# Airgineers

NAR ANTIN

# **3S Class Rules**



# **GENERAL RULES**

- G1. When interpreting the rules of Airgineers, please remember that common sense always applies
- G2. Each team must have two people present in the Pilots Box one Pilot and one Spotter
  - a. The Pilot must sit in the Pilot's Seat whilst the race is in progress
  - b. The Spotter must stay in the Spotter's Station behind the Pilot for whom they are spotting
- **G3.** The Pilot may only control their Drone from FPV (First Person View) using appropriate FPV Goggles. Pilots are not permitted to control their Drone from a LOS (Line Of Sight) perspective
- G4. The Transmitter may only be touched by the Pilot during the race except to Disarm in case of emergency
- G5. Prior to the Race starting, each Drone may be placed on a Launch Pad by a Team Member
  - a. Drones must be Disarmed when they are being placed and must remain Disarmed until an Event Official states that it is safe to Arm
  - b. Any Drones that are Armed prior to an Event Official stating that it is safe to Arm may be Disqualified from the Race
- G6. The Organisers and Event Officials can request that any or all Drones are Disarmed at any point during the Race
  - a. Organisers and Event Officials reserve the right to intervene and Disarm any drones at any time if for any reason they feel it is necessary to do so
- G7. No Team Members are permitted to enter the Live Area at any point during a Race

# **DRONE RULES**

- D1. Each Drone may have a maximum of 4 Motors
- D2. The Transmitter and Receiver for all flight controls must operate on the 2.4Ghz frequency range
- D3. Each Drone must be fitted with an FPV camera and VTX operating on the 5.8GHz frequency range
  - a. VTX should be capable of 40 channels with a frequency range of approximately 5.658GHz to 5.917GHz (known as Race Band)
  - b. VTX should not be set to a power output of greater than 25mW
- **D4.** Each Drone and all onboard electronics must be powered by a maximum of one lithium polymer battery pack with a rated voltage not greater than 11.1V
  - a. The only on-board equipment that may be powered by a separate battery is an action camera such as GoPro or similar. These cameras must be powered by their own internal battery





- **D5.** The maximum length and width dimension of 250mm is taken diagonally between the centres of a front and rear motor and does not include propellers. There is no maximum height.
- D6. Propellers must not exceed 5" (127mm) diameter
  - a. Propellers must be plastic
  - b. There is no limit to the number of blades that each propeller can have
  - c. There are no restrictions on the pitch of the propeller
- D7. Only one Drone design may be used by a team at any given Event and must be used for all types of Races.
  - a. It is expected that damage may be sustained throughout the course of an event so any parts including Frames, Propellers, Motors, Flight Controllers, Cameras, VTX etc. May be changed or replaced. However, these must be identical to these with which the Drone passed Inspection.
- **D8.** All Drones must be able to be Disarmed via a single switch on the Transmitter. This switch must be clearly identified with a red marker such as heat-shrink tubing or red PVC tape tightly wrapped to the switch actuator
- **D9.** Drones must be fitted with a failsafe that cuts power to all motors in the event of loss off signal between the Transmitter and the Drone





## SAFETY RULES

- **S1.** If at any time a Drone or the actions of the Team responsible for that Drone are deemed to be unsafe or behaving in an unsafe manner, the offending Team's Drone may be Disarmed by the Event Officials and the Team may be disqualified from the Race. Serious breaches of safety of any kind may result in disqualification from the Event
- S2. Any Team Members entering the Live Area at any time must wear suitable eye protection
- **S3.** Lithium Polymer batteries may only be charged when all the following criteria are satisfied:
  - a. Charging takes place in the designated Charging Zone(s) which will be defined by the Event Organisers in the briefing
  - b. Batteries are contained in a suitable fireproof LiPo safe bag whilst being charged

Failure to comply with this rule will be considered a breach of Safety Rule 1

- S4. Drones may only be connected to a battery when in a designated Live Area
- **S5.** VTX may only be powered up when your Team is about to participate in a Race powering a VTX at any other time may result in interference for another team currently participating in a race and will be considered a breach of S1
- **S6.** Teams must be familiar with the Abort Signal for the event. This is typically an air horn and will be demonstrated in the briefing. If this signal is given at any point during and event, Pilots must land their Drones immediately and await further instructions from an Event Official

Airgineers 3S Class Races are conducted in a Time Trial format in which each team takes turn to set a solo timed run around a circuit which is marked out by a series of Gates and Turn Flags. Pilots must navigate around the course passing through each Gate in the correct order and in the correct direction, passing on the outside of each turn flag. Depending on the length of the course, Pilots may need to complete 1 or more laps in each Race.

All Teams will have an equal number of timed attempts over the duration of the Event. The winner is the team that completes the required number of laps in the fastest time.



## **EXAMPLE 3S OUTDOOR COURSE**



The example course shown is typical of the type of layout used at Airgineers competitions. The exact layout will be determined by the event organisers but will usually consist of 4 or 5 Gates and a number of turn flags.

Pilots start the Race from the Launch Pad and join the course before completing the required number of laps

#### Starting a race

- **R1.** At the beginning of each Race, the Drone must be placed so that it is fully within the boundary of the Launch Pad and so that no part of the Drone is touching the ground surrounding the Launch Pad
- **R2.** Once the Drone is correctly positioned and the Pilot and Spotter are in the Pilots Box, the Race will be started with the following procedure
  - a. The Event Official signals it is safe to Arm the Drone with the command "Arm your drone"
  - b. After a short pause, the start of the race is signalled by a sound such as an air-horn or monosyllable voice command such as "Go" given by the Event Official
- **R3.** In the event of a false start, the Event Officials will allow one restart. A second false start will result in the team forfeiting that run. Teams will not be permitted to change batteries before a restart.

#### **Flight Occurances**

- **R4.** In the event that the Pilot misses a Gate or flag during a run, they permitted to fly back and attempt to pass through it correctly before continuing to the next Gate. Failure to pass through all Gates in the correct order will mean that the time for that lap is not valid.
- **R5.** If the Pilot crashes during the course of a run, they may try to get back in the air and continue the attempt if they are in a position to do so.
- **R6.** If the Pilot is not able to get back in the air, the Drone should be Disarmed and the attempt will be terminated
- **R7.** If the Event Officials determine that the Drone has sustained damage that makes it unsafe, the Pilot will be instructed to land and the attempt will be terminated

#### Completion of a Race

**R8.** After successfully completing an attempt, Pilots must land within the confines of the Live Area, Disarm their Drone and await instruction from an Event Official before retrieving the Drone



#### Disqualification

- **R9.** A Team may be disqualified from a Race if
  - a. More than one false start is committed
  - b. The Drone exits the Live Zone at any time whilst in flight
  - c. The Pilot is flying too high so that the Event Officials cannot adequately judge if the course is being completed
  - d. The Pilot engages in any flying that the Event Officials consider to be dangerous

#### **Video Signal Issues**

- **R10.** The Event Organisers will attempt to optimise the course to avoid FPV video reception issues. However, sometimes issues may occur.
  - a. Reflights will only be issued if the Event Officials are convinced that the issue was caused by an identifiable and avoidable external cause
  - b. Interference caused by the environment, competitors own equipment, member of the public etc. will not justify a reflight
  - c. In the case of an issue that prevents Event Officials to adequately judge if the course has been successfully completed, a re-flight may be granted

# Glossary

Abort Signal	A safety instruction which means any Drones in flight must land immediately
Armed	A drone status where power is connected and drone can respond to control inputs
Camera	A camera on the Drone that forms part of the FPV system
Charging Zone	An area designated by the Event Officials for the safe charging of Lithium Polymer batteries
Disarmed	A drone status where power is connected but the motors are not turning and where all other control inputs are disabled
Disqualified	A team that is Disqualified from a Race or Match will not receive any points or times for that Race or Match. Teams that are disqualified from an Event will not be able to compete in any further Races or Matches or recieve any awards at that Event.
Drone	A multi-rotor model
Event Official	A member of the team responsible for the running of an Airgineers event
Failsafe	A system that prevents the Drone from continuing to fly in the event of control signal failure
Flight Controller	An electronic system mounted on a Drone consisting of sensors and processors to aid flight control
FPV	First Person View
FPV Goggles	A device that incorporates a screen and video reciever for the purpose of receiving a FPV video feed from a Drone
Frame	The structural chassis of a Drone
Gate	A structure used for marking out the route of a circuit
Inspection	The process whereby a Drone is approved by the Event Officials to compete at an Airgineers event
Launch Pad	The space from which a Drone must take off from at the start of a Race or Match
Live Area	An controlled area designated for the flying of Drones
LOS	Line of Sight
Motor	Any type of electric motor which is in any way connected to the propulsion system of a Drone
Organisers	The Airgineers team
Pilot	The Team Member who will control the Drone for a given Race or Match
Pilots Box	The designated area when Pilots are positioned whilst a Race or Match is in progress
Propellors	A propellor or rotor that provides propulsion for moving the Drone
Race	A head-to-head between 2 or more Drones or a time trial around a defined circuit
Reciever	A device on a Drone for receiving radio control signals from the Transmitter
Spotter	A person designated by each Pilot to monitor their Drone and it's surroundings from LOS whilst the Pilot is flying FPV
Student	A person who is aged 16 years or younger at the time of the event
Team Member	A person who meets the definition of Student and is part of a team competiting at an Airgineers event
Transmitter	A device used by the Pilot to send radio control signals to their Drone
Turn Flag	A structure used for marking out the route of a circuit
VTX	Video Transmitter - part of the FPV system that transmits a video signal

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