

# The Rules of the Rampaging Chariots Robotic Games 2010.

(Note changes from 2009 are identified by italic text)

Rach Rampaging Chariot may compete in up to three events. These are: Assault Course, Football and either the Sumo OR the Tug-of-War events. Teams entering two robots may enter one in each event. Note: The Sumo and Tug-of-War events require similar skills and technical requirements and we have found that choosing between these two events allows a more even distribution of trophies/medals and prevents batteries becoming completely exhausted.

## Featherweight Assault Course

### **Contest:**

Rampaging Chariots race side by side through a 20m assault course consisting of a series of obstacles designed to test both robot and driver. Note ramps will be one of the many obstacles.

Fastest eight robots go forward to quarterfinal and the knockout competition. 5 second penalty for each pole knocked over and 15 second penalty for each obstacle not completed. Time out at the end of 2 minutes with distance travelled recorded.

### **Specific rules:**

*Robots must be able to pass under the pivot point of the paddle which is 400mm above the floor*

## Featherweight Tug of War

### **Contest:**

Random Order of participants compete two at a time in a Knockout Competition. (x have 1<sup>st</sup> round bye). A line attaches the robots to each other. Each machine stands equidistant on either side of a chasm. The winner is the machine that pulls its opponent over the edge into the chasm. In the event of neither machine being pulled over the edge, the machine farthest from the chasm after 30 seconds will be declared the winner. Best of three successive pulls are played.

### **Specific rules:**

Each pull will last up to 30 seconds. The surface of the platforms will be painted wood. An 8mm eyebolt or similar must be fitted to the rear of each machine at a height of 8cm from the ground. No devices are allowed to anchor the machine to the floor or prevent it from being pulled back.

# Featherweight Sumo

## Contest:

Two radio-controlled featherweight robots compete in a Knockout Competition. (x have 1<sup>st</sup> round bye) to expel their opponent from the 1.85m (6ft) diameter ring (Dohoy) within 1 minute. Winner is first to push their opponent off the platform. If both robots fall off, the winner is the last to touch the floor. At 1 minute time-out the robot furthest from the edge wins. Best of three successive bouts are played.

## Specific rules:

No devices are allowed to anchor the machine to the floor or prevent it from being pushed back. A wedge shaped or curved front projecting no more than 100mm from the front of the main chassis is allowed. The Sumo Official can stop a contest and restart it at his or her discretion. Opponents to shake hands before and after each bout.

# Featherweight Football

## Contest:

Teams of 2 a side play football on a pitch 5m wide and 5m long with a 1m wide net at opposite corners. Random Order of teams compete in a Knockout Competition. (x have 1<sup>st</sup> round Bye)

Winner is the team that scores the most goals within 3 minutes. If after 3 minutes the result is a draw, extra time of 1 minute will be played and the 'golden goal' rule applies. If after a total of 4 minutes the result is a draw simultaneous penalties will be taken with an inert goalkeeper facing towards the centre. The team to score the first goal wins. Individual contestants may form teams before the day of the event, otherwise officials will assign teams on the day.

Competitors must not tackle an opponent who is not in possession of the ball. Two Yellow cards = Red card which results in the offending robot being sent off the pitch for 1 minute.

## Specific rules:

*Electric or spring actuators to 'kick' the ball are permitted. Machines must not have a scoop or bucket that can contain the ball but may have one pair of guides that project no more than 50mm from the front of the main chassis.*

## Autonomous Competition

To enable senior pupils and students of 18 years and over to participate, we intend to have a small demonstration event this year for Autonomous Rampaging Chariots. We challenge senior school and university students to modify a standard Rampaging Chariot (or similar size robot) to undertake any of the Sumo, Assault Course, Tug-of-War or Football events with no human intervention.

We also welcome static displays of any robots that will help to foster young people's interest in engineering.

# General Rules

## Rampaging Chariots Robotic Games General Construction Rules (Rev 5)

### **General**

If circumstances demand, the organisers, at their sole discretion, reserve the right to alter or change these specifications.

### ***Definition of a Standard Rampaging Chariot***

A Rampaging Chariot is a radio controlled sporting vehicle designed to undertake the Assault Course, Sumo, Tug-of-War and Two-a-Side Football events of the Rampaging Chariots Robotic Games.

A Rampaging Chariot has the following characteristics:

1. Four Wheels
2. Tank type (skid) steering
3. *Powered by cordless electric drill motors with epicyclic gearboxes*
4. Energised by battery power
5. Two motor control boards built by students to a standard design and containing a PIC microcontroller loaded with standard software issued by the Rampaging Chariots Guild.

### **Permissible Modifications**

We encourage modifications to standard Rampaging Chariots within the rules, but the aims and spirit of the Rampaging Chariots Project is paramount. Our aims are to interest young people in engineering and provide a fun competition. We will not allow the Rampaging Chariots Robotic Games to be compromised by unfair competition using expensive or purpose built professionally made components.

All robots will be inspected by experienced engineers to confirm the construction is within the spirit of the competition and commensurate with that expected from school pupils below the age of 18 with access to normal school workshop tools and facilities.

The decision of the judges is final.

If you consider that your design of robot may not comply with either the rules or spirit of the Rampaging Chariots Robotic Games, please contact the Rampaging Chariots Guild by Email for guidance: [www.rampagingchariots.org.uk](http://www.rampagingchariots.org.uk)

### **Competition**

1. Entries must be largely built by students although assistance from parents or teachers is permitted.
2. The age limit for competitors is before their 18<sup>th</sup> birthday on the day of the event. Older students may enter an autonomous Rampaging Chariot in a separate competition.
3. All entrants / teams may compete in more than one event but each Rampaging Chariot can only be entered into either the Sumo **OR** the Tug-of-War events.

4. Only authorised staff and referees may touch the Rampaging Chariots during a match or bout.
5. Where appropriate, limited time will be allowed between events, bouts, and rounds for repairs, adjustments, changing or charging batteries etc.
6. *Modifications and configuration changes must normally remain in place throughout the different Games events with the exception of a fixed wedge or scoop for the Sumo Event.*
7. *To prevent frequency clashes, radio transmitters and receivers will normally be substituted by technical staff for similar units working in the 2.4 GHz band. Radio control receivers should be easily accessible to allow this change to be undertaken before an event.*
8. *If a team experiences a technical problem that cannot be resolved quickly, the organisers may at their discretion allow the use of a borrowed house robot. Substitute robots are intended to allow teams to experience the fun of the games and cannot be used in the semi final or final of any event*
9. Intentional collisions are prohibited.

## **Safety**

1. Entries will be inspected for safety and reliability before being allowed to compete. Please consider this requirement and bring along any item that will aid the safe testing of your robot, for example: a wooden block that will support the robot with its wheels off the ground.

Please be aware that building and operating robots can be hazardous if basic safety precautions are not taken. We will take all reasonable precautions to ensure that 'live' events are conducted in such a manner that safety of all personnel is our highest priority. We can only ask that when building and testing your robots at home, school etc, you also take the same approach of safety first. If you have any concerns regarding safety issues, you are encouraged to contact Rampaging Chariots Guild for guidance.

2. The organisers reserve the right to ban or disqualify any entry that in their opinion is or could be unsafe and could cause injury to people, damage to the venue, equipment or is not in the spirit of the Rampaging Chariots Robotic Games.

3. Any moving arm, lever or mechanism that could cause personal injury to competitors or others must be fitted with a visible locking pin that shows that the arm/lever/mechanism is securely locked into place when not in competition.

Locking pins must be painted red and must be in place at all times except while the entry is competing or is being worked on. These locking pins are not included in the weight of the entry.

4. Sharp edges on the exterior of the robot are prohibited.

5. No spinning arms or weapons of any type are permitted

6. Maintenance within the pits area will be limited to basic hand tools. Maintenance involving the use of sharp tools is only to be undertaken by pupils or cadets under the direct supervision of an adult engineer or staff member. Selex Galileo technical staff will be available to assist if a maintenance operation requires the use of a power tool. No grinding or welding will be permitted. You should ensure you bring along any personal protective equipments such as goggles, gloves etc you may need to safely maintain your robot.

7. Radio controlled 12kg featherweight class robots should automatically cease operation in the event of loss / interference of the transmitter signal. This feature is incorporated into the electronic motor drive boards supplied by the Rampaging Chariots Guild. For actuators not controlled through these boards an option is to fit a failsafe between the appropriate receiver channel and devices controlling motors or any actuators. Failsafes are available from most model shops. If you are unsure if your set-up will comply, we will be pleased to advise. You should test your failsafes as part of the process of working up your robot; this is best done by putting the robot on its cradle, selecting a constant speed and turning the transmitter off.

8. *Any autonomous robot in the 12kg featherweight class or over should be fitted with a remote kill function that brings all of the robot functions to a halt.*

9. You must not activate your robot outside of the arena unless specifically instructed to do so by a Robotic Games official. All Rampaging Chariots are to be fitted with a visible power on light that illuminates as soon as the power is connected.

In the Pits, power is only to be connected when the robot is off the ground with its wheels free to rotate.

In the Arena, the person connecting the power must stand to the side of the robot.

## General construction

If you consider that your design of robot may not comply with either the rules or spirit of the Rampaging Chariots Robotic Games, please contact the Rampaging Chariots Guild by Email for guidance.

### Weights and dimensions

1. Weight limits and maximum dimensions are 12Kg, 600mm long by 400mm wide.

### Motive power

1. *Motive power must be electric, but a spring is allowed to power a football kicker.* Kinetic energy storage devices for example a flywheel are not permitted

2. Entries must be fitted with a means of removing all power from power circuits, radio receivers and control systems. **This means must be quick to operate and easily assessable.** Battery connectors, on/off switches or removable plugs are examples. If in doubt contact the Rampaging Chariots Guild for advice.

If there is more than one switch, these must be positioned adjacent to one another. Switches must be positioned in a visible part of the robot bodywork, fitted away from any operating arm, device or drive and this position must be clearly marked.

### Electric

1. *Working voltages must not exceed a nominal 24V DC.*

2. All power connections (connections carrying a heavy current) must be of an adequate grade and adequately insulated. Cables must be routed to minimise the chances of being cut or damaged.

3. Batteries must be completely sealed and must not contain free-flowing liquid and securely mounted. (AGM, Gel, Ni-Cad or Ni-MH types typically acceptable). Please note that Lithium based batteries are not permitted.

Batteries are charged using commercial 18v chargers supplied with the cordless drills, or a charger approved by the technical supervisor.

4. Battery connections must be adequately insulated.

5. Robots generating excessive levels of electrical interference will be excluded from events.

### Control

1. Entries may use VHF frequency band 27 or 40MHz AM or FM or 2.4GHz. Splat transmitters which transmit over a band which covers a number of discrete frequencies are not permitted. The VHF frequency band 35 MHz is not allowed as it is exclusively reserved for flying models.

Note: The organisers have a frequency monitoring device that will indicate if systems are transmitting over more than one discrete frequency.

2. On entries employing radio control, any operating circuit that is or could be deemed to be dangerous, *e.g. a ball kicker*, must be fitted with an approved type of radio signal fail-safe device.

3. *Deleted*

4. Radio transmission devices that interfere with the operation of other Rampaging Chariots are

prohibited.

5. The Rampaging Chariots Games will be operating a transmitter control at the events where all radio transmitters will be stored until such time that they are needed for a challenge. There will be limited opportunity to sign out your transmitter for testing purposes so make sure you arrive on the day with your robot ready to compete. The Rampaging Chariots Guild have a radio transmitter / receiver emulator to enable robots to be tested on the bench without emitting radio signals. This is available on loan from the organising team.

6. *To prevent frequency clashes, radio transmitters and receivers will normally be substituted before events by technical staff for similar units working in the 2.4 GHz band. Radio control receivers should be easily accessible to allow this change to be undertaken before an event. In some circumstances it may not be possible or desirable to change the transmitter and receiver and the organisers reserve the right to allow some robots to retain their existing radio system provided it does not interfere with another robot.*

## **Autonomous Rampaging Chariots**

1. *An autonomous Rampaging Chariot is defined as one which can accomplish the event without human intervention.*

2. *Any autonomous robot in the 12kg featherweight class or over must be fitted with a remote kill function. This could typically take the form of a GO- STOP switch on the radio transmitter.*

3. *All navigation calculation and control functions should be undertaken on board the robot.*

4. *An external beacon or camera with a uni-directional radio or electro-optic link is permitted.*