Mechanism onto one Standard in accordance with their needs. Thus, this Standard has two 17mm Launching Mechanism.

3.1.1 Robot Lineup

Teams that meet a certain entrance lineup can participate in the competition, for details, please follow manuals to be released.

RoboMaster requires robots to fight together as a team. Good teamwork is therefore critical to victory. Below shows the robot lineup.

Table 3-1 Robot Lineup

Type	Full Lineup Qty.	Eligible Competition
Hero	1	Chinese Regional Competition, International Regional Competition, Wild Card Competition and the Final Tournament
Engineer	1	
Standard	2	Chinese Regional Competition
	3	International Regional Competition, Wild Card Competition and the Final Tournament
Aerial	1	Chinese Regional Competition, International Regional Competition, Wild Card Competition and the Final Tournament
Sentry	1	
Missile Launching System	1	

Type	Full Lineup Qty.	Eligible Competition
Radar Station	1	

3.1.2 Hero

Below shows Hero's specification:

Table 3-2 Hero Specification

Item	Limit	Violations and Penalties	Notes
Initial HP	300	-	-
Operating Mode	Manual, configured up to one remote controller	-	-
Maximum Total Power Supply Capacity (W·h)	200	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (v)	30	Unable to pass the pre-match inspection	-
Maximum Chassis Power Consumption (W)	120	HP deduction	For details of buffer energy, please follow manuals to be released
Launching Mechanism	A 42mm Launching Mechanism	-	Can only be equipped with one laser sight
Projectile Supply Capability	Can only receive	-	-
Initial Projectile Quantity (round)	0	-	-
Initial Firing Speed Limit for Projectiles (m/s)	16	HP deduction	-
Projectile Launch Speed (round/s)	Negatively correlated with initial velocity	HP deduction	For details, please follow manuals to be released

Item	Limit	Violations and Penalties	Notes
Maximum Weight (kg)	35	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System
Maximum Initial Size (mm, L*W*H)	800*800*800	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 800*800 square
Maximum Expansion Size (mm, L*W*H)	1200*1200*1200	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 1200*1200
Referee System	Four large Armor Modules, Speed Monitor Module (42mm projectiles)	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 4.3 kg

3.1.3 Engineer

Major changes:

- Can obtain Projectile Containers on the ground (Resource Island has no steps)
- Enter the Projectile Supplier to supply projectiles and serve as a mobile Projectile Supplier
- Rescue way:
  - Revive defeated robots of its own side with RFID cards that it carries
  - Rescue defeated robots to the Restoration Zone of its own side

Table 3-3 Engineer Specification

Item	Limit	Violations and Penalties	Notes
Initial HP and Maximum HP	500	-	-

Item	Limit	Violations and Penalties	Notes
Operating Mode	Unlimited but can be configured up to one remote controller	-	-
Maximum Total Power Supply Capacity (W·h)	200	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (V)	30	Unable to pass the pre-match inspection	-
Maximum Chassis Power Consumption (W)	Unlimited	-	-
Projectile Supply Capability	Can receive and supply	-	-
Initial Projectile Quantity (round)	0	-	-
Maximum Weight (kg)	35	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System
Maximum Initial Size (mm, L*W*H)	800*800*800	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 800*800 square
Maximum Expansion Size (mm, L*W*H)	1200*1200*1200	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 1200*1200 square

Item	Limit	Violations and Penalties	Notes
Referee System	Four small Armor Modules, Video Transmission Module (Transmitter), RFID Interaction Module, Positioning System Module, Main Controller Module, Power Management Module, Light Indicator Module	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 2.6 kg

3.1.4 Standard

Below shows Standard's specification:

Table 3-4 Standard Specification

Item	Limit	Violations and Penalties	Notes
Initial HP	100	-	-
Operating Mode	Manual, configured up to one remote controller	-	-
Maximum Total Power Supply Capacity (W·h)	200	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (v)	30	Unable to pass the pre-match inspection	-
Maximum Chassis Power Consumption (W)	120	HP deduction	For details of buffer energy, please follow manuals to be released
Strength	Drop freely at a vertical height of 0.2 m three times without any damage to any position of the body	-	-

Item	Limit	Violations and Penalties	Notes
Launching Mechanism	A 17mm Launching Mechanism	-	Can only be equipped with one laser sight
Projectile Supply Capability	● Can only receive projectiles ● Can enter the official projectile supplier to complete the projectile supply action	Unable to pass the pre-match inspection	-
Initial Projectile Quantity (round)	0	-	-
Initial Firing Speed Limit for Projectiles (m/s)	30	HP deduction	-
Projectile Launch Speed (round/s)	Negatively correlated with initial velocity	HP deduction	For details, please follow manuals to be released
Maximum Weight (kg)	25	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System
Maximum Initial Size (mm, L*W*H)	600*600*500	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 600*600 square
Maximum Expansion Size (mm, L*W*H)	800*800*800	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 800*800 square

Item	Limit	Violations and Penalties	Notes
Referee System	Four small Armor Modules, Speed Monitor Module (17mm projectile), Video Transmitter Module (Transmitter), RFID Interaction Module, Positioning System Module, Main Controller Module, Power Management Module, Light Indicator Module	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 3.0 kg

3.1.5 Aerial

Below shows Aerial's specification:

Table 3-5 Aerial Specification

Item	Limit	Violations and Penalties	Notes
Initial HP	-	-	-
Operating Mode	Unlimited but can be configured up to two remote controllers	-	-
Maximum Total Power Supply Capacity (W·h)	To be determined	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (v)	48	Unable to pass the pre-match inspection	-
Launching Mechanism	A 17mm Launching Mechanism	-	Can only be equipped with one laser sight
Projectile Supply Capability	Can only receive	-	-

Item	Limit	Violations and Penalties	Notes
Initial Projectile Quantity (round)	500	-	-
Initial Firing Speed Limit for Projectiles (m/s)	30	Attack time deduction	-
Projectile Launch Speed (round/s)	Unlimited	-	-
Maximum Weight (kg)	To be determined	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System
Maximum Initial Size (mm, L*W*H)	To be determined	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 1700*1700 square
Referee System	Speed Monitor Module (17mm projectile), Video Transmitter Module (Transmitter), Positioning System Module, Main Controller Module, Power Management System	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 0.6 kg

Production Requirements

- Aerial must be fitted with propeller cages.
- Aerial must be fitted with exterior light.

3.1.6 Sentry

Below shows Sentry's specification:

Table 3-6 Sentry Specification

Item	Limit	Violations and Penalties	Notes
Initial HP	600	-	-
Operating Mode	Fully Automatic and configured up to one remote controller for debugging	-	-
Maximum Total Power Supply Capacity (W·h)	200	Unable to pass the pre-match inspection	The total capacitance of the robot does not exceed 10 mF
Maximum Power Supply Voltage (v)	30	Unable to pass the pre-match inspection	-
Maximum Chassis Power Consumption (W)	30	Unable to pass the pre-match inspection	Buffer energy is 200 joules
Launching Mechanism	Two 17mm Launching Mechanisms	-	• Can install only one laser sight • During each match, when the total number of projectiles that have been launched reaches 500 rounds, both Launching Mechanisms power off.
Projectile Supply Capability	Cannot supply	-	-
Initial Projectile Quantity (round)	500	-	-

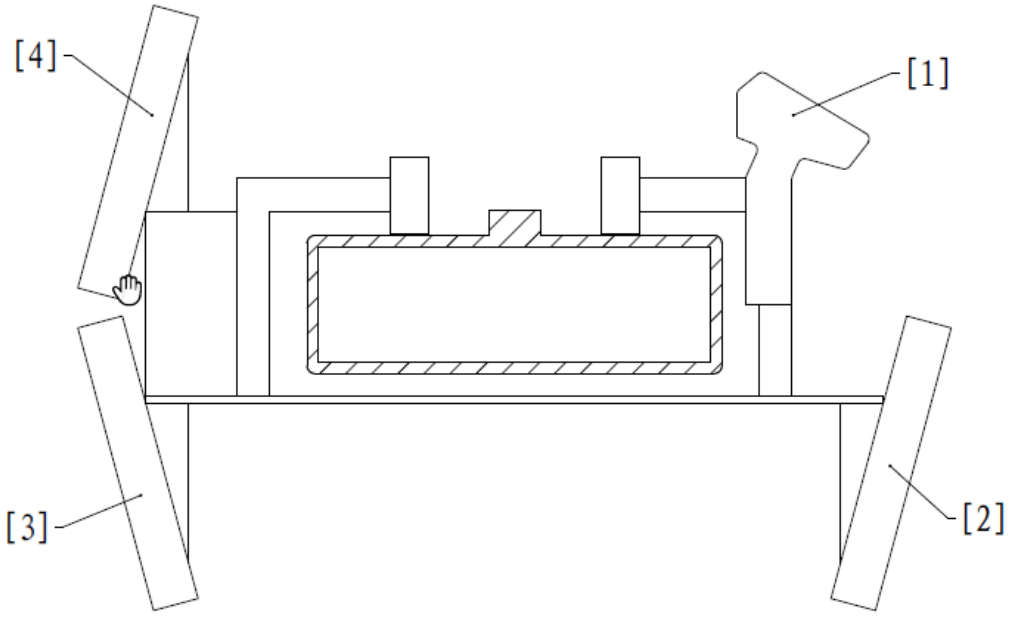
Item	Limit	Violations and Penalties	Notes
Initial Firing Speed Limit for Projectiles (m/s)	30	HP Deduction	-
Projectile Launch Speed (round/s)	Negatively correlated with initial velocity	HP deduction	For details, please follow manuals to be released
Barrel Heat Limit	480	-	Calculated separately for each Launching Mechanism
Barrel Cooling Value Per Second	160	-	
Maximum Weight (kg)	15	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System
Maximum Size (mm, L*W*H)	Choose one of the following solutions: ● 500*600*800 ● 800*500*600	Unable to pass the pre-match inspection	● The maximum size of Sentry below the upper surface of the Sentry track is no more than 450 mm (include the maximum expansion size) ● Light Indicator Module is mounted on any side of the track and must be above the upper surface of the track ● Light Indicator Module, Positioning System Module and its bracket are not included into the overall size constraints

Item	Limit	Violations and Penalties	Notes
Referee System	Three large Armor Modules, two Speed Monitor Module (17mm projectile), Positioning System Module, Main Controller Module, Power Management Module, Light Indicator Module	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 3.1 kg

3.1.6.1 ID Settings

Sentry

Sentry has three Armor Modules, the Armor Module ID of the one facing the Base Zone is 0 and the other side, which has two Modules, is 1 for the below one and 2 for the above.



[1] Light Indicator Module [2] Armor #0 [3] Armor #1 [4] Armor #2

Figure 3-1 Sentry Armor Module ID Setting

3.1.6.2 Mechanism related to Base

If Sentry is playing: When Sentry is destroyed, the Base Shield is opened.

If Sentry is not playing: When Outpost is destroyed, the Base Shield is opened.

3.1.7 Missile

The Missile Launching System consists of Missiles and a Missile Launcher. A Referee System needs to be mounted on the Missile Launcher. The Aerial Gimbal Operator controls the operational interface and transmits data to control the Missile System through the student data port. Missile relies on its own visionary intelligence to locate the object, controlling flight direction with rudders, propellers, air jets and other means, and relies on inertial to collide with the object.

Missile Launcher is the carrier of Missile and provides power to Missile. Missile Launcher can be configured with a laser sight.

Below shows Missile's specification:

Table 3-7 Missile Specification

Item	Limit	Violations and Penalties	Notes
Object	Base, Outpost	-	-
Initial Launch Speed Limit (m/s)	18	Unable to pass the pre-match inspection	-
Maximum Total Power Supply Capacity (W·h)	4	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (v)	8.4	Unable to pass the pre-match inspection	-
Maximum Weight (kg)	0.15	Unable to pass the pre-match inspection	-
Maximum Size (mm, L*W*H)	200*120*80	Unable to pass the pre-match inspection	• Its orthographic projection on the ground should not exceed a rectangular area of 200*120

Item	Limit	Violations and Penalties	Notes
			● Missile wingspan is no more than 120
Flight Distance (mm)	18000-26000	-	-

Below shows Missile Launcher's specification:

Table 3-8 Missile Launcher Specification

Item	Limit	Violations and Penalties	Notes
Initial HP	None	-	-
Operating Mode	Manual, configured up to one remote controller	-	-
Rotational Angles (°)	● Yaw angle: Unlimited ● Pitch angle: 25-45	-	-
Maximum Total Power Supply Capacity (W·h)	200	Unable to pass the pre-match inspection	-
Maximum Power Supply Voltage (V)	30	Unable to pass the pre-match inspection	-
Maximum Operation Power (W)	Unlimited	Unable to pass the pre-match inspection	-
Missile Loading Limit	4	-	-
Maximum Weight (kg)	25	Unable to pass the pre-match inspection	Include the battery weight, but not the weight of the Referee System

Item	Limit	Violations and Penalties	Notes
Maximum size (mm, D*H)	φ1000*1000	Unable to pass the pre-match inspection	The orthographic projection on the ground must not exceed a circular area of φ1000
Referee System	Main Controller Module and Power Management Module	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 0.2kg

3.1.7.1 Production Requirement

After Missile is launched, it lands on the Battlefield and may collide with or be crushed by other robots. In addition, the missile receives a rather large impact when it hits the target. It is recommended that the participating teams adopt a buffer and strength design to avoid missile damage.

Missile must be fitted with green exterior light.

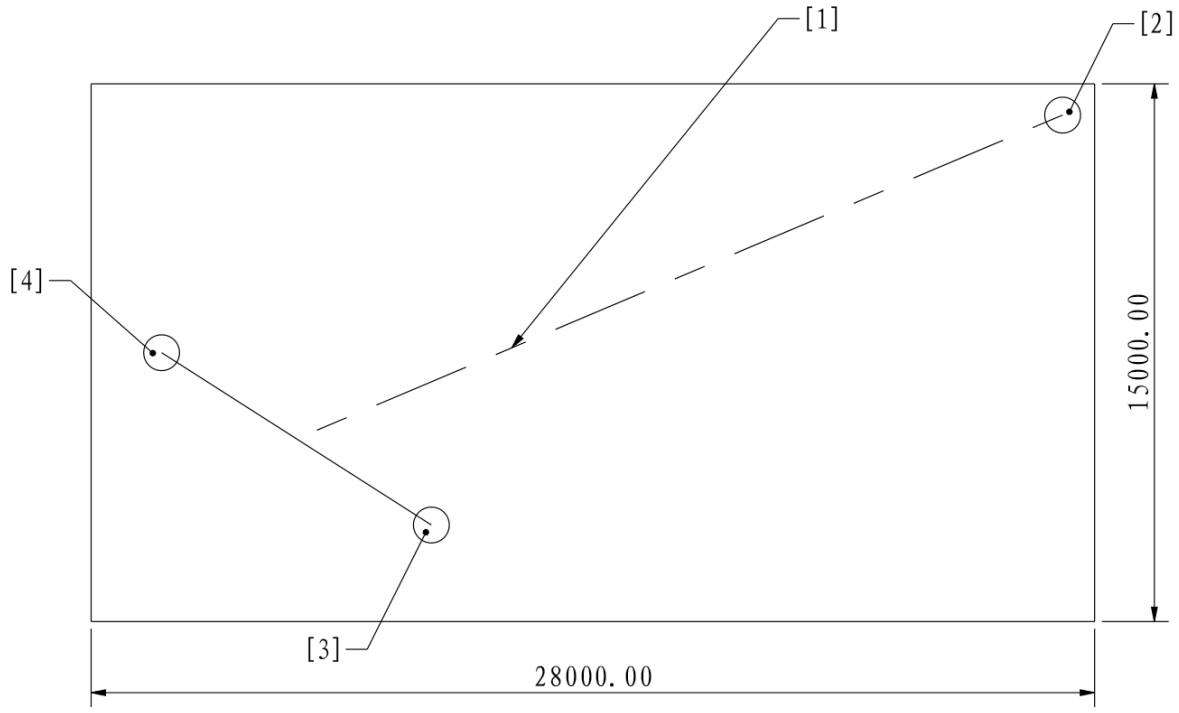
3.1.7.2 Guidance Feature

Specific-brand infrared LED integrated light beads are mounted on Base and Outpost as the object to be identified by Missile. Different parameters are used for the shape, number and size of the light beads on the base and Outpost, which the missile uses as a basis for identification.

3.1.7.3 Missile Launch Silo

Missile Launch Silo is an official battlefield component. The Launch Silo Opening faces the point midway between Base and Outpost. Launch Silo Opening has two positions: open and closed.

Within the three-minute setup period, the team must place the Missile Launcher in the Launch Silo. During the match, the team must launch Missile when Silo Opening is open.



[1] Launch Silo Opening Orientation [2] Launch Silo [3] Outpost [4] Base

Figure 3-2 Missile Launch Silo Opening Orientation

3.1.8 Radar Station

Radar Station has the advantages of a high viewing angle and excellent computing power. The participating teams can get the latest battle information through effective use of Radar Station.

Radar Station is composed of two parts, computing equipment and a sensor, and the two are connected by a flexible cable.

Below shows specification of Radar Station's processing platform:

Table 3-9 Specification of Radar Station's Processing Platform

Item	Limit	Violations and Penalties	Notes
Operating Mode	Fully automatic	-	-
Maximum Power (W)	1000	Unable to supply power properly	-
Power Supply Voltage (V)	220	-	-

Item	Limit	Violations and Penalties	Notes
Power Supply Frequency (Hz)	50	-	-
Maximum Size of Exterior (mm, L*W*H)	400*250*500	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 400*250 square
Communication Interface	TTL serial port	-	Student data port
Network Latency Limit (ms)	100	-	-
Upstream Bandwidth (Byte/s)	1130	-	Refer to the Referee System's inter-robot communication bandwidth
Referee System	Main Controller Module and Power Management Module	Teams that fail to meet the installation requirement of Referee System will be unable to pass the pre-match inspection	Weight: 0.2kg

Below shows specification of Radar Station’s sensor:

Table 3-10 Specification of Radar Station’s Sensor

Item	Limit	Violations and Penalties	Notes
Maximum Weight (kg)	10	Cannot pass pre-match inspection	-
Maximum Size of Exterior (mm, L*W*H)	1200*300*300	Unable to pass the pre-match inspection	Its orthographic projection on the ground should not exceed a 1200*300 square

3.1.8.1 Installation Specification

3.1.8.1.1 Computing Equipment

During the three-minute setup period, the team must place the computing equipment on a console with a protective cover on the Battlefield. A power outlet with an air switch on the console supplies power to the computing equipment. On the console, you can also place a display that is not larger than 23 inches and some input devices such as a mouse and keyboard for the computing platform.

A display screen will be placed in the Operator Room. The source picture is provided by Radar Station, which can transmit video signals or other custom pictures. The signal system must be 1080P60 and the interface is HDMI.

The computing equipment must not use wireless equipment for the receiving device. If the receiving device cannot be removed, it must be disabled in the operating system.

3.1.8.1.2 Sensor

The sensor is placed on a prefabricated bracket. Each team's bracket is 3 meters high and located centrally in the short side of the Perimeter Wall of one's own battlefield. During the three-minute setup period, teams need to deploy the Radar Station onto the mounting bracket. The signal transmission and power supply of the sensor equipment must be resolved by the participating teams.

If there is an emergency such as a short circuit or fire in the Radar Station area, the referee may power off or perform other necessary operations.

3.1.8.2 Typical applications

Not limited to this plan.

Two to three high-speed cameras are used as sensors, which are connected to the computing platform with a RJ45 network cable. The participating teams adjust the camera direction to obtain near-field, medium-range, and distant view information as visual warning areas. Camera calibration is done by identifying special visual markers on the Battlefield.

- Whole-field localization is done by identifying the participating teams' robots on the Battlefield and the threat coefficient of the enemy robot is calculated. This is then superimposed on the acquired image data in a layered fashion, and transmitted to a display screen in the Operator Room to direct the Operator to respond. In addition, the team can also use HP issued by the referee system, location and other information to guide the Sentry to make its own decision.
- The high-speed camera detects enemy missiles, predicts the ballistic trajectory, calculates the small projectile trajectory used for intercepting missiles, and sends the intercepting direction to Standard or Sentry to hit the

missile, thus completing the anti-missile mission.

4. Competition Mechanism

4.1 Level-up Mechanism

4.1.1 Experience System

At the beginning of the game, the robot level of Standard and Hero are both Level One, and their performance level are both Zero Level. Move up levels by getting Experience Points.

The Level-up Mechanism during the game is as follows:

- If a robot from one side is defeated and the killer is detected, the killer can obtain the Experience Points of the corresponding Value of Experience Points, and the assisting robot obtains 25% of the Experience Points of the corresponding Value of Experience Points (based on the calculation result of the referee system server) of the defeated robot. The average will be rounded off and accurate to one decimal place.

  For example, when destroying a Level 1 Standard, the killer gains 2.5 Experience Points. Each assisting robot gains 2.5 * 25% = 0.6 Experience Points.

- If a robot from one side is defeated and no killer is detected, the Experience Points of the corresponding Value of Experience Points (based on the calculation result of the referee system server) of the defeated robot will be evenly distributed to the surviving Hero and Standard. The average will be rounded off and accurate to one decimal place.

In addition, Standard gains 0.2 Experience Points every 12 seconds, and Hero gains 0.4 Experience Points every 12 seconds. If Standard or Hero is in a defeated state, the original Experience Points remain the same, and natural growth Experience Points are no longer gained during the course of the battle. After leveling up, leftover Experience Points is counted towards the next level.

4.1.2 Performance System

After leveling-up, Standard and Hero's barrel heat upper limit, barrel cooling value per second and their own Value of Experience Points are correspondingly increased.

Before the start of the competition, Standard and Hero's Performance Points are 0 points. At the start of the game and after leveling up each time, Standard and Hero gain 2 Performance Points for use in upgrading robot performance. The Operator can select among three performance options: maximum HP, chassis power and projectile's maximum initial speed, and assign the available Performance Points to the corresponding robot. Once the performance option is used, it is irrevocable.

For example, after the start of the game, Standard gains 2 Performance Points. The corresponding Operator chooses to use 1 Performance Point and increase the maximum HP to

Level 1, so that maximum HP becomes 200 points. Then this Standard levels up and gains 2 Performance Points, the Operator chooses to use 3 Performance Points and upgrades the projectile's maximum initial speed to Level 3, so that the projectile's maximum initial speed becomes 30 m/s.

Table 4-1 Standard Level

Level	Barrel Heat	Barrel Cooling Value per Second	Number of Performance Points	Experience Points Needed to Level Up	Value of Experience Points
1	240	40	2	3	2.5
2	360	60	4	6	5
3	480	80	6	/	7.5

Table 4-2 Standard Performance Upgrade

Performance Level	Maximum HP	Chassis Power (W)	Projectile Maximum Initial Speed (m/s)
0 (Initial State)	100	40	10
1	200	60	12
2	300	80	15
3	500	120	30

Table 4-3 Hero Level

Level	Barrel Heat	Barrel Cooling Value per Second	Number of Performance Points	Experience Points Needed to Level Up	Value of Experience Points
1	200	20	2	8	7.5
2	300	40	4	12	10
3	400	60	6	/	15

Table 4-4 Hero Performance Upgrade

Performance Level	Maximum HP	Chassis Power (W)	Projectile Maximum Initial Speed (m/s)
0	200	60	8

Performance Level	Maximum HP	Chassis Power (W)	Projectile Maximum Initial Speed (m/s)
1	300	80	10
2	500	100	12
3	700	120	16

4.2 Missile Launch Mechanism

Each team needs to meet its missile activation condition, which is related to the battle state of both sides, to launch missile.

After meeting missile activation conditions, Launch Silo Opening is opened, a process that takes 5 seconds. The indicator light goes on once Launch Silo Opening is fully opened, indicating that the Missile can be launched, for a duration of 20 seconds. The Aerial Gimbal Operator can choose the number of missiles to be launched and the subject of the attack. The indicator light is off, indicating that Launch Silo Opening is starting to close. It takes 5 seconds to close.

After all missiles are fully launched, Launch Silo Opening does not open again.

4.3 HP Deduction

Armor Attack

⚠ In the actual match, the normal speed of the projectile that touches the Armor Module panel is different from the initial firing speed of the projectile due to the projectile speed decay and the incident angle not normal to the Armor Module Panel. The damage detection is based on the speed normal component of the projectile contacting the Armor Module panel.

Armor Module detects damage sources base on its pressure sensor feedback and the vibration frequency of the armor plate. Damage sources are divided into projectile attack, collision and Missile. Collisions including crashing into other robots, throwing objects or robot's components hitting against the Battlefield are prohibited.

Below is the HP deduction under the situation of no attack gain.

Table 4-1 HP Deduction of Armor Attack

Attack Type	HP Deduction
42mm projectile	• Armor Module of Robot: 100

Attack Type	HP Deduction
	● Armor Module of Base and Outpost: 200
17mm projectile	10
Collision	2
Missile	1000