Report of the CIAM UAV Working Group

Bruno DELOR - Chairman of the CIAM UAVWG

Annex:

1- Terms of Reference of the UAVWG (Version 1.0 - June 2014).

2- Terminology and definitions.

As recommended by the 2014 CIAM Plenary Meeting, a temporary UAV Working Group (UAVWG) has been established by the CIAM bureau.

The scope and the mission of this working group are described in the Terms of Reference document (see annex 1). The appointed members of the CIAM UAVWG as defined in this document have been informed by an email of the CIAM President dated 7th June 2014.

Beginning of July, Graham LYNN, respected aeromodeller from United Kingdom, has been nominated member of the UAVWG regarding his contribution for EASA and EAS[1] on RPAS and aeromodelling.

So, now there has been finally nine appointed members (including the Chairman) in the UAVWG.

According to the Terms of Reference, an interim report has been established for a presentation by the CIAM President at the CASI meeting (16th October 2014 in Thailand) before to be evaluated by CIAM Bureau at the December Bureau Meeting

The following document is the final report as validated by the CIAM Bureau for presentation to the April 2015 CIAM Plenary Meeting. This report is completed, as required in the Terms of Reference document, by a draft rule for events.

1. FAI CLASSIFICATIONS AND TERMINOLOGY

Three classes are defined in the FAI Sporting Code (General Section) regarding aerodynes that does not carry a human being:

- Class F: Model Aircraft (AL7)
- Class S: Space Model
- Class U: Unmanned Aerial Vehicle UAV (AL5)

As mentioned in General Section 2014 Edition Paragraph 1.4, classes F and S are attached to CIAM (Aeromodelling Commission) and class U is attached to CASI (Air Sport General Commission).

Note: Class S is not concerned by UAV considerations and so is not mentioned in that report.

1.1. Definition of the FAI Class F (Model Aircraft)

This class is defined as follows (General Section 2014 Edition Paragraph 2.2.1.6): "*An aircraft of limited dimensions, with or without a power source, not able to carry a human being*".

The definition of a Model Aircraft is detailed in Section 4 "Aeromodelling" Volume ABR Section 4C Part 1 Paragraph 1.1 "General Definition of a Model Aircraft":

a) *A model aircraft is an aircraft of limited dimensions, with or without a propulsion device, not able to carry a human being and to be used* ***for competition, sport or recreational purposes****.*

b) For the whole flight, a radio-controlled model aircraft shall be in the ***direct control of the flier****, via a transmitter, and in the flier's sight other than for momentary periods.*

1 **EASA:** European Aviation Safety Agency
EAS : Europe Air Sports

c) *For control line model aircraft, the flier must physically hold the control line handle and control the model aircraft himself.*

d) *Free flight model aircraft must be launched by the flier and must not be controlled remotely during the flight other than to stop the motor and/or to terminate the flight.*

e) *A model aircraft shall not be equipped with any device that allows it to be flown **automatically** to a selected location.*

1.2. Definition of the FAI Class U (UAV)

This class is defined as follows (General Section 2014 Edition Paragraph 2.2.1.17): "*An aerodyne with means of propulsion that does not carry a human, and which is designed **for scientific research, commercial, governmental or military purposes***".

Notes:

- There are mainly two basic types of UAV, those that are always under the direct control of the operator (within or not VLOS) and those that fly autonomously for at least a part of the flight.
- In the present document, the word "professional" will be used for covering globally activities corresponding to the scientific research, commercial, governmental or military purposes. Most of them are commercial ones but some research activities -like forest growth, geological and archeological research- have to be considered as professional even if they are not done on a commercial basis.

1.3. Terminology and definitions

The General Section includes some general definitions which can apply to a model aircraft. Those definitions are in annex 2.

In this annex 2, the terminology used by International civil Aviation Organization (ICAO) and other terms which can be useful for aeromodelling are also defined.

Note: Regarding those definitions, UAV (Unmanned Aerial Vehicle) which corresponds to the term which is used by FAI for Class U, or RPV (Remotely Piloted Vehicle) are acronyms of the official OACI term RPA (Remotely Piloted Aircraft), whereas UAS (Unmanned Aerial System) is an acronym of RPAS (Remotely Piloted Aircraft System).

2. IMPACT OF TECHNOLOGY ON AEROMOELLING ACTIVITIES

The current available technology clearly impacts the aeromodelling activities (competition, sport or recreational purposes).

2.1. Impact on the actual FAI model aircraft classes

The actual International FAI model aircraft classes are defined for competition purposes only.

The use of electronic devices such as gyro sensors, altimeter, telemetry, GPS offers possibilities of increased performances.

Each CIAM Sub-committee has to define for their classes if such devices can be used and the appropriate requirements and limitations. That can be done with the support of the Electronic Devices In Competitions (EDIC) Working Group established in January 2014.

Note: As discussed during the Open Forum at the 2014 CIAM Plenary Meeting Regarding, it is now possible to imagine in a near future a "blackbox" for data collection or a software FAI mode in order to prevent the risk of "cheating" using on competition such electronic devices.

2.2. New possible types of model aircraft and events classes

CIAM must take attention on all recreational activities that are now possible by using the current available technology such as FPV, circuit with GPS guidance, ...

Note: Just as an illustration of the rapid progress of the technology, the US company Eagletree has recently put on the market a new product named Vector which is a complete stabilising and controlling unit which can be used not only for a multi-rotor, but as well on a fixed wing aeroplane.

It is also important for CIAM to show its interest for all available types of model aircraft. For example, CIAM must clearly recognize a multi-rotor as a specific type of model aircraft and encourage organization of appropriate events as already done in some countries such as Australia and France.

For example, the "Fédération Française d'Aéromodélisme" (FFAM) has organized for the first time in 2014 an Open Event for multi-rotors. At that stage and as hoped by the participants, it has to be considered as a recreational event (festival or flight symposium) rather than a real competition with rigid rules.

Australia (and possibly other countries) has also organized equivalent multi-rotors events with a good level of participation.

Those experiences clearly confirm that there is a potential interest for such multi-rotors events. It could also be imagined equivalent events with fix wing aerodynes.

2.3. Draft rule

As requested in the Terms of Reference of the UAVWG, the Working Group has prepared a draft rule to be considered as a base for organisation of recreational or sporting events with model aircrafts equipped with on-board electronic devices or flight system named "drone model aircraft" and which can be rotary or fixed wing.

Two types of event are covered in draft rule document as proposed

- Recreational event based on a list of flight tasks to be done.
- FPV Racing competition.

The objective is mainly to show that CIAM takes attention and interest regarding those new types of aeromodelling practice and to encourage and help organization of such events. At the moment, those events will be mainly organised on a national basis even if it could be imagined an international event if a country is interested to organize it.

Those rules could be soon outdated regarding rapid evolution of the technology. Moreover, it seems that those who actually practice those activities are not looking for real competition.

So, those rules have clearly to be considered as provisional and certainly not as official or "rigid" competition rules.

At this stage, it is not necessary to officially act new FAI classes (even as provisional rules) to cover those activities.

In those conditions, there is no need at the moment to create a new CIAM Sub-committee in order to cover the evolution of these draft rules and the corresponding events. This can be done on behalf of the CIAM Bureau. A new CIAM Sub-committee will be necessary only when specific FAI classes with real international competitions will be imagined.

3. AIRWORTHINESS AND AIRSPACE REGULATIONS

All National Aviation Authorities and International Airworthiness Administrations work on RPAS in order to define adequate regulations both for airworthiness and for airspace considerations.

ICAO on a world level, Federal Aviation Administration (FAA) in USA and European Aviation Safety Agency (EASA) in Europe are working on the subject.

Note: JARUS (Joint Authorities for Rulemaking on Unmanned Systems) which has been created in 2007 is a group of experts from the National Aviation Authorities (NAAs) and regional aviation safety organizations. Its purpose is to recommend a single set of technical, safety and operational requirements for the certification and safe integration of RPAS into airspace and on aerodromes in order to facilitate each national authority to write their own requirements and to avoid duplicate efforts. The countries members of JARUS are: Australia, Austria, Belgium, Brazil, Canada, Czech Republic, Colombia, Denmark, Finland, Germany, Great Britain, Greece, France, Ireland, Israel, Italy, Malta, Netherlands, Norway, Russia, South Africa, Spain, Switzerland, United States of America.

So, it is obvious that new regulations relative to RPAS will be published in the near future.

There is a risk that those regulations which will mainly be defined for professional activities be also applicable to aeromodelling (competition, sport and recreational purposes).

Thus, once more, it is important to clearly differentiate a model aircraft from a RPA/RPAS (UAV). It is important to consider that a model aircraft used for a recreational or sportive purpose is no more a model aircraft as soon as it is used for a professional purpose.

It is necessary to be proactive on the subject in order to avoid regulations which will not be adapted for aeromodelling activities.

The European Commission is working from 2012 towards a "strategy for the development of civil applications of RPAS" with the objective of a RPAS Road Map covering especially the question of insertion of RPAS in non-segregated airspace. EASA is in charge of the question and a Notice of Proposed Amendment (NPA 2014-09) is actually in discussion in order to propose the alignment of the European common rules of the air (SERA) with amendment 43 to Annex 2 to Chicago Convention in relation to RPAS. In other words, the proposed rules are:

- Rules of the air applicable to RPAS of any mass when flown under general Air Traffic (GAT) rules;
- Nothing related to airworthiness, licensing of remote pilots and operations of RPAS with a mass below 150 kg.

A practical example which shows the necessity to be vigilant in order that regulations defined for RPAS (UAV) have finally not a negative impact on aeromodelling.

EAS, which is the organization representing sport and recreational aviation at the European level, does its best to be involved and take the opportunity to express its position.

In a paper dated January 2013 and signed by David Roberts (EAS President), EAS defines the position of sports and recreational aviation regarding the European Strategy for RPAS. Concerning aeromodelling. In that paper, EAS stresses the main differences between a model aircraft and a RPAS and insists on the fact that any regulation applicable to RPAS must, by definition, not apply to model aircrafts. EAS also offered its technical assistance in order to guide the European Commission and EASA towards the deployment of RPAS in a non-conflicting way with sports and recreational activities.

EAS is officially recognized by FAI. CIAM must continue to be in contact and discuss with EAS with the objective to have common positions regarding model aircraft versus RPAS (UAV).

A questionnaire had been sent to all NAC's by Gerhard Wöbbeking on November 2013 regarding advanced flying systems (FPV, Auto Systems and sUAS). The compiled results of this questionnaire which have been sent to the CIAM Delegates by a mail dated 4 April 2014 provide useful datas.

CIAM should continue to follow the airworthiness and airspace regulations defined by the main National Aviation Authorities which can have an impact on aeromodelling activities, especially regulations on RPAS.

CIAM could also have interest to summarize some basic principles in order to help the NAC's for discussion with their National Aviation Authority and so contribute to the trend towards continuing harmonized rules for model aircraft. This activity should be undertaken in liaison with Europe Air Sports (EAS).

This process may protect the aeromodelling activity from being regulated, at some future date, by rules defined for RPAS.

4. PROPOSALS REGARDING AEROMODELLING ACTIVITIES AND MODEL AIRCRAFT

Proposal 1

Consider as aeromodelling activities all sportive and recreational activities done with aircrafts of limited dimensions not able to carry a human being.

Justification:

The improvement of the technology with miniaturization of sensors and systems may be beneficial for model aircrafts and the current development of UAS may have a positive impact on the aeromodelling activities and contribute to its development.

So, new activities are now possible with a model aircraft by using Advanced Flight Systems (flight stabilisation, automatic flight control,...). As an illustration, FPV activities are more and more developed in some counties regarding the actual miniaturization and performances of the on

board video cameras with possibility of a transmission to a pilot headset or to a computer and screen on ground.

Some new types of model aircraft such as multi-rotors are now available which also offer the possibility of different types of aeromodelling practice.

CIAM must cover all sportive and recreational activities which are now possible to imagine with the new types of model aircraft and/or by using the possibilities of the current technology. If CIAM fails to do this, there will be a clear risk that some other organizations appear to cover those activities as it has been the case for radio-controlled jets with the International Jet Model Committee (IJMC) and organization of the Jet World Masters.

Proposal 2

Only use the terms UAV (and UAS or UA), RPA/RPAS for professional activities (scientific research, commercial, governmental or military purposes).

Justification:

Class F (Model Aircraft) and Class U (UAV) are clearly differentiated. Both concern aircraft that do not carry a human being but the use of such aircrafts in class F are limited to competition, sport or recreational activities while they are used in class U for professional activities.

In those conditions, it is important to forget the terms UAS/UAV (or "Small UAV") or RPAS/RPA for competition, sport or recreational purposes which are relevant of aeromodelling activities. For those activities, it is recommended to consider only the term model aircraft.

As a consequence, class U does not have to be covered by CIAM.

Note: Class U does not concern any sport purpose; so, it will not be logical to consider that this class have to be covered by a FAI Air Sport Commission, even CIACA or CASI. The only interest to maintain such a specific class in the classification for sporting events and records is regarding records done in a professional environment.

Proposal 3

Modify as follows Paragraph 1.1 "General Definition of a Model Aircraft" of Volume ABR Section 4C Part 1 *(deletions as* ~~strike-through~~ *and additions as* **bold underlined**):

a) A model aircraft is an aircraft of limited dimensions, with or without a propulsion device, not able to carry a human being and to be used for competition, sport or recreational purposes

b) For the whole flight, a radio-controlled model aircraft~~ shall be in the direct control of the flier, via a transmitter, and in the flier's sight other than for momentary periods~~ **must be within visual line of sight (VLOS) of the flier who assumes directly its control or who is in a situation to take the direct control at any moment, including if the model is being flown automatically to a selected location**.

c) For control line model aircraft, the flier must physically hold the control line handle and control the model aircraft himself.

d) Free flight model aircraft must be launched by the flier**,** and must not be **equipped with any device that allows it to be flown automatically to a selected location or** controlled remotely during the flight other than to stop the motor and/or to terminate the flight

~~e) A model aircraft shall not be equipped with any device that allows it to be flown automatically to a selected location.~~

~~f)~~**e)** In the case of record attempts conducted under Part 2, the claimant(s) shall confirm that the submitted record claim is for a model aircraft record as noted in Table III.

Justification:

It is not necessary to modify the general definition of a model aircraft in General Section of the FAI Sporting Code.

But the detailed definition of a model aircraft in Volume ABR have to be adapted.

So, it is recommended to reconsider the sub-paragraph b) in order, under some conditions, to permit flights such as FPV which are not realised in direct VLOS of the flyer who controls its model aircraft via the visual pictures he got from his headset or on a screen on ground.

But, in that situation, it is necessary to accept to assume a separate VLOS of the model aircraft in order to prevent any collision with another aircraft. It can be done by an operator (other than the flyer) in charge of the safety and who has to be permanently in situation, in case of a problem, to take the control of the model aircraft using or not a dual radio-control transmitter.

It is also recommended to delete the subparagraph e) in order to accept devices, equipments or systems that permit automatic flight for a model aircraft (within respect of the VLOS requirement).

With such modification of the detailed definition of a model aircraft, all types of aircrafts which are not able to carry a human being and which are used within VLOS of the flier for competition, sport or recreational purposes can be considered as a model aircraft. That covers the case of a model aircraft which is directly radio-controlled by the flier with a transmitter but also the case of a model aircraft which is computer controlled for an automatic flight.

Note: In the January 2013 paper signed by the EAS President, David Robert, the following fundamental characteristics of an aeromodel (model aircraft) are suggested to the European Commission:

- It is operated for sport and recreational purposes and in non-commercial environment.
- It is operated within visual line of sight (VLOS) of the operator;
- The primary purpose of a flight is to fly the aeromodel to increase personal skills, whereas with an RPAS the primary purpose of the flight is the achievement of the task (aerial work) with the control of a flight being a secondary or automated function.

Those characteristics are compliant with the modified FAI detailed definition of a model aircraft which is suggested.

Proposal 4

Formalize a typology of the different types of model aircraft and take it in account for the naming of the actual FAI model aircraft classes.

Justification:

It seems appropriate do define the different types of model aircraft according to the FAI terminology as defined in General Section (see annex 2).

So, on reference of the general definitions of General Section, it could be suggested to retain the following terminology as applicable for model aircraft: aeroplane, glider, motor glider, helicopter (as a type of rotorcraft), aerostat.

It is also appropriate to retain some other specific types such as multi-rotor (or multi-copter), drone model aircraft, self guided drone (see definitions in annex 2 paragraph C).

Notes:

- As mentioned before in the report, it is necessary to assume a permanent VLOS of the model aircraft in order to prevent any collision with another aircraft. It can be done if necessary by an operator (other than the operator in charge of the flight) in charge of the safety.
- The term "drone" (acronym of RPA with a military origin) is now a very common name used both to characterize small UAV's for civil professional applications and as toy or model aircraft for recreational use. So, that term can be confusing and so justify a clear definition when used as a model aircraft for a recreational or competition purpose.

It is also suggested to clarify the naming of the actual FAI model aircraft classes. At the moment, "model aircraft" is mentioned for some classes, in the name of the class. For some other classes, the term "helicopter" or "glider" is used in preference to "model aircraft"; for RC racer classes, the combination "pylon racing model aircraft" is used.

All categories and classes for class F are relative to model aircraft. So, rather to mention "model aircraft", it is more useful to mention in the name of a class the type of model aircraft corresponding to that class: "aeroplane", "helicopter", "racer", "glider", "motor glider", "aerostat", ...

5. CONCLUSION

The expansion of the professional activities of aircrafts not able to carry a human being (RPA/RPAS, UAV/UAS) represents at the same time an opportunity and a risk for aeromodelling.

An opportunity because miniaturization of sensors and systems can be profitable for the sportive and recreational activities and so can contribute to a development of aeromodelling. Moreover, specific skills and competences of some aeromodellers can interest the professionals and so give an opportunity for associations or persons to take part to professional activities being remunerated or not.

A risk because airworthiness and airspace regulations which will be defined for RPAS UAV's may have a negative impact on model aircraft activities. So, in order to minimize that risk, it is strongly recommended to consider that model aircraft activities could only be done within visual line of sight (VLOS) of the model aircraft and so stays on that point as it is now.

It is recommended to consider as a model aircraft any type of small aircraft which does not carry a human being as soon as it is used for competition, sport or recreational purposes with respect of the VLOS requirement.

CIAM must take care about all types of those aircrafts, such as for example multi-rotor or self guided model aircraft ("recreational drone"), and must cover all sportive and recreational activities which are now possible to imagine with such types of model aircraft and/or by using the new possibilities offered by the current technology.

As requested in the Terms of Reference of the UAVWG, the Working Group has completed its report by a draft rule to be considered as a base for organisation of recreational or sporting events with drone model aircrafts (rotary or fixed wing). At this stage, it is not necessary to act new FAI classes (even as provisional rules) and to create a new CIAM Sub-committee in order to cover the corresponding events. This can be done on behalf of the CIAM Bureau and a new CIAM Sub-committee will be necessary only when specific FAI classes with real international competitions will be imagined.

Regarding airworthiness and airspace regulations, it is necessary to be careful in order to avoid regulations which will not be adapted for aeromodelling activities.

- ANNEX 1 -

TERMS OF REFERENCE OF THE UAVWG

(Version 1.0 - June 2014)

Background

During CASI Plenary Meeting in Kuala Lumpur (October 2013), CIAM President mentioned that CIAM will examine the possibility to include UAV and similar technology activities within the scope of CIAM activities.

On a proposal of the CIAM Bureau Meeting, CIAM Plenary Meeting in April 2014 decided to establish a Working Group in order to prepare a report to be evaluated during the December 2014 CIAM Bureau Meeting. Depending on the report, CIAM will consider the interest of a separate Sub-Committee to take care of this activity. This will be decided by the CIAM Plenary Meeting in 2015.

Mission

The mission of this CIAM Working Group is:

- To evaluate the impact for CIAM activities of the current available technology especially regarding the sporting activity and events.
- To prepare a draft rule to be considered as a base for future sporting events and consider whether a test event can be organized.
- To define the interest of a new separate Sub-Committee and the qualifications required for the members of such a Sub-Committee.
- If so tasked by CIAM Bureau, to prepare the necessary rules modifications in order to establish a new Sub-Committee.

The CIAM Working Group will prepare an interim report to be presented at the next CASI meeting (October 2014) and a report to be evaluated by CIAM Bureau at the December Bureau Meeting.

Membership

The working group will comprise the following 8 (eight) appointed members:

- Chairman: Bruno DELOR – France (CIAM 1st VP and CIAM Delegate)
- Members:
  - Narve JENSEN - Norway (CIAM 2nd VP and CIAM delegate)
  - Robert HERZOG - Belgium (CIAM Delegate)
  - Ivan HOREJSI - Czech Republic
  - John LANGFORD - USA (CIAM Space Models expert and CEO of AURORA Technologies)
  - Bengt LINDGREN - Sweden (CIAM Delegate and CASI member)
  - Jure PECAR - Slovenia
  - David TRAINO - Australia

Transaction of business

- The normal business of the Working Group is expected to be conducted through the mediums of email and VoIP (Voice over IP) services.
- The Working Group may plan face-to-face meetings in conjunction with other CIAM activities meetings at which all, or the majority of, Working Group members are present.
- Working Group members are not entitled to claim any casual expenses or travel costs from the CIAM unless these are expressly pre-approved by CIAM Bureau.

Term

- The Working Group shall be appointed for a term from June 2014 to April 2015.

- ANNEX 2 -

TERMINOLOGY DEFINITIONS

A) FAI GENERAL DEFINITIONS

a) General Section Paragraph 2.2.1

- **Aircraft:** vehicle that can be sustained in the atmosphere by forces exerted on it by the air. There are two types of aircraft: aerodyne and aerostat.
- **Aerodyne:** heavier-than-air aircraft which derives its lift in flight mainly from aerodynamic forces.
- **Aerostat:** aircraft lighter than air.

b) General Section Paragraph 2.2.1.3 (definitions regarding class C)

- **Aeroplane:** fixed wing aerodyne with means of propulsion.
- **Electrically-powered aeroplane:** aeroplane which can be sustained in level flight in the atmosphere using solely an electrical motor(s).
- **Solar-powered aeroplane:** aeroplane which can be sustained in level flight in the atmosphere using solar energy impacting on its airframe as its energy source.

  Note: Solar-powered aeroplane model aircraft (or UAV) but it can be imagined in a next future regarding the progress done on the solar panels technology.

c) General Section Paragraph 2.2.1.4 (definitions regarding class D)

- **Glider:** fixed wing aerodyne capable of sustained soaring flight and having no means of propulsion.
- **Motor glider:** fixed wing aerodyne equipped with means of propulsion, capable of sustained soaring flight without thrust from the means of propulsion

d) General Section Paragraph 2.2.1.5 (definitions regarding class E)

- **Rotorcraft:** aerodyne that derives the whole or a substantial part of its lift from a rotary wing system.
- **Helicopter:** rotorcraft with a power driven rotor system whose axis (axes) is (are) fixed and substantially perpendicular to the longitudinal axis of the rotorcraft.

Note: this class covers two other types of rotorcraft (autogyro and tilt rotorcraft).

B) ICAO TERMINOLOGY

Remotely Piloted Aircraft (RPA)**:** unmanned aircraft which is piloted from a remote pilot station.

Remotely Piloted Aircraft System (RPAS)**:** remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design.

Remote pilot station: component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.

RPA observer: trained and competent person designated by the operator who, by visual observation of the remotely piloted aircraft, assists the remote pilot in the safe conduct of the flight.

Remote pilot: person charged by the operator with duties essential to the operation of a remotely piloted aircraft and who manipulates the flight controls, as appropriate, during flight time.

Operator: person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Note: In the context of a remotely piloted aircraft, an aircraft operation includes the remotely piloted aircraft system.

Visual line of sight (VLOS) **operation:** operation in which the remote pilot or RPA observer maintains direct unaided visual contact with the remotely piloted aircraft.

C) OTHER DEFINITIONS USEFUL FOR AEROMODELLING

Fixed wing model aircraft: model aircraft with mean(s) of propulsion which derives its major lift from fixed wing(s) surface(s).

Rotary wing model aircraft: model aircraft with mean(s) of propulsion which derives the whole or a substantial part of its lift from a rotary wing system.

Multi-rotor (or multi-copter): rotary wing model aircraft with more than two rotors.

Drone model aircraft: model aircraft equipped with on-board electronic devices (gyro sensors, altimeter, telemetry, GPS, video camera, ...) or associated flight systems (flight stabilisation, automatic flight control,...).

Note: *a drone model aircraft such as defined in the present document must have a mean of propulsion and can be in a fixed-wing configuration (aeroplane) or in a rotorcraft one.*

Self-guided drone: drone equipped with a programmable autopilot system which can automatically stabilize the drone and/or initiate a programmed flight path. Such a drone is mission orientated and computer controlled nearly its entire flight, but it must be possible for the flight operator to desactivate at any moment the autopilot system.

First Person View (FPV)**:** video view of the model aircraft's camera transmitted to a headset goggle of the pilot or to a screen.

Fédération Aéronautique Internationale

Drone model aircraft event
Draft rule

Edition 1
Effective 1st May 2015

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DRAFT RULE FOR A DRONE MODEL AIRCRAFT EVENT

TECHNICAL REGULATIONS FOR DRONE MODEL AIRCRAFT EVENTS

New aeromodelling activities are possible with possibilities offered by the current technology and miniaturization of on-board electronic devices (gyro sensors, altimeter, telemetry, GPS, video camera, ...) and associated flight systems (flight stabilisation, automatic flight control,...), combined or not with new types of model aircraft such as multi-rotor.

As an illustration, First Person View (FPV) activities are more and more developed in some counties regarding the actual performances of on-board video cameras with transmission to a pilot headset goggle or to a screen on ground.

This draft rule document has to be considered as a base for organisation of recreational or sporting events with model aircrafts equipped with on-board electronic devices or flight system.

Note: *model aircrafts equipped with on-board electronic devices or flight system are named "drone model aircraft" in the present document; they can be rotary or fixed wing.*

Most of those who actually practice such activities are not looking for real competition. So, the proposed rules have clearly to be considered as provisional and not as official or "rigid" competition rules.

Such events can be organised on a national basis, but also on an international one if a country is interested to organize an international event. In case of an international event, it is recommended to publish it on the FAI calendar.

Note: *for aeromodelling activities, use of terms such as Unmanned Aerial Vehicle (UAV), Unmanned Aircraft System (UAS) Remotely Piloted Vehicle (RPV) or Remotely Piloted Aircraft System (RPAS) must be avoided. Indeed, those terms are directly relative to FAI class U which corresponds to professional activities (scientific research, commercial, governmental or military purposes) done with aerodyne that does not carry a human being. It is important to avoid any confusion between those professional activities and aeromodelling activities (competition, sport or recreational purposes) corresponding to class F.*

1. DEFINITIONS

1.1. General definitions

Aircraft: vehicle that can be sustained in the atmosphere by forces exerted on it by the air.

Aerodyne: aircraft heavier-than-air which derives its lift in flight mainly from aerodynamic forces.

Model aircraft (FAI class F)**:** aircraft of limited dimensions, with or without a propulsion device, not able to carry a human being and to be used for competition, sport or recreational purposes.

Important note: *a radio-controlled model aircraft may be equipped with any device, such as an autopilot system, that allows it to be flown automatically to a selected location; but, for the whole flight, it must be within visual line of sight (VSOL).*

Fixed wing model aircraft: model aircraft with mean(s) of propulsion which derives its major lift from fixed wing(s) surface(s).

Rotary wing model aircraft: model aircraft with mean(s) of propulsion which derives the whole or a substantial part of its lift from a rotary wing system.

Multi-rotor (or multi-copter): rotary wing model aircraft with more than two rotors.

Drone model aircraft: model aircraft equipped with on-board electronic devices (gyro sensors, altimeter, telemetry, GPS, video camera, ...) or associated flight systems (flight stabilisation, automatic flight control,...).

Note: *a drone model aircraft such as defined in the present document must have a mean of propulsion and can be in a fixed-wing configuration (aeroplane) or in a rotorcraft one.*

1.2. Visual line of sight (VLOS) definition

The flight operator who assumes directly the control of the model aircraft - or a safety operator who at any moment of the flight, including when flying automatically to a selected location, is in a situation to take the direct control or to inform immediately flight operator of any danger - must maintain direct unaided visual contact with the model aircraft.

1.3. Other definitions

First Person View (FPV)**:** video view of the model aircraft's camera transmitted to a pilot headset goggle or to a screen on ground.

Note: *it is strongly recommended that the system is configured to initiate a failsafe procedure cutting off motors when losing the radio link.*

Self-guided drone: drone equipped with a programmable autopilot system which can automatically stabilize the drone and/or initiate a programmed flight path. Such a drone is mission orientated and computer controlled nearly its entire flight, but it must be possible for the flight operator to desactivate at any moment the autopilot system.

Note: *it is strongly recommended that the system includes a "Return To Home" (RTH) function so that the drone may automatically return to a selected location in case of lost of the radio link.*

Flight operator: the pilot who flies the drone and takes flight decisions based on received information. The flight operator can be allowed a helper that can feed information from a video link.

Note: *FPV or self-guided flights requires a safety operator (other than the FPV flyer) who can guarantee the VSOL of the drone model aircraft during all the flight.*

2. GENERAL CHARACTERISTICS FOR DRONE MODEL AIRCRAFT

For an event as concerned in the present document, it is recommended to limit the maximum flying weight to 5 kg. In any case, the flying weight must be under 25 kg which corresponds to a general characteristic of a model aircraft (see Volume ABR Section 4C 1.2).

A noise limit of 96 dB(A) at 3 metres is also strongly recommended to be imposed for each drone.

Other specifications may be defined for the event such as a maximum span for a fixed wing drone or swept area of the lifting rotor(s) for a rotary wing drone.

3. GENERAL CONSIDERATIONS

Two types of events are covered in the document:

- Contest event (FPV Racing and Freestyle Aerobatics).
- Recreational event based on a list of flight tasks to be done.

For the recreational event based on a list of flight tasks, the list of flight tasks and the corresponding rules must be published by the organiser before the event, and preferably in advance of the entry deadline. The event rules must precise how the final placing will be done and if each participant may or not choose a limited number of flight tasks to fly.

For both types of events, the organiser must provide a suitable site according to the flights tasks and that permits flights under safety conditions with safe recovery of the drone

The organiser must also organise the different controls to be done prior to the beginning of the flights: checking of frequencies, control of the individual participant insurance, checking of the documents required such as certificates, processing of the drones (for example mass), …

4. OFFICIALS

4.1. Event Director

It is strongly recommended for the organiser to nominate an Event Director responsible for the management of the event and smooth and safe running.

The Event Director shall take operational decisions in accordance with the event rules. He must also take care about a sufficient number of qualified officials and the necessary technical equipment (electronic stopwatches, distance measurement devices, target equipment, …).

4.2. Flight Director

It is also recommended to nominate a Flight Director in charge of the march of the flight tasks.

The Flight Director defines the flight conditions for each flight task (take-off area, targets, timing, measured distance, …), controls the evolution of the flight tasks and validates them.

The Flight Director may:

- cancel a task if the weather conditions do not allow a normal and equal flight between competitors,

- invalidate a task if all competitors receive zero for their flight score.

4.3. Panel of judges

It is recommended to nominate a Panel of judges including a Chairman, the Flight Director and one other judge. The Panel of judges must be defined prior to the start of the event and the members shall be chosen for their experience and/or drone model aircraft competence.

It is the responsibility of the Panel of judges, in conjunction with the Event Director, to make any decision dictated by the event circumstances that may arise. The Panel of judges can penalise / disqualify a participant for infringement to the rules, misconduct, unsafe or unsporting behaviour.

Any decision from the Panel of judges is obtained by majority vote and in the case of a tie the Chairman makes the final decision.

4.4. Other officials

Other officials can be in charge of distance measurements or timekeeping, and of other observations.

Those officials will be nominated provided they are qualified or trained for the activity they have to perform.

They will report as necessary to the Flight Director and/or to the Chairman of the Panel of judges of any incident or deviation occurring during the event.

5. PARTICIPANTS AND HELPERS

It is the participant's responsibility to obtain the event rules.

Entry can be closed at a deadline date defined by the organiser.

By his entry, each participant recognises that he accepts, and will comply with, the event rules and especially on safety.

Each participant must comply with the national regulations such as (but not limited to): flight drone authorisation, pilot degree, insurance, radio equipment. Unless specific agreement is obtained from authorities, the radio frequencies must fit the regulations of the organising country.

Each participant can be allowed one helper but who is not allowed in normal flight to touch the radio equipment.

6. SAFETY

The Event Director, the Flight Director and other judges must always take care about safety and ensure that participants, helpers and officials involved in the flying site comply with the safety rules defined by the organiser.

The Panel of judges may disqualify, without right of appeal, any participant who infringes or ignores the safety rules and will exclude from the flying site any other person who deliberately infringes or ignores the safety rules.

7. LOCAL RULES

The organizer may define any local rule that he considers appropriate especially in order to respect the airworthiness and for airspace regulations applicable in the organizing country.

Such local rules may especially concern:

- how to respect the permanent VSOL of the drone (safety operator, …),
- national regulation applicable for FPV flight (safety operator with or without a dual radio-control transmitter, RTH function, …).
- limitation regarding dropping of objects.

8. EVENT RESULTS

The organiser must inform the participants on results throughout the event and publish the final results and placing as soon as possible after the last flight task is finished.

It is recommended to publish the official results and placing within one week after the event.

9. CONTEST EVENT

Note: *FPV Racing and Freestyle Aerobatics concern multi-rotors only.*

9.1. FPV Racing

The competition can start by a qualification sequence based on the best time lap done by each competitor (one competitor in flight at the same moment). As defined by the organiser, each registered competitor may have two or more timed qualification runs; the best time lap done by each participant is taken in account for the ranking after qualification.

The number of competitors selected for the race rounds from the qualification sequence is defined by the organiser.

Each race round is defined by the ranking issued from the qualification times, so that the fastest qualified competitors are in different rounds.

The race rounds are conducted in groups of a maximum of four competitors. The fastest two competitors in the race of each group are selected for the next race round until four competitors remain for a final race. The final race will determine the first, second, third and fourth places.

Note: *depending of the number of competitors selected for the race rounds from the qualification sequence, it could be justified to conduct race rounds with groups of three competitors instead of four, for example if there are twelve competitors selected.*

9.1.1. Classes

The competition can be organised with only one class only (all types of multi-rotors together) or with different classes such as defined by the organiser prior to the competition.

Classes can be for example defined considering the diameter of the propellers:

- Class A: maximum propeller diameter of 5 inches.
- Class B: diameter propeller between 5 inches and a maximum of 7 inches.
- Class C: diameter propeller between 5 inches and a maximum of 10 inches.

Classes may also be defined as follows (maximum 6 motors for all classes and LiPo batteries only):

a) Limited Mini Class
   - 250 mm max axis motors spacing.
   - 6 inches maximum prop diameter.
   - Batteries: Electric motors are limited to a maximum no load voltage of 17 volts (4S) for the propulsion circuit.

b) Unlimited Mini Class
   - 300 mm max axis motor spacing.
   - 7 inches max prop diameter.
   - Batteries: Electric motors are limited to a maximum no load voltage of 17 volts (4S) for the propulsion circuit.

c) Open Class: any multi-rotor which does not meet the specifications of the two Mini Classes. For safety, a maximum flying weight of 2 kg is recommended.

9.1.2. Multi-rotor equipment

The multi-rotor must be equipped with a failsafe system that cut immediately motors as soon as radio signal is lost.

Autopilot system with GPS and/or RTH is not allowed.

9.1.3. Circuit

The circuit is defined by the organizer taking care about safety of officials, competitors and spectators alike.

The circuit may be:

- a path marked through a wooded area or,
- a path marked through a man made structure,

- or a series of marked gates in an open field,
- or any combination of the above.

The number of laps for the race rounds is defined by the organiser prior to the competition but in such a way that the time race is between 2 and 6 minutes. The number of laps for the final race can be different for example the double of the number of laps defined for race rounds.

9.1.4. Time result

Competitors will take-off from ground within a designated start area.

A box for timed events, from behind a line for group races. The multi-rotors are placed in the start area armed and ready to fly; that can be done by an helper for each competitor. It is recommended that motors are not running before start but that is not always possible with some flight controllers.

The competitors will take place in the designated pilots area and will await the call of the official timer.

Note: *as this is an FPV event in which the competitors fly via a video feed from the multi-rotor, the pilots area does not need to be adjacent to the start area.*

The official timer should give for the start of the race a clear countdown, second per second for the last 5 seconds. The timekeeping starts when the start of the race is announced. The time is stopped when any part of the multi-rotor crosses the finish line.

If the finish line is some distance from the start area, and/or from the pilots area, then the timekeepers should be near the finish line.

9.1.5. Video transmitter frequency allocation

Each competitor must take care that his video transmitter is not powered when he is not racing in order to avoid interference with competitors who are flying.

Powering a video transmitter on a channel being used but another competitor who is racing may conduct the offender to be excluded from the event.

Before each race round, the concerned competitors need to ensure they are on a different video channel and do not interfere each other.

9.1.6. Safety

We recommend for this type of race to deploy around the course a number of race officials. These officials will be equipped with walkie-talkies and alarms (Whistle, Horn). In case of intrusion or problem on the course they can immediately stop the race. Any intervention by a official is followed by a full stop of the race. All pilots must land their machine. A pilot does not land his machine is disqualified.

9.2. Freestyle Aerobatics

9.2.1. Specifications

a) Mass: maximum mass (with batteries) of 2 kg.

b) Batteries: electric motors are limited to a maximum no load voltage of 17 volts (4S).

c) Rotor blade or propeller: metal is prohibited.

9.2.2. Number of multi-rotor per competitor

The number of multi-rotor that can be used by a competitor for the competition s not limited.

9.2.3. Helper

After leaving the start box, the pilot is allowed one helper.

The helper may give information to the pilot during the flight.

9.2.4. Contest Area Layout

Refer to the layout at the end of this section. The drawing below shows the recommended layout, the shape and distances of which should be kept for safety.

9.2.5. Types and number of flights

There are two different types of flight: Freestyle and Music Freestyle.

The organiser defines before the competition the number of rounds of flight for the competition with about the same number of rounds on Freestyle flight and on Music Freestyle flight.

The competition can be organised with preliminary rounds (with a minimum of two preliminary rounds) followed by two fly-off rounds (one on Freestyle flight and one Music Freestyle flight) for the top best placed competitors after preliminary rounds. The organiser defines the number of competitors selected for the fly-off rounds within a minimum of 6 and a maximum of 10 (depending of the number of competitors).

9.2.6. Organisation

The flight order for the first round of flight (Freestyle) will be determined by a random draw.

The flight order for round two (Music Freestyle), three (Freestyle), four will start after the first, second and third quarter of the initial order.

In case of fly-off rounds, the flight order for the fly-offs will be determined in the same manner.

Use of music on Freestyle flight is not allowed. Play-back music for Music Freestyle flight is mandatory.

The competitor must be called at least 5 minutes before he is required to enter the start box.

After the preceding competitor has finished his flight, the competitor can enter the start box and is given one minute to make adjustments and final checks.

The multi-rotor may be hovered only up to 2 m in the start box. To reach the flying area, the multi-rotor can be flown or be manually carried.

For each flight, the competitor is given a flight time of at least two minutes, and no more than three minutes. The flight time begins:

- when the competitor or his helper gives a distinctive hand signal;
- or if the multi-rotor leaves the start box before the end of the one minute period of adjustments and checks or if this period finishes.

If the music starts before the flight for Music Freestyle, the flight time starts not later than 15 seconds after the start of the music.

During the flight time, there are no restrictions for the flight or the performed manoeuvres except those regarding safety.

The flight time finishes only with another distinctive helper hand signal.

9.2.7. Safety

The prohibited flying area (see figure below) is observed by the judges. If the safety line is crossed, the flight will be scored zero points.

The competitor may choose his position during the flight with the following constraints:

(a) The multi-rotor must not fly between the pilot and judges.

(b) The pilot must stand in front of the judges.

The non-observance of these constraints will be penalized by a zero score in the safety criterion for the flight

If, during a flight in any of the schedules, a part of the multi-rotor, except the landing gear or top body touches the ground the flight is finished and scored zero points. This does not apply to the multi-rotor tilting over after a landing.

9.2.8. Judging and scoring

The number of judges is at least three, and no more than five.

If the flight time is less than two minutes or more than three, a downgrade of 5 % will be applied on the score of the flight. A flight shorter than one minute thirty seconds or more three minutes thirty seconds will be scored zero points.

Each flight will be scored on the basis of the following criterias.

Criterion	**Maximum points for Freestyle flight**	**Maximum points for Music Freestyle flight**

Difficulty	80	40
Harmony	20	40
Creativity	20	40
Precision	20	20
Safety presentation	20	20

The score for each criterion are given after the flight. It is important, that the scores reflect the entire flight, not only some details of the flight.

Difficulty: evaluation of the level of difficulty of the flight. It is important to judge the entire flight, not only some highlights, in such a way the score reflects the average level of difficulty of the total flight. Risky manoeuvres should never be mistaken as difficult manoeuvres and must not lead to higher scores for difficulty, but result in a downgrade for safety.

Harmony: the combination of the manoeuvres, smooth or flowing transitions between them are the main factors for this criterion. The manoeuvres size and dynamic in relation to the multi-rotor performance may be taken in account. Harmony can be as well evaluated in dynamic as in gentle sequences. For Music Freestyle flights, the harmony between the music and the presentation must be taken in account.

Creativity: new combinations or new manoeuvres at all will lead to high scores. Also dynamic and diversified sequences are positive. There also should be a variety of different tempi in the presentation. Sequences without manoeuvres or repetitions will lead to downgrades.

For Music Freestyle flights, the transformation of musical accents into the performance is of great importance.

Precision: precision and recognition of manoeuvres and sequences are evaluated in this criterion.

Safety presentation: in addition to the safety rules, the impression of the presentation related to safety has to be the guide taking in account if the competitor does not exceed the limit of his skills. Flying unsafe in any way (for example too close to himself) results in a downgrade. Flying low (within the rules) by itself is not a reason for downgrade

9.2.9. Classification

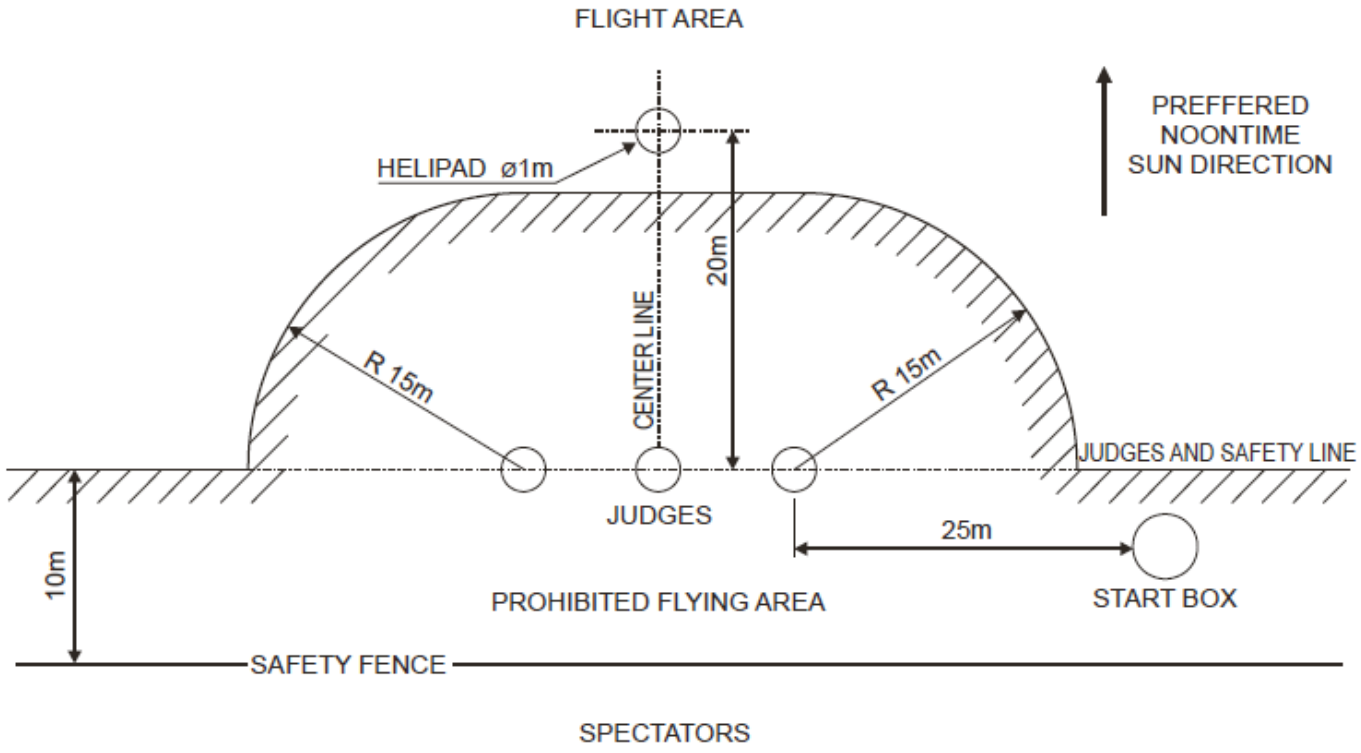
After completion of each round, all scores will be normalized by awarding 1000 points to the highest total score. The scores of the other competitors are then normalized to a percentage in the ratio of actual score over the highest score for the round.

The lowest normalized score of each competitor will not be taken in account for his result (throwaway score). To determine the final result, the other normalized scores are added together and then divided by the number of rounds taken in account. If only one round is flown, then the classification will be based on the normalized score of that unique round.

In case of fly-off rounds, the final result of the preliminary rounds plus the two normalized fly-off scores provide three normalized scores with the best two taken in account for the classification of the finalists.

Ties on placing will be broken by taking on the basis the throwaway score. If a tie still stands for the three first places, a “sudden death“ fly-off (Music Freestyle flight) is organised.

FREESTYLE CONTEST LAYOUT AREA



10. RECREATIONAL EVENT

The event is based on a list of flight tasks to realise.

The event rules will define if rotary wing drones such as multi-rotor are only concerned, or if the event is also opened to fixed wing drones.

Note: *some of the flights tasks which are defined in the present document are mainly adapted only to rotary wing or to fixed wing.*

Some of the flight tasks are adapted fro FPV flight. The event rules will precise id such a task is realised in FPV or not.

For each flight task, a working time is defined which can depend of the flight task. This working time is defined by the Flight Director before the beginning of the flight task or before each round in case of different rounds.

The beginning and end of the working time will be announced with an acoustic signal. The first time when the acoustic signal is heard defines the beginning, and the second one the end of the working time

The penalty points applicable in each task must be defined prior to the beginning of the flight task.

Marker: for some flight tasks, a marker is necessary.

Each participant may have his own marker. The marker shall have a minimum mass of 60 g. A control of the mass of the marker may be done by after each release of the marker.

The marker must be inside the following dimensions volume: 110 mm x 45 mm x 20 mm.

The organiser can mark the marker at the initial processing of the drone done prior to the beginning of the flight tasks.

Flight task score

For each flight, each participant gets a flight score. The score may consist of the distance from target in cm and/or the flight time in seconds and takes in account the eventual penalty points.

For some flight tasks, it is appropriate to fly in groups. In that case, the number of participants in a group is defined in the event rules for each concerned flight task, or by the Flight director prior to the beginning of the flight task. The event rules will also precise how are done the groups, for example by draw.

The results within each group may be normalised if appropriate, 1000 points being the basis for the best score of the winner of the group. In that case, the normalised scores within a group are calculated by using the following formula: Normalised points = Participant's score / Best participant's score x 1000.

For a flight task, different rounds can be organised. In that case, the event rules will precise how is done the calculation for the final scores of the concerned flight tasks. When different rounds are organised and when the flight task does not justify to fly in groups, it could be also be considered appropriate to normalise the results at the end of each round.

General placing

There will be a separate individual placing for each flight task. It is also recommended to have a specific individual placing for juniors (age limit 18 in the year of the event).

It is also possible to define a general placing taking in account all flight task scores. In that case, the event rules must define how will be done that general placing.

10.1. Task A - Fast and Precise

Note: *task for rotary wing drones. This task is organised with one participant in flight at the same moment.*

Flying area: square 50 m x 100 m.

Target area: diameter 2 m with different marked lines circles (for example every 0,5 m radius).

Lowest height to fly: 4 m.

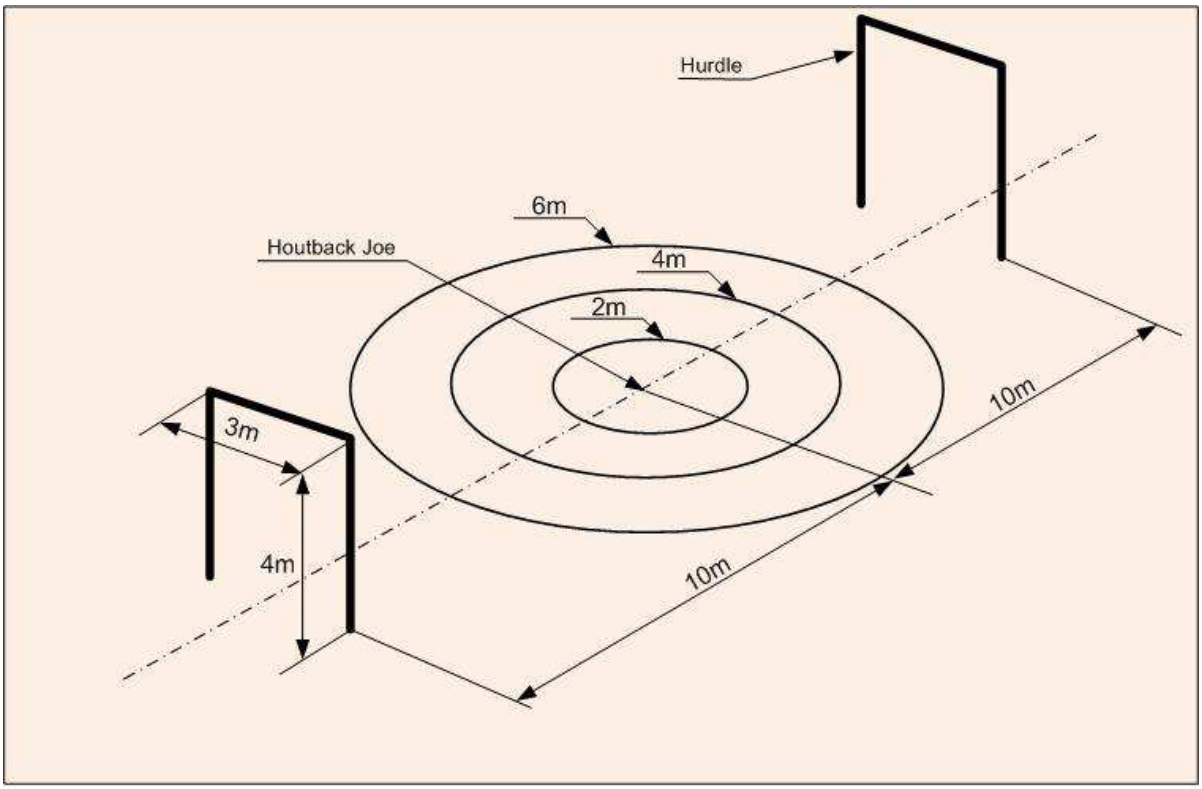
Points are based on the circle in which the marker fells. A marker dropped outside the target area can give penalty points.

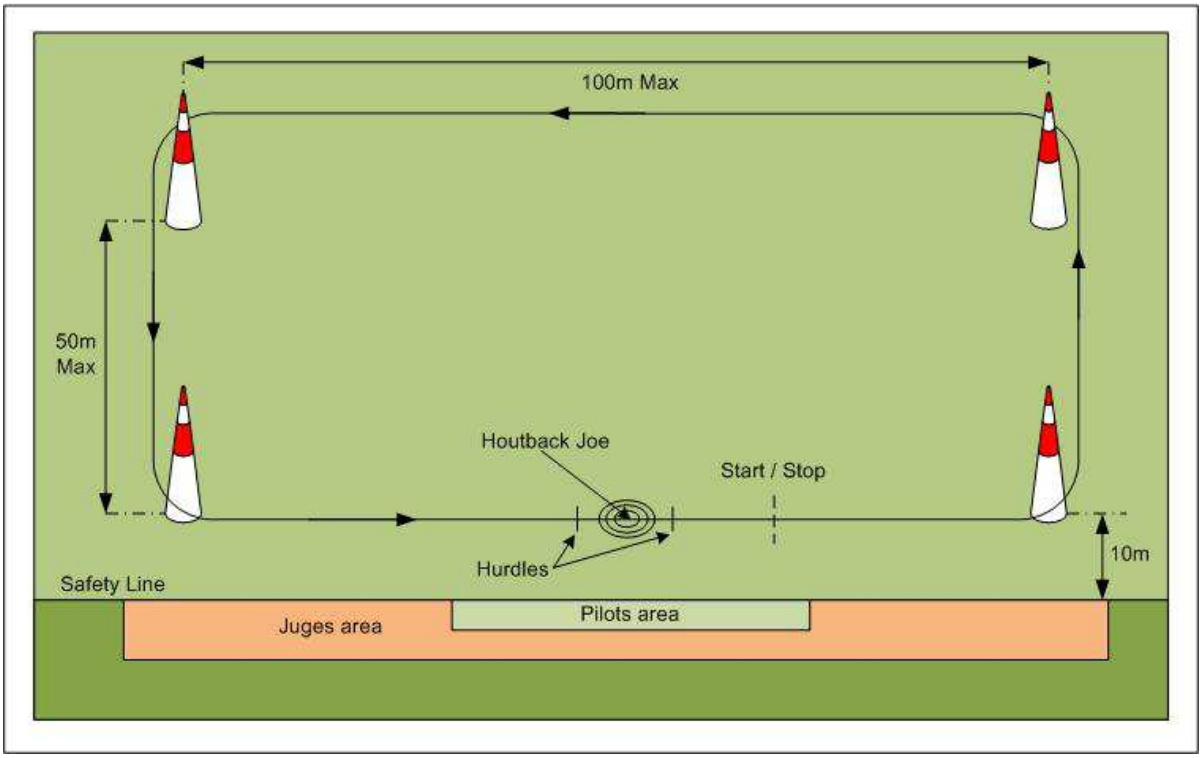
Automatic flight devices (GPS) are forbidden for this event

Goal: Starting from start point and realize x times the flight circuit with a precision landing inside the circle, stopping propellers 5' and restart for a new circle. Approach must be done upside of the hurdle.

Scoring: time between first take off and last landing with motors off.

For each precision landing, 5% downgrade total time if a piece of the drone is outside the circle.





10.2. Task B - Ground targets to find

Note: *task for rotary wing drones and fixed wing drones. This task is adapted to FPV flight. This task can be organised with one participant in flight at the same moment or by groups of 2 or 3.*

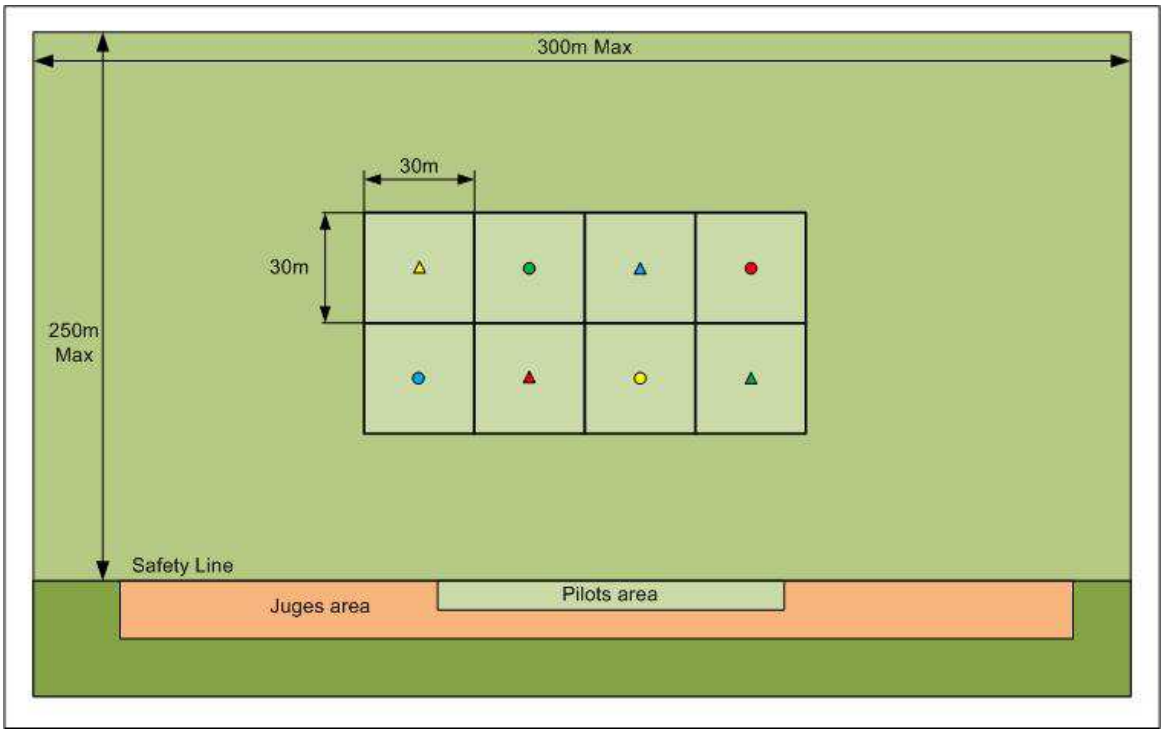
6 target zones marked in a target area of 300 m x 300 m.

The pilot is at a distance of about 100 m from the target area.

The ground target in each target zone must have a size of about 30 cm in order to be clearly visible by the pilot. The ground targets must be distinct (different shape and/or different colour).

For each ground target, the participant will drop its marker.

Points are based on the distance between the marker and the centre of the ground target: for example, one point for each centimetre from the centre of the target and 400 points when the distance is greater than 4 meters.



10.3. Task C - Deck landing

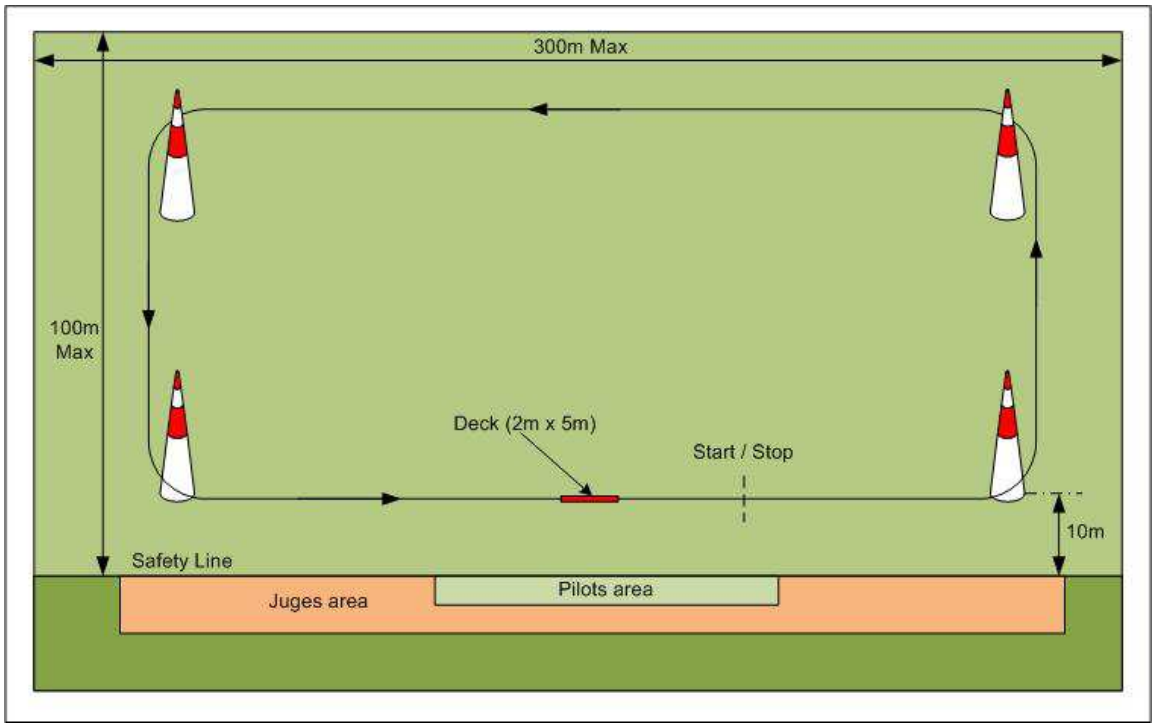
Note: *task mainly for fixed wing drones. This task is adapted to FPV flight. This task can be organised with one participant in flight at the same moment or by groups of 2 or 3.*

Flying area: square 100 m x 300 m.

Target: 2 m x 5 m marked on the ground.

The purpose is to make 5 "touch and go" in the minimum time.

Points are based on the time spent to realize the 5 "touch and go". If all 5 "touch and go" are not realised during the working time, penalty points can be allocated depending the number of "touch and go" realised.



10.4. Task D - Slalom

Note: *task for rotary wing drones and fixed wing drones This task can be organised with one participant in flight at the same moment or by groups of 2 or 3.*

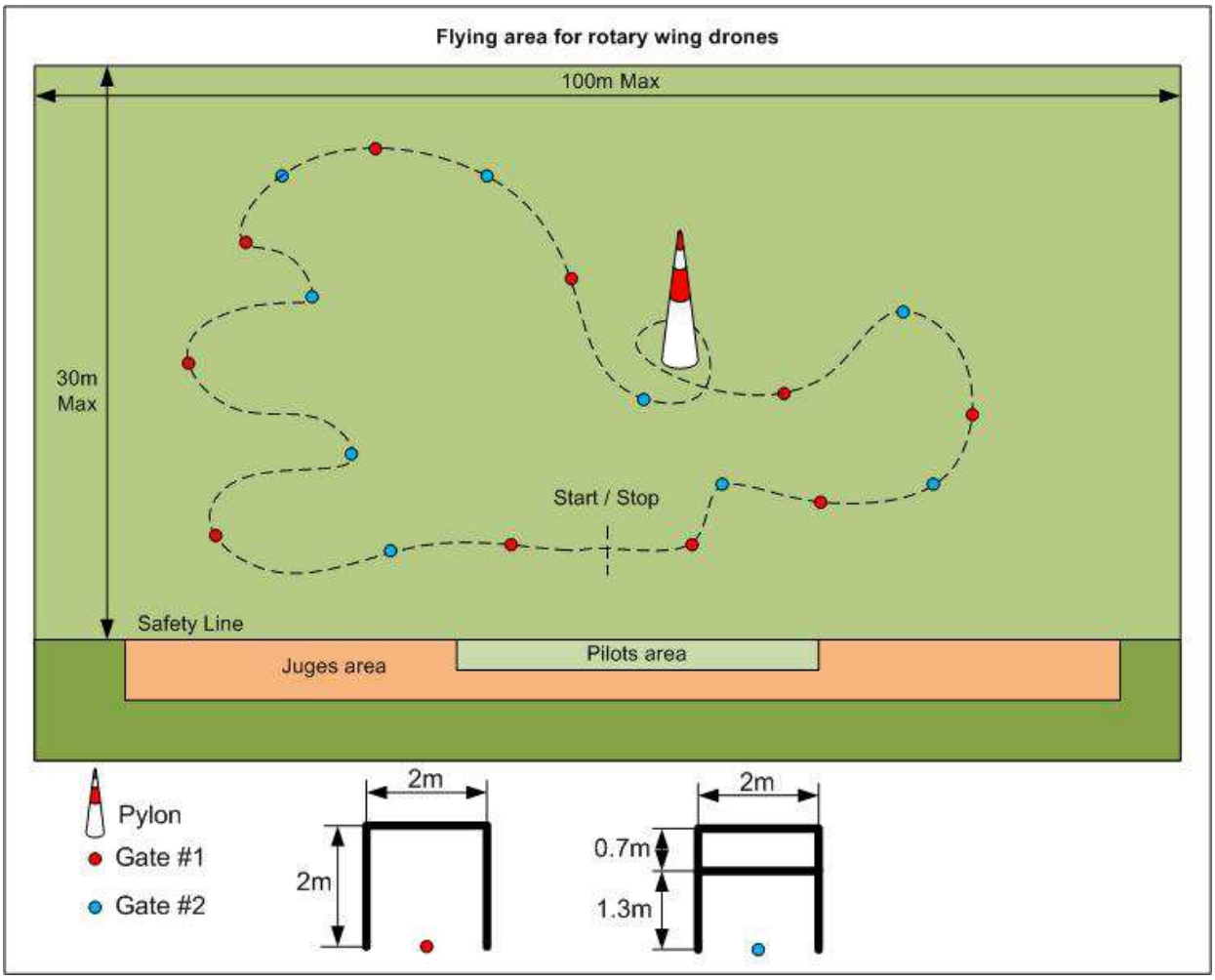
The purpose of this task is to pass through gates, make circles around a mast, and pass under obstacles.

The circuit and the gates are defined by the organiser.

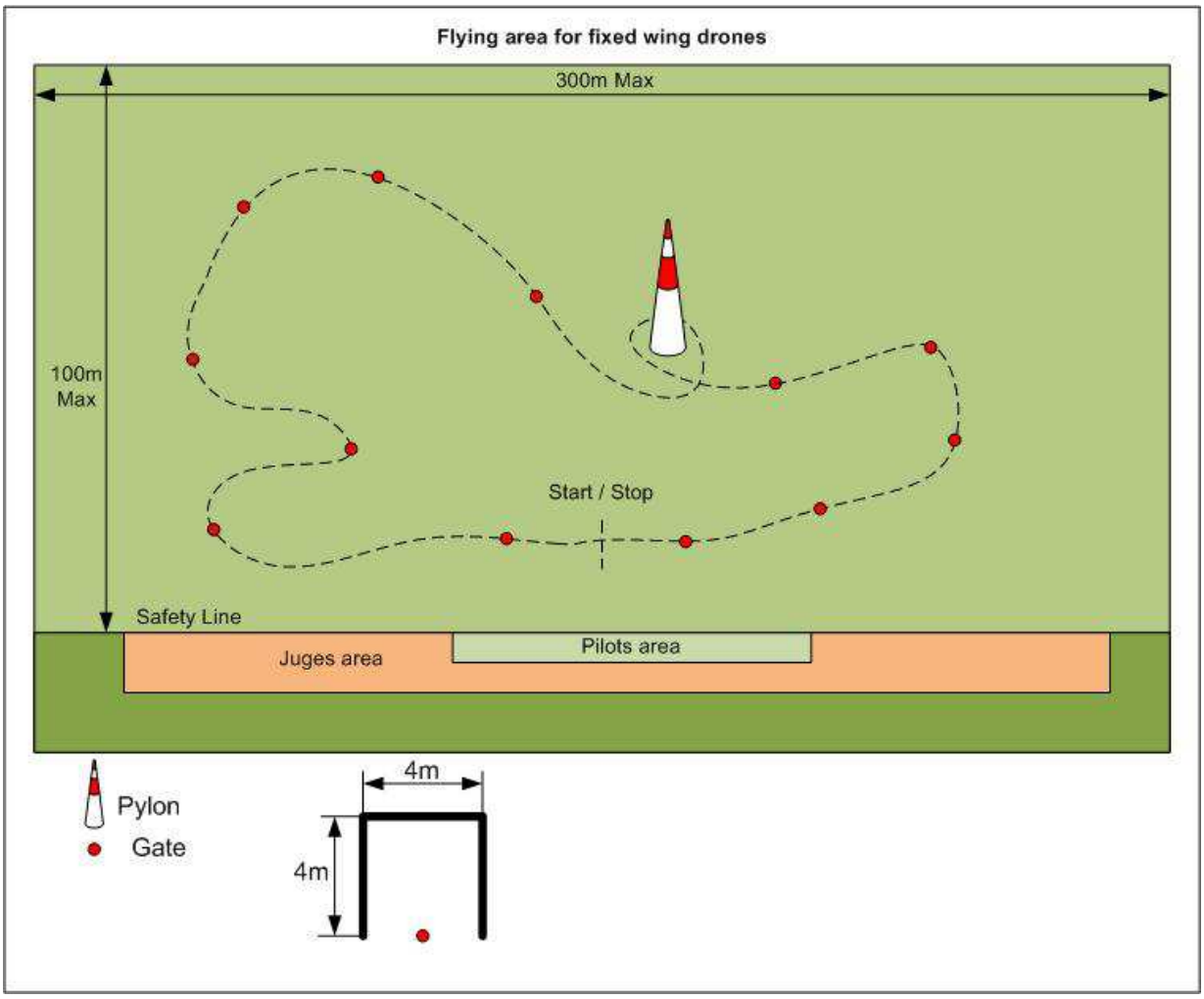
Flight time is recorded in seconds, since the signal of beginning of the working time up to the landing.

Penalty points can be allocated for errors.

Flying area for rotary wing drones: square 30 m x 100 m.



Flying area for fixed-wing drones: square 100 m x 300 m.



10.5. Task E - Tunnel

Note: *task for rotary wing drones and fixed wing drones. This task is adapted to FPV flight. This task can be organised with one participant in flight at the same moment or by groups of 2 or 3.*

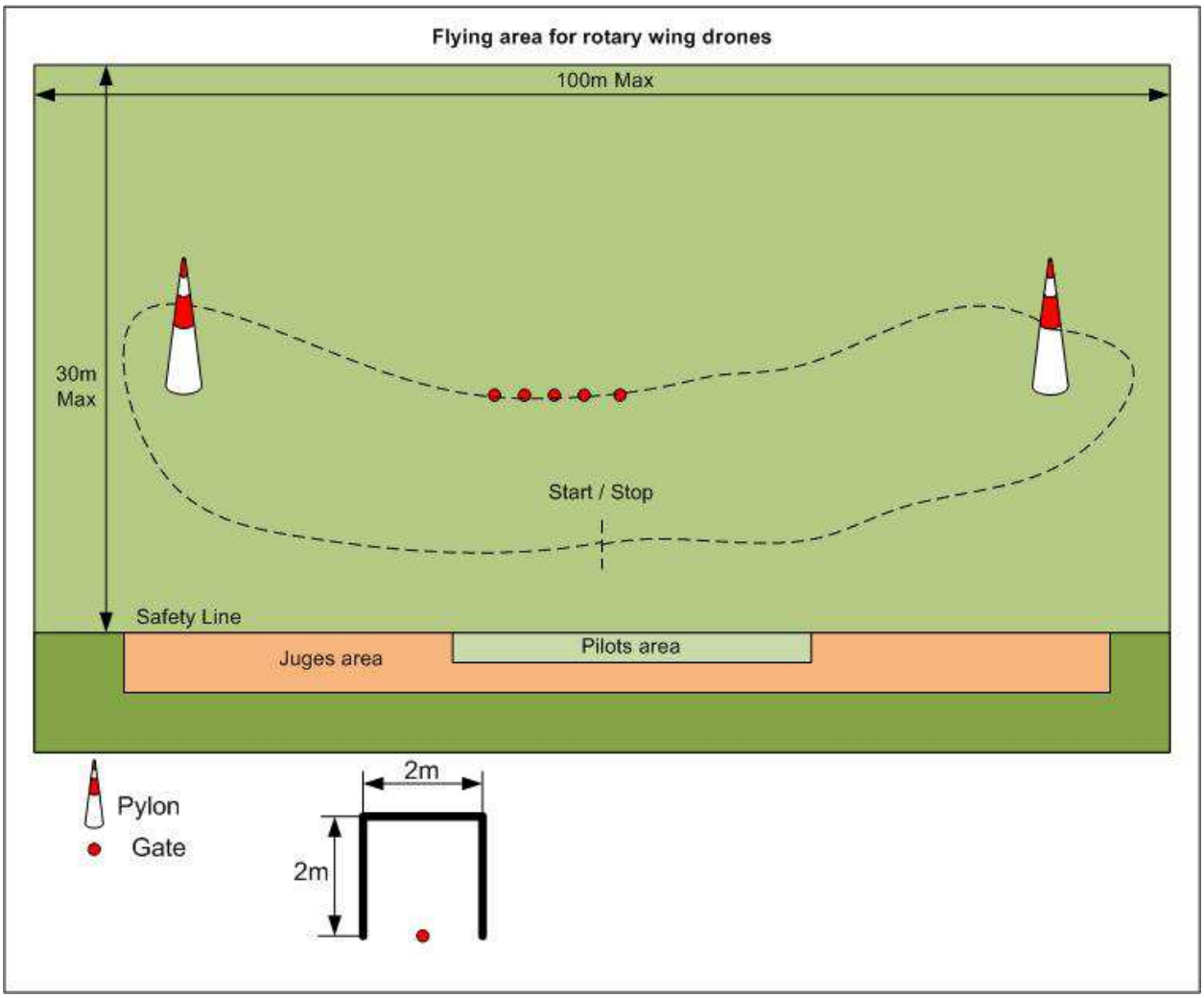
Flying area: square 100 m x 300 m.

The purpose of this task is to pass through different gates representing a tunnel; the tunnel circuit has to be done a certain consecutive number of times as defined by the Flight Director (for example 5 times).

The circuit and the gates are defined by the organiser.

Flight time is recorded in seconds, since the signal of beginning of the working time up to the landing.

Penalty points can be allocated for errors.



10.6. Task F - Pylon race

Note: *task for rotary wing drones and fixed wing drones. This task is adapted to FPV flight. This task must be organised by groups of 3.*

Flying area: square 100 m x 300 m.

The distance between the pylon 1 and the pylons 2 and 3 is about 180 m.

The purpose of this task is a race organised by groups with 10 laps to complete.

The number of participants per group (3 or 4) is defined by the Flight Director.

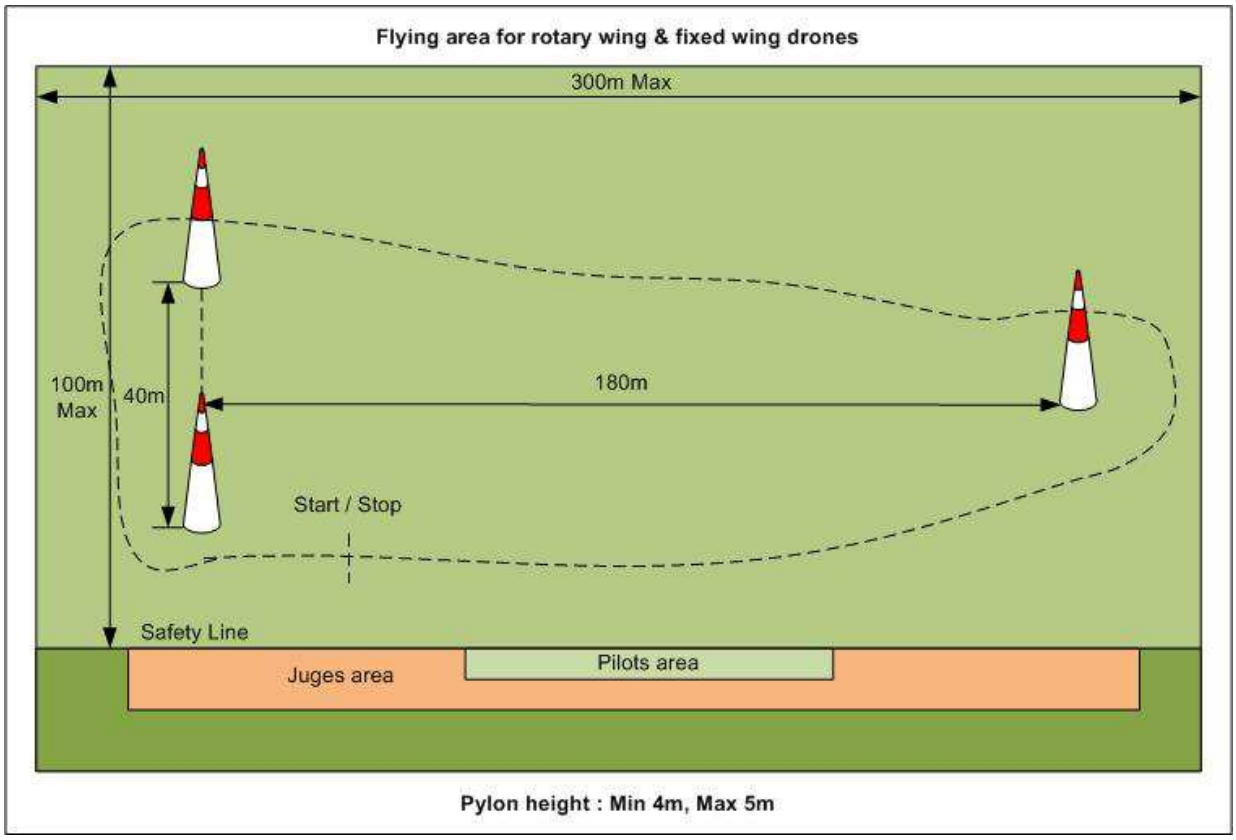
After qualifying rounds, a final can be organised.

The race starts with running engines at the start/finish line. Take-off will be hand launched. For each pilot, the race finished at the start/ finish line when 10 full laps have been completed.

Flight time is recorded in seconds, since the signal for start up to when the 10 laps are completed.

Penalty points are allocated:

- for a cut pylon infringement;
- if the 10 laps are not finished at the end of the working time.



10.7. Task G - Pyloon

Note: *task for rotary wing drones. This task is adapted to FPV flight. This task must be organised by groups of 2 or 3.*

Flying area: square 100 m x 300 m.

The distance between the two pylons is about 100 m.

The purpose of this task which can be assimilated to biathlon is a Pylon race with 5 laps to complete combined with burst of balloons.

The number of participants per group (2 or 3) is defined by the Flight Director.

After each performed lap, the pilot must burst a balloon attached to a post with propellers. The number of balloons must be adapted to the number of participants per group; it is also possible to associate a colour balloon to each participant.

After qualifying rounds, a final can be organised.

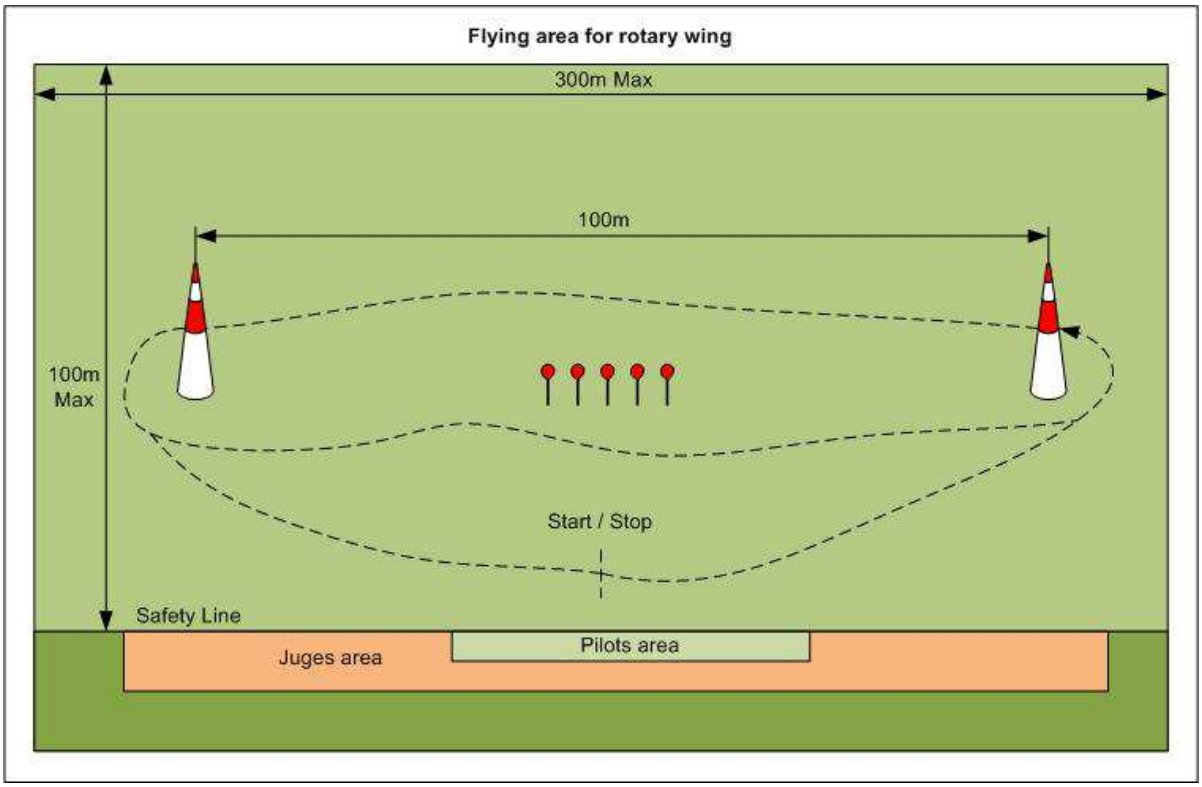
The race starts with running engines at the start/finish line. Take-off will be hand launched. For each pilot, the race finished at the start/ finish line when the 5 laps have been completed.

Flight time is recorded in seconds, since the signal for start up to when the 5 laps are completed.

Penalty points are allocated:

- for a cut pylon infringement;
- for a non burst balloon;
- if the 5 laps are not finished at the end of the working time.

Note : The number of balloon must be proportional to the number of participants per round. We can also associate a balloon color per participant.



10.8. Task H - Multi tasks

Note: *task for rotary wing drones. This task can be organised with one participant in flight at the same moment.*

Flying area: square 20 m x 20 m.

The purpose of the task is to realize 5 elementary tasks:

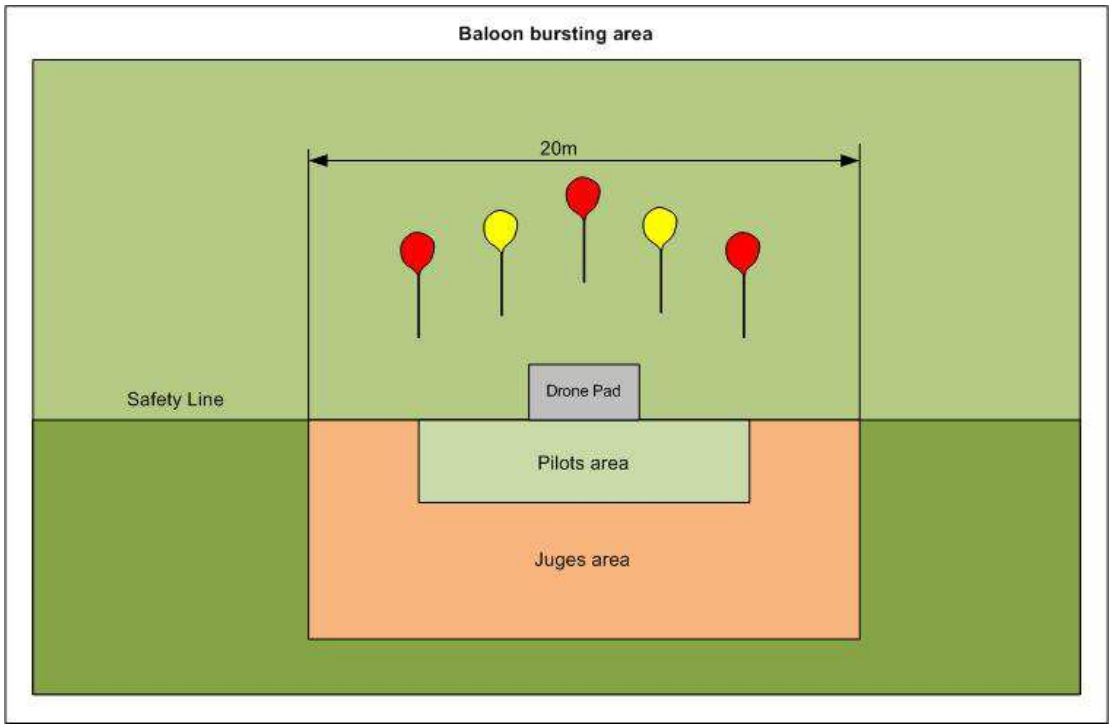
Each participant can choose the order in which he will perform the elementary tasks. All the elementary tasks will begin and closed at the same time.

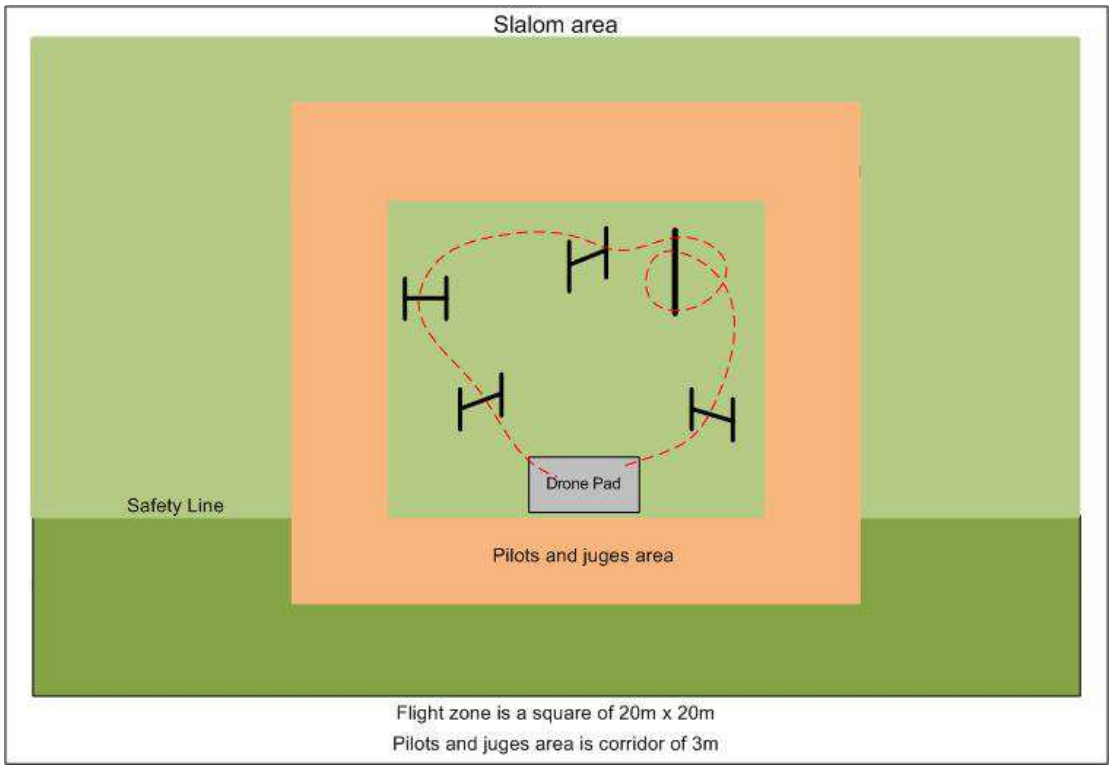
Each participant will take off from the same start/finish line. The race starts with running engines. Take-off will be hand launched.

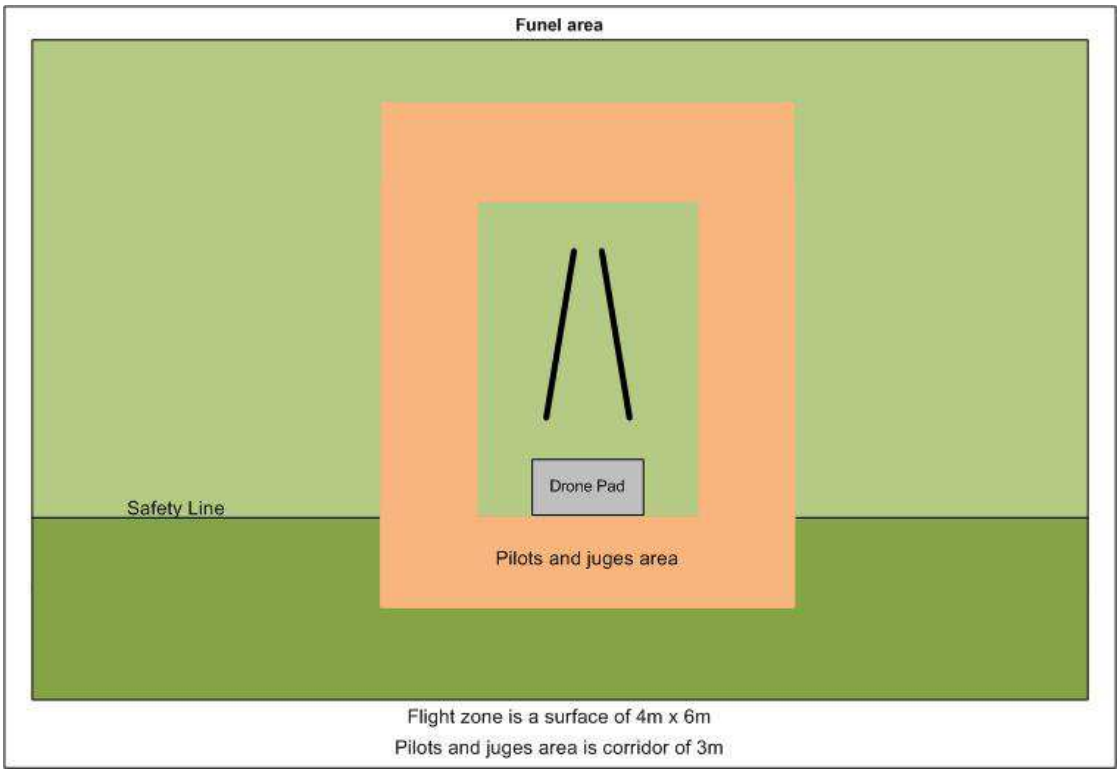
The flight time is recorded, in seconds, since the starting signal to landing at the start/finish line after performing all the elementary tasks.

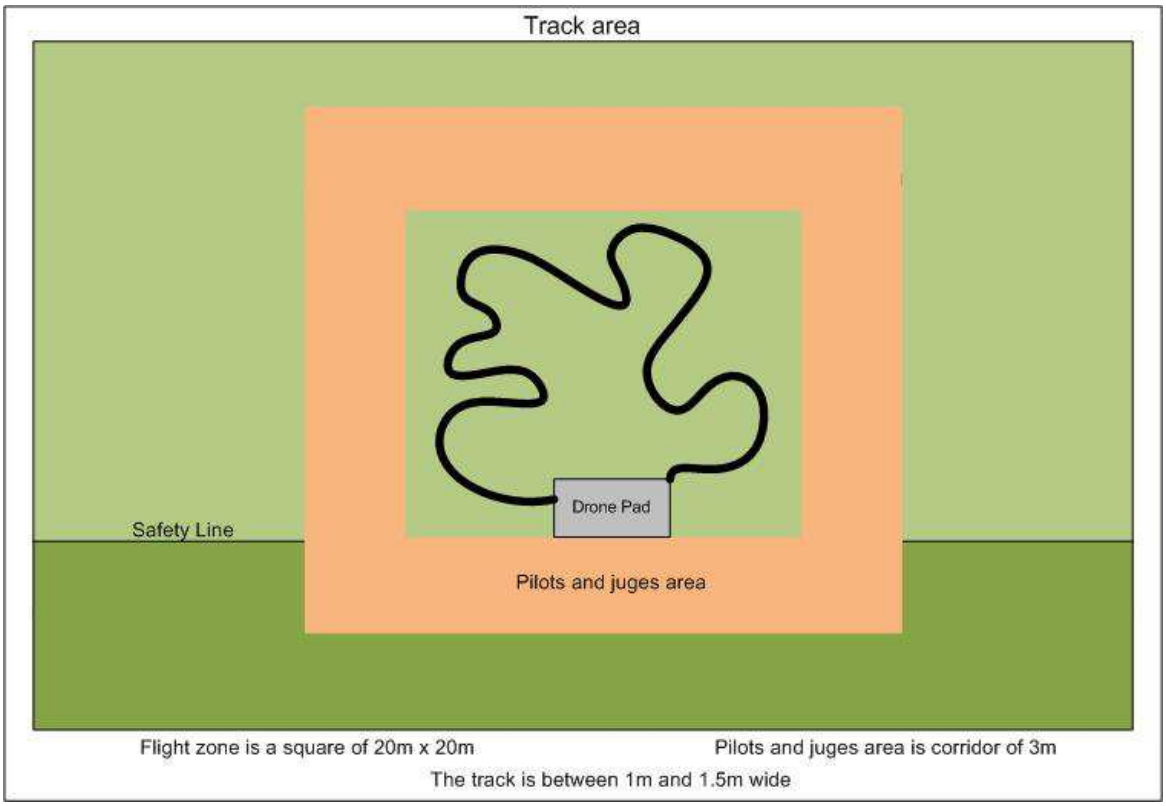
The 5 elementary tasks are:

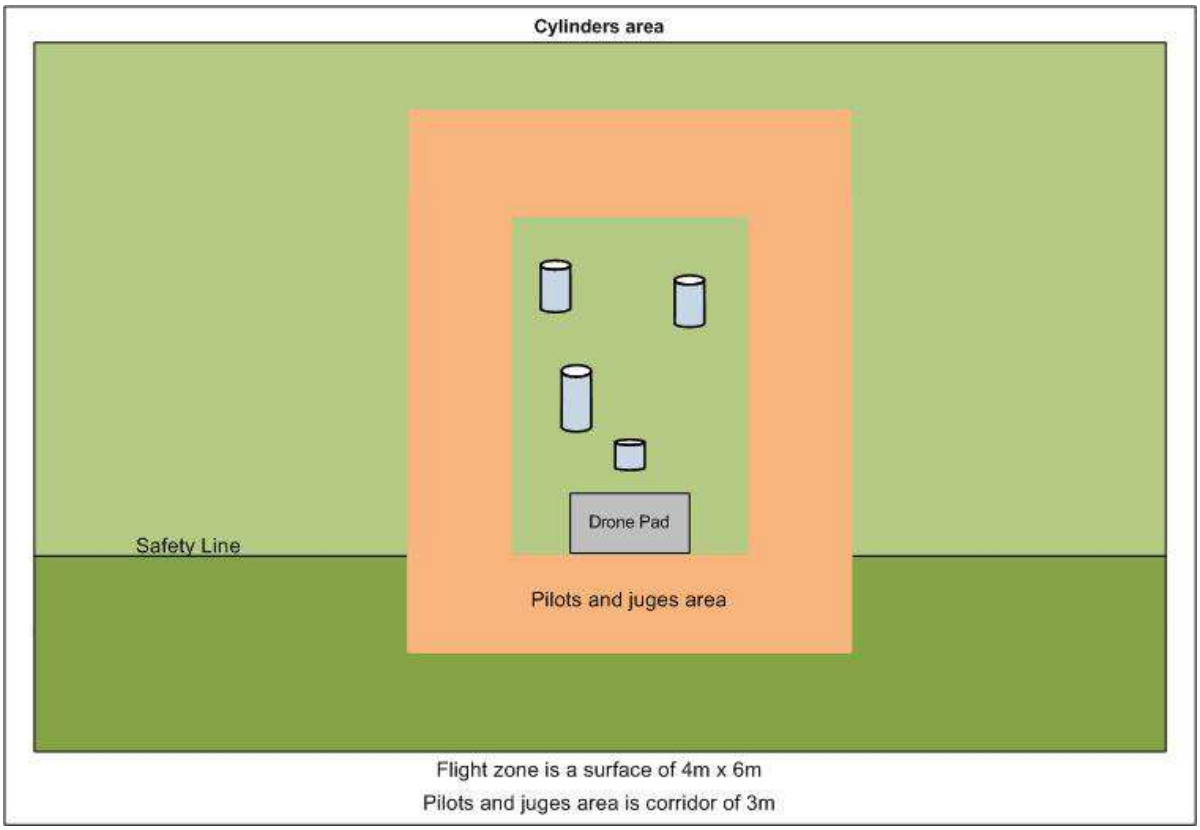
- **Balloons bursting:** 5 balloons to burst with the propellers in the minimum time. The balloons are fixed on rigid rods at 1.5m from the ground. The rods are at least two meters from the safety line and a maximum of 5m. If you want to harden a little, this ordeal. It is possible to have three stacked balloons of the same rod. One should burst, as the middle. For easier identification the balloon in the middle, is a different colour. Please do not replace the rods by wire or twine to keep the balloons. This can be dangerous.
- **Slalom:** 4 gates to pass through, and make circle around a mast, in the minimum time.
- **Funnel:** two metal or wood bars, 4 m long. Enter of the tunnel is 40 cm wide, exit is 10 cm wide. A 60 g weight is suspended to the rotorcraft by means of a 1 m long string. The task is to go trough the funnel the weight touching the ground. If the weight touches the sides of the funnel: 1 penalty of 10s. If the weigh take-of from the ground: 1 penalty of 10s. 2 penalties, the fly is null.
- **Track :** a 60 g weight is suspended to the drone with a string one meter long. The task is to follow the track, the weight touching the ground. Penalty of 10s if the weight touches the sides of the track. In case of 2 penalties, the score is zero.
- **Cylinder:** a 60 g weight is suspended to the drone with a string one meter long. The task is to touch the bottom of four cylinders, about 10 cm. Each cylinder should have a different height.


Baloon bursting area
20m
Safety Line
Drone Pad
Pilots area
Juges area


Slalom area
Safety Line
Drone Pad
Pilots and juges area
Flight zone is a square of 20m x 20m
Pilots and juges area is corridor of 3m


Funel area
Drone Pad
Safety Line
Pilots and juges area
Flight zone is a surface of 4m x 6m
Pilots and juges area is corridor of 3m


Track area
Drone Pad
Safety Line
Pilots and juges area
Flight zone is a square of 20m x 20m
Pilots and juges area is corridor of 3m
The track is between 1m and 1.5m wide


Cylinders area
Drone Pad
Safety Line
Pilots and juges area
Flight zone is a surface of 4m x 6m
Pilots and juges area is corridor of 3m