Venombots Rule Book

Adopted on March 25, 2010
1st Amendment on July 27, 2010
2nd Amendment on August 12, 2010
3rd Amendment on October 6, 2010

Chapter I - General

Section 1.1 - You can make a team of minimum 1 and maximum 6 members

Section 1.2 - **Specification of the robot**

Section1.2.1 - Maximum dimensions can be 750 mm x 750 mm x 1000 mm.

Section 1.2.2 - Weight should not exceed 40 kg including the weight of pneumatic source/tank. If the tank is external, its weight would be considered 1.5 times its actual weight. Weight of external power source (batteries and adaptors) will not be counted. Weight of wireless wheeled robots will be counted as 0.75 x the actual weight.

Section 1.3 - All participants have to build and operate robots at their own risk. Combat robotics is dangerous. Please take care of yourself and others while building, testing and competing.

Section 1.4 - If you have a robot or weapon design that does not fit within the categories set forth in these rules or is in some way ambiguous or borderline, please contact the safety expert. Safe innovation is always encouraged, but surprising the event staff with your brilliant exploitation of a loophole may cause your robot to be disqualified before it even competes.

Section 1.5 - Compliance with all event rules is mandatory. It is expected that competitors will comply with the rules and procedures of their own accord and not require constant policing.

Section 1.6 - Each event has safety inspections. It is at their sole discretion that your robot is allowed to compete. As a builder you are obligated to disclose all operating principles and potential dangers to the safety expert.

Section 1.7 - **Cardinal Safety Rules:** Failure to comply with any of the following rules will result in instant expulsion from the event and possible barring from future competition.

Section 1.7.1 - Radio Controllers must be turned off at or near events for any purpose without obtaining the appropriate frequency clip or explicit permission from the event coordinators.

Section 1.7.2 -Proper activation and deactivation of robots is critical. Robots must only be activated in the arena, testing areas, or with expressed consent of the safety officials.

Section 1.7.3 - All robots must be able to be FULLY deactivated, which includes power to drive and weaponry, in under 60 seconds by a manual disconnect.

Section 1.7.4 - All robots not in an arena or official testing area must be raised or blocked up in a manner so that their wheels or legs cannot cause movement if the robot is turned on.

Section 1.7.5 -Locking devices: Moving weapons that can cause damage or injury must have a clearly visible locking device in place at all times when not in the arena. Locking devices must be painted in neon orange or another high-visibility colour. Locking devices must be clearly capable to stopping, arresting or otherwise preventing harmful motion of the weapon.

Section 1.7.6 - It is expected that all builders will follow basic safety practices during work on the robot anywhere. Please be alert and aware of your safety and people passing by.

Chapter II -Mobility

Section 2.1 - All robots must have easily visible and controlled mobility in order to compete.

Methods of mobility include:

Section 2.1.1 - Rolling (wheels, tracks or the whole robot)

Section 2.1.2 - Shuffling (rotational cam operated legs)

Section 2.1.3 - Flying (helium balloons, ornithopters, etc.) is not allowed.

Section 2.1.4 - IC engines or liquid fuel engines are not allowed.

Chapter III - Robot control requirements

Section 3.1 - Tele-operated robots must be radio controlled by standard Radio Control Equipment, or use an approved custom system.
Section 3.2 - All robot radio systems must have a way to change frequencies or coded channels to prevent radio conflicts. Having at least two frequencies or coded channels available is recommended. Lack of extra frequencies may result in a forfeit. Priority for frequency use will be allocated in order of registration entry.

Section 3.3 - Non Standard or Home built control systems must be approved by head electronics.

Section 3.4 - All robots that are heavier than 15 Kg's should use a radio systems on the FM band, or an approved custom control system.

Section 3.5 - This event recommends, but does not require a separate power switch for the radio.

Chapter IV - Autonomous/Semi-Autonomous Robots

Any robot that moves, seeks a target, or activates weapons without human control is considered autonomous. If your robot has any autonomous features, you are required to contact the safety expert before registration.

Section 4.1 - Autonomous robots must have a clearly visible light for each autonomous subsystem that indicates whether or not it is in autonomous mode, e.g. if your robot has two autonomous weapons it should have two “autonomous mode” lights (this is separate from any power or radio indicator lights used).

Section 4.2 - The autonomous functions of a robot must have the capability of being remotely armed and disarmed. (This does not include sensors, drive gyros, or closed loop motor controls.)

Section 4.2.1 - While disarmed, all autonomous functions must be disabled.

Section 4.2.2 - When first activated the robot must have no autonomous functions enabled, and all autonomous functions must failsafe to off if there is loss of power or radio signal.

Chapter V - Batteries and Power

Section 5.1 - The only permitted batteries are ones that cannot spill or spray any of their contents when damaged or inverted. This means that standard automotive and motorcycle wet cell batteries are prohibited. Examples of batteries that are permitted: gel cells, Hawkers, NiCads, NiMh, dry cells, AGM, etc.

Section 5.2 - All on-board voltages above 36Volts require prior approval from the battery expert. (It is understood that a charged battery's initial voltage is above their nominal value)

Section 5.3 - All electrical power to weapons and drive systems (systems that could cause potential human bodily injury) must have a manual disconnect that can be activated within 15 seconds without endangering the person turning it off. (E.g. No body parts in the way of weapons or pinch points.) Shut down must include a manually operated mechanical method of disconnecting the main battery power, such as a suitable high current master
switch or removable link. Relays may be used to control power, but there must also be a mechanical disconnect.

Section 5.4 - All efforts must be made to protect battery terminals from a direct short and causing a battery fire.

Section 5.5 - All Robots must have a light easily visible from outside that shows its main power is activated.

Chapter VI - Pneumatics

Section 6.1 - You must have a safe and secure method of refilling the system and determining the pressure.

Section 6.2- Pressures are limited to 20 Bar.

Section 6.3 - All components must be used within the specifications provided by the manufacturer or supplier. If

the specifications aren't available or reliable, then it will be up to the Pneumatic Weapon Expert to decide if the component is being used in a sufficiently safe manner.

Section 6.4 - Pneumatic systems on board of the robot must only employ non-flammable, non-reactive gases (CO2, Nitrogen and air are most common). It is not permissible to use fibre wound pressure vessels with liquefied gasses like CO2 due to extreme temperature cycling.

Section 6.5 - All pneumatic components on board of the robot must be securely mounted. Particular attention must be made to pressure vessel mounting and armour to ensure that if ruptured it will not escape the robot. (The terms 'pressure vessel, bottle, and source tank are used interchangeably)

Section 6.6 - All pneumatic components within the robot must be rated or certified for AT LEAST the maximum pressure in that part of the system. You may be required to show rating or certification documentation on ANY component in your system.

Section 6.7 - All pressure vessels must be rated for at least 120% of the pressure they are used at and have a current hydro test date. (This is to give them a margin of safety if damaged during a fight.).

Section 6.8 - If regulators or compressors are used anywhere in the pneumatic system there must be an (additional) over pressure device downstream of the regulator or compressor set for no more than 130% of the lowest rated component in that part of the pneumatic system.

Section 6.9 - All pneumatic systems must have a manual main shut off valve to isolate the rest of the system from the source tank. This valve must be easily accessed for robot de activation and refilling.

Section 6.10 - It is required to be able to easily bleed all pressure in the robot before exiting the arena. (You may be required to bleed the entire system if it is believed that you have any damaged components.)

Section 6.11 - All pneumatic systems must have appropriate gauges scaled for maximum resolution of the pressures in that part of the system. (There must be gauges on both the high AND low-pressure sides of regulators.)

Chapter VII - Hydraulics

Section 7.1 - Robots lighter than 10 kg are exempted from the remaining rules in this section, but good engineering and best practices must be used in all hydraulic systems. However the pressure for 6 Kilogram or less robots is limited to 250psi and there must be an easy way to determine this pressure.

Section 7.2 - All hydraulic components on-board a robot must be securely mounted. Particular attention must be made to pump and accumulator mounting and armour to ensure that if ruptured direct fluid streams will not escape the robot.

Chapter VIII - Rotational weapons or full body spinning robots

Section 8.1 - Spinning weapons that can contact the outer arena walls during normal operation must be pre-approved by the safety expert. (Contact with an inner arena curb, or containment wall is allowed and does not require prior permission.)

Section 8.2 - Spinning weapons must come to a full stop within 60 seconds of the power being removed using a self-contained braking system.

Chapter IX - Springs and flywheels

Section 9.1 - Springs used in robots lighter than 10 Kg are exempted from the rules in this section. However safe operation and good engineering are always required.

Section 9.2 - Any large springs used for drive or weapon power must have a way of loading and actuating the spring remotely under the robots power.

Section 9.2.1 - Under no circumstances must a large spring be loaded when the robot is out of the arena or testing area.

Section 9.2.2 - Small springs like those used within switches or other small internal operations are exempted from this rule.

Section 9.3 - Any flywheel or similar kinetic energy storing device must not be spinning or storing energy in any way unless inside the arena or testing area.

Section 9.3.1 - There must be a way of generating and dissipating the energy from the device remotely under the robots power.

Section 9.4 - All springs, flywheels, and similar kinetic energy storing devices must fail to a safe position on loss of radio contact or power.

Chapter X - Weapons and Materials

The following weapons and materials are absolutely forbidden from use:

Section 10.1 **- Weapons allowed at the event**
This includes but is not limited to:

Section 10.1.1 - Overhead weapons: this includes- Spiked Axes, Bladed Axes, Hammers, blades.

Section 10.1.2 - Flipping weapons: this includes- rear hinged flipper, front hinged flipper.

Section 10.1.3 - Gripping weapons: this includes-vertical crushers, horizontal crushers, pincers, jaws.

Section 10.1.4 - Lifting weapons: these includes-lifters, scoops, conveyor belts.

Section 10.1.5 - Rotating weapons: these includes-cutting discs, circular saws, drills, chainsaws.

Section 10.1.6 - Small smoke effects may be used, please contact the safety expert for prior approval.
Section 10.1.7 - Tethered Projectiles ARE allowed at this event.
Tethered projectiles must have a securely attached tether of sufficient strength to safely stop the projectile at a distance of not more than 8 feet from the robot.

Section 10.2 - Weapons not allowed at the event
This includes but is not limited to:

Section 10.2.1 - RF jamming equipment, RF noise generated by an IC engine (Use shielding around sparking components), EMF fields from permanent or electro-magnets that affect robots electronics. Weapons or defenses that stop combat completely of both (or more) robots (this includes nets, tapes, strings, and entanglement devices).

Section 10.2.2 - Weapons that require significant clean-up, or in some way damages the arena to require repair for further matches. This includes but is not limited to: Liquid weapons (Also, a bot may not have liquid that can spill out when the robot is superficially damaged), Foams and liquefied gasses, any powders, sand, ball bearings and other dry chaff weapons.

Section 10.2.3 - Un-tethered Projectiles

Section 10.2.4 - Heat and fire are forbidden as weapons. This includes, but is not limited to the following: Heat or fire weapons, Flammable liquids or gases

Section 10.2.5 - Explosives or flammable solids such as: Gunpowder / Cartridge Primers, military Explosives, etc.

Section 10.2.6 - Light and smoke based weapons that impair the viewing of robots by an Entrant, Judge, Official or Viewer. (You are allowed to physically engulf your opponent with your robot however).

Section 10.2.7 - Hazardous or dangerous materials are forbidden from use anywhere on a robot where they may contact humans, or by way of the robot being damaged.