Street League Rule Book V3.2.0

Street Legal drone specifications

1. Frame
    - 1.1. All parts must be open source including 3D prints, or modifications from the original design.
        - 1.1.1. Acceptable licenses include the following
            - 1.1.1.1. GLP V3
            - 1.1.1.2. MIT
    - 1.2. Each motor must be less than 399mm away from all other motors.
    - 1.3. Drone frames may not contain or carry liquids during flight.
    - 1.4. Arm rules
        - 1.4.1. The arm shall be defined as the primary load bearing material which spans from each motor to the adjoining portion of the frame. A frame may have several arm segments per motor.
            - 1.4.1.1. There may only be 3 arm segments counted towards the cross sectional area and perimeter limits. Any additional arm segments will not be included in these calculations.
        - 1.4.2. The total convex perimeter of all arms which support a given motor must be 42mm or more across the thinnest portion of each arm's length.

Figure 1: The red line would be the convex perimeter of a star shaped arm

1.4.2.1. The Free Clause: Surfaces which are occluded by any other arm segments with respect to the axis of the thrust column, will not be counted in the perimeter calculation.

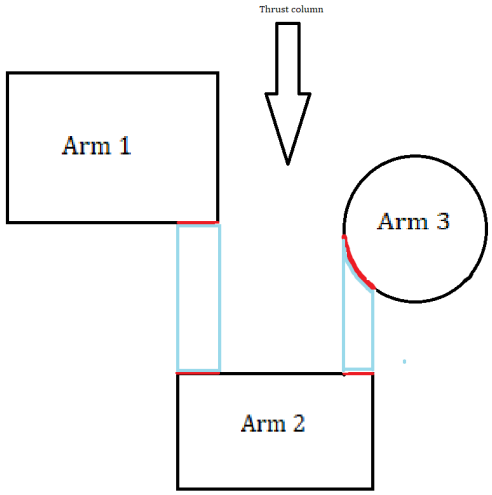

Figure 2: The red portion of the 3 arm surfaces will not be counted in the perimeter calculation

1.4.2.1.1. Street Legal frames may be assembled in such a way that they fail the “The Free Clause”. Drones built in such configurations are not legal.

1.4.3. For each motor, the total cross sectional area of all its arms must be greater than 90mm^2

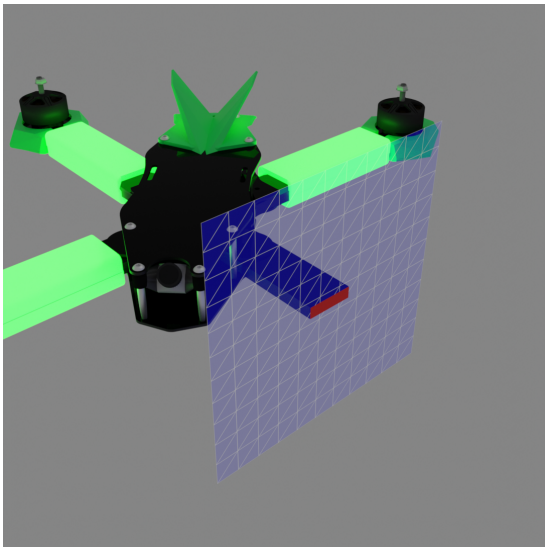

Figure 3.

2. Motors
   2.1. Exactly 4 motors allowed.
   2.2. The volume of each motor stator must be less than 4950mm².

2.3. A 1250KV is recommended, but higher or lower KVs are permitted. See section 9 for more information.
2.4. At any point before the day of the motor's first use in an official event, the following criteria must be met.
2.4.1. A Street League Admin must have received a representative sample of the motors for inspection and approval. Contact us at info@streetleague.io to request an inspection.
2.4.1.1. Spreadsheet
2.4.2. At least 10 sets (40 motors) must be available for retail purchase.
2.4.3. The motor must be available for purchase to anyone within the same country as the event in which they are first used.
2.4.4. Pre-orders are not considered available for retail purchases.

3. Battery's
3.1. Must have 5 cells
3.2. Each cell may be changed to no more than 4.25v at the beginning of the race and the sum voltage may be no more than 21.25.
3.3. The manufacturer rating for the milliamp hours must be 2200mAh.
3.4. Must be sold by at least one retailer.
3.5. All flight control and powertrain systems may only be powered by a single battery which meets the specifications defined in 3.1 - 3.4.

4. Propellers
4.1. A Street League Admin must have received a representative sample of the propellers from the manufacturer for inspection and approval. Contact us at info@streetleague.io to request an inspection.
4.2. Allowed Propellers
- HQ 7x4x3
- Gemfan 7037

4.3. Propellers may not be modified in any way which is likely to benefit the performance of the drone relative to the original propeller design.
4.4. Amari clause: Propellers must be directly affixed to the motors such that they spin at the same RPM under normal operating conditions.

5. LEDs
5.1. Light emitted by at least one source must be visible from six cardinal directions of the quad each with at least 10deg field of view.
- At least one LED visible from the top, bottom, left, right, front, and back of the quad must be lit at the beginning of every heat.

5.2. Intentionally or negligently disabling LEDs during the pilot's timed laps, is prohibited.
5.3. The LED may be any color which resides in the human visible spectrum.
5.4. The LED must have a reasonable brightness, as determined by the race director. This includes both minimum and maximum brightnesses.

6. Weight
6.1. At the beginning of each heat the drone must weigh 1280 grams or more.

6.2. The drone must not be constructed in such a way as to shed weight during normal operation by design or negligence.

6.2.1. Pilots whose quads have repeatedly shed weight due to negligence will be penalized at race directors discretion.

7. Electronics

7.1. No powered mechanical systems are permitted except the 4 motors used for thrust.

Note: Failure to comply with the drone specifications may result in one or more of the following consequences.

- Labeling the pilot an NSB (non-spec boy) in the street league registry.
- Heat disqualification.
- Disqualify the pilot from the race.

Software

8. Flight Control Software
    8.1. The flight controller must use the official Street League firmware to operate the drone's systems.
        - Firmware coming soon. Download will be available at StreetLeague.io/spec
    8.2. The FC and ESC software and hardware must have Dshot RPM telemetry enabled at all times. This must be available for testing throughout the event.
    8.3. ESC firmware must be marked by its developer as a stable release. Custom HEX files are not allowed.
9. In flight settings
    9.1. No settings which allow the pilot to adjust the throttle limit, or motor output limit remotely may be enabled. The exception is if such changes are visible via OSD such as via stick commands.
    9.2. Throttle Boost may not be increased past the Betaflight default of 5.

Hardware

10. Video Transmitters
    10.1. Drones must be capable of transmitting video at 5.8ghz frequencies including all RaceBand Channels.
    10.2. Broadcasting on another pilot's channel during a heat is prohibited, and can result in disqualification at the race director's discretion.
    10.3. The VTX must be capable of outputting power between 25mw and 200mw. Power output is decided on a per event basis.
    10.4. Broadcasting at higher output powers than specified for the event is grounds for disqualification at the race director's discretion.
    10.5. Both analog and digital FPV systems are allowed, so long as they meet the above requirements. Systems which have been shown to work are Analog 5.8, HDzero, and DJI FPV systems.
        10.5.1. DJI O3 air units are banned until they have been proven to be compatible with other video systems.
    10.6. It is highly recommended that pilots set up tramp telemetry or smart audio in order to change their channels quickly and easily. They will be expected to do so quite frequently.
11. Control Link
    11.1. Drones must disarm upon loss of radio.
    11.2. Should a pilot have less video than necessary to safely operate the aircraft, they must disarm the aircraft.
    11.3. Pilots must not broadcast over 100mw on their radio transmitter.
    11.4. Any 2.4ghz or 915mhz control link is allowed.

Race Format

12. Staging and Launching
    12.1. The drone must maintain at least one point of contact with the starting surface until the starting signal is given.

12.2. The starting surface may be provided and possibly required by the race director on a race by race basis.
    12.2.1. When starting surfaces are provided, all pilots in the heat must have access to identical starting surfaces.
12.3. When the starting surface / blocks are provided by the individual pilots:
    12.3.1. Pilots must place their starting blocks in the spot designated by the race director. Table, ground, etc.
    12.3.2. The starting blocks may not be more than 4.5 inches tall when the drone is placed on them
    12.3.3. Starting blocks which mechanically, thermally, or electrically aid the drone assist the drone during staging, or launching are not allowed.
    12.3.4. The starting blocks must not interfere with or hinder other drones or pilots from staging or launching their drones.

13. Points Rounds
    13.1. Pilots will fly in one “First to X Laps” heat in each round. At the end of the round, all pilots are ranked by how many laps they completed, then by how quickly they completed them.
    13.2. Based on a pilot’s position in each Points Round, they will receive points which accumulate throughout Points Rounds.
        13.2.1. Pilots who fail to pass the timing gate at least once will receive 0 points.
    13.3. After each Points Round, pilots will be placed into a heat containing other pilots whose overall points are closest to theirs.

14. Elite 8
    14.1. At the end of Points Rounds, the top 8 pilots by points will be placed into the Elite 8.
    14.2. Heat A will be comprised of positions 1,3,5,7, and Heat B will be comprised of positions 2,4,6,8 respectively.
    14.3. Elite 8 heats are heads up, first to (X) laps.
    14.4. In order to be selected to advance to Finals, a pilot must get first place in an Elite 8 heat. Once they have, they will not participate in subsequent Elite 8 heats. Only two pilots will be selected to advance to Finals.
    14.5. Pilots who fail to advance to Finals will be ranked in the following way
        14.5.1. Upon entering the Elite 8, Pilots will enter a new set of points rounds.
        14.5.2. Pilots will then earn Elite 8 points for each pilot who’s times they beat each heat like a normal points round. Points are accrued across both Elite 8 heats.
        14.5.3. These points will determine the pilots ranked 5th - 8th.

15. Finals
    15.1. In Finals, pilots will race heads up, first to (X) laps.
    15.2. Each heat, the pilot who finishes last is eliminated.
        15.2.1. If some pilots don’t finish X laps, last place is decided by the pilot with the least number of gates (not flags) completed.

15.2.1.1. This is tie-broken by a raceoff when more than one pilot has crashed on the same lap number, and after the same gate. All tied pilots must compete in this race-off.

15.2.1.1.1. Race-offs which result in the losers tying are re-run with only the tied pilots. Any other participating pilots are considered the winners of the previous raceoff.

15.3. Heats will be flown until two pilots remain, in which the pilots will go head to head for first place.

15.4. Following Points Rounds, a holeshot rule will be put into play. Race directors will designate a gate near the beginning of a track to be the holeshot. If any pilot in a heat suffers a mid-air with another pilot prior to the holeshot gate, which results in them being unable to reach the holeshot gate, the heat will be re-run.

Course Navigation

16. Element order

16.1. Pilots are expected to navigate the course in the sequence and direction of elements specified by the race director.

16.1.1. If a pilot is believed to have navigated the course incorrectly intentionally by the race director, the pilot may be disqualified from the round or event.

17. Element completion

17.1. Elements are considered completed when the pilot passes by or through them.

17.1.1. Gates are considered complete when the drone intersects with the imaginary plane that comprises the opening of the gate in the correct direction as described during the course walkthrough.

17.1.2. Flags will be considered complete when the drone is more than half way around the flag after having traveled primarily in the direction (clockwise, or counterclockwise) described during the course walkthrough.

17.1.2.1. Flying above the max height of a flag element will result in a missed element if there is any reasonable doubt that the flag was not completed successfully.

Rule Enforcement

18. Pilots agree to allow their motors, vtx, and other equipment to be submitted for testing upon marshal or race director request.

18.1. These may occur at any time before or after heats.

19. The top 4 pilots MUST allow the race director to fully spec check their quad before finals and after at the race directors discretion.

Race Procedure

20. All pilots must promptly leave the launch block area and return to the flight line when the “course closed” callout sounds.

20.1. Once the course closed callout occurs

20.1.1. No pilot or anyone else may physically interact with any of the quads on the launch blocks in any way.

20.1.1.1. Doing so will lead to the race being paused and the offending pilot and any person attempting to assist that pilot being disqualified from the current round and receiving zero points.

20.1.2. Any pilot or other person that does not promptly leave the launch block area will be disqualified from the current round and receive zero points.

21. The race will begin, at latest, after a predefined amount of time after the course closed callout by an automated timer system.

22. The pilots may choose to start the race early by signaling that they are “Ready” by either a thumbs up and race director acknowledgment or by pressing a physical button located on the flight line.

22.1. By signaling that the pilot is “Ready”, the pilots are acknowledging that they believe their equipment is ready to fly and that they are prepared to race.

23. Once the race start sequence has begun pilots will attempt to complete their race to the best of their ability. Any situations that may warrant a rerun will be examined after the race is complete. Save only for imminent safety concerns.

23.1. If a pilot believes that a competitor’s radio equipment interfered with their ability to operate their drone and wants a rerun, they must request it before the race is marked as complete by the race director.

24. Reruns, raceoffs, and DQ’s will be exercised at the race director’s sole discretion.

25. Pilots who leave the starting blocks early for any reason may be allowed to continue their round if they meet the following requirements.

25.1. The drone may not be directly interacted with by any person. IE: touching, kicking, flipping over, etc.

25.2. The drone must be landed and allow all other non false starting competitors to pass them such that there is no doubt that they did not gain an advantage

25.3. The false starting pilot may not interfere with any other non false starting pilot before the holeshot gate or they will be disqualified and the race restarted

25.4. The false starting pilot must enter the hole shot gate after all pilots who have entered the hole shot gate without incident.

25.4.1. Incident’s would include, crashing, midairing, veering off course, etc. at the race directors discretion.

26.

Willful attempts to subvert these rules during a Street League event may result in a yearlong or lifetime ban from official Street League events. These occurrences will be reported by the race director and decided upon by the league’s stewards.

The rules herein are subject to change at the discretion of the organizers of Street League, in order to keep competitive integrity and make the best racing possible for all pilots and spectators.

Spirit of the rules

- To provide a framework for high quality racing.
- To be approachable, enjoyable, and affordable for pilots and brands.
- To stimulate meaningful innovation in the space of UAV performance.