

First Person View (FPV) Flight Novice/Advanced

Challenge Booklet 2027

Organised by:

DSO NATIONAL LABORATORIES

SCIENCE CENTRE singapore

Supported by:

MINDEF SINGAPORE

SAFMC 2027 COMPETITION SCHEDULE

Category	Date	Remarks
FPV – Novice Challenge		
FPV – Advance Challenge		
Awards Presentation Ceremony		

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1. INTRODUCTION

General Rules and Regulations can be found in the “General Rules and Regulations” Booklet.

For Category FPV Novice, teams are made up of ONE (1) to TWO (2) member.
For Category FPV Advance, teams are made up of ONE (1) member.

The pilot is expected to fly and maneuver a multi rotor aircraft through first-person view (FPV) remote control and guide the craft through a series of air gates in a pre-defined course.

It is recommended that those new to FPV flying to participate in the Novice category as opposed to Advance, as the latter involves more powerful and complicated drones that requires more experience.

Students who have participated in previous SAFMC FPV Novice (C2) more than TWO(2) times are not eligible to compete in the FPV Novice category again. Additionally, the top TEN (10) winners from previous SAFMC FPV Novice (C2) events are also ineligible for FPV Novice. We highly encourage these students to take part in the Advance category instead.

Both FPV Novice and Advance do not require presentation and proof of flight videos.

(Novice)	(Advance)
This category is perfect for beginner FPV drone pilots to hone their skills and gain experience in a competitive context. The course is designed to be easily navigated by the junior pilot while still providing a high-paced and fun challenge.	This category tests the skill of the more advanced FPV drone pilot. With a course designed to be more technical, it is sure to stretch the abilities of the pilot while providing a fun challenge.

You may wish to refer to Section 9, which highlights some of the useful resources for participants who are new to FPV flying. Be sure to check our website regularly for updates on useful workshops catering to this category!

2. CATEGORY AWARDS

Awards listed below will be given out during SAFMC 2027 Awards Presentation Ceremony.

All scoring decisions made by the judges are final. For cases that require arbitration, the Singapore Amazing Flying Machine Competition (SAFMC) organizing committee will have the final say.

The list of awards for FPV Advance/ Novice Category is listed in the subsequent sections.

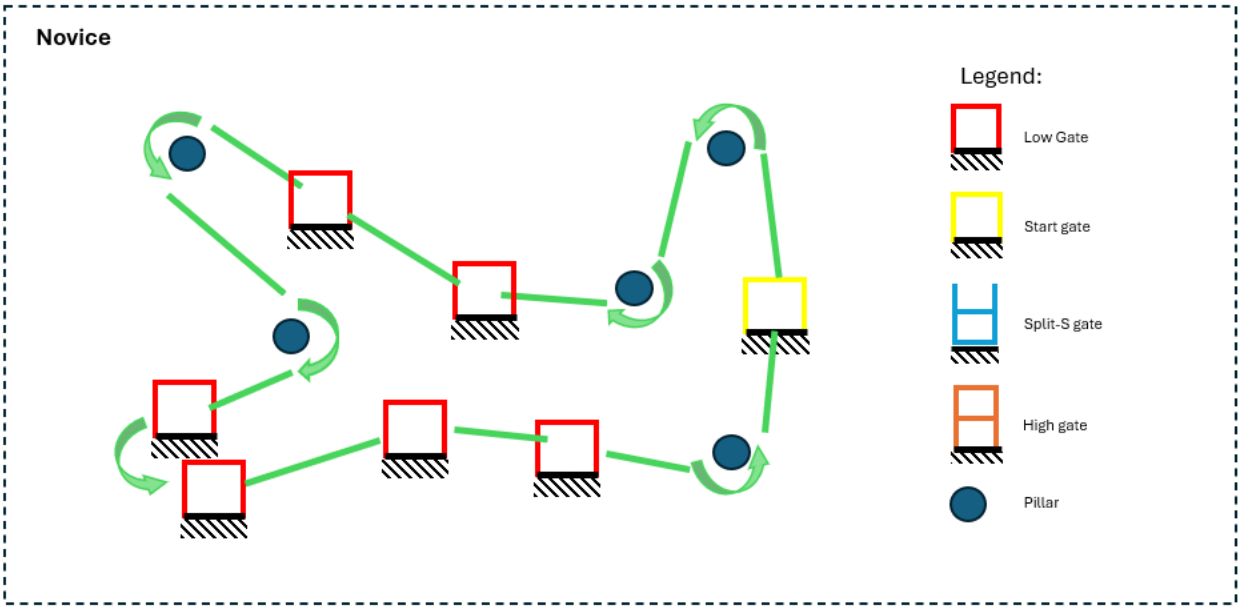
	Award & Rank	Medal	Trophy	Cash Prize Amount	REMARKS
FPV Flight (Novice)	Championship Award	✓	✓	$600	Only 1st to 3rd Place will receive both medals and cash prizes
	1st Runner Up	✓		$400	
	2nd Runner Up	✓		$200	
	BEST LAP BONUS			$200	

	Award & Rank	Medal	Trophy	Cash Prize Amount	REMARKS
FPV Flight (Advance)	Championship Award	✓	✓	$1200	Only 1st to 3rd Place will receive both medals and cash prizes
	1st Runner Up	✓		$800	
	2nd Runner Up	✓		$600	
	BEST QUALIFIER BONUS			$300	

Note: Prizes may not be given out if minimum standard is not met or if there are insufficient participants. The SAFMC organizing committee will have the final say and the decision made is final.

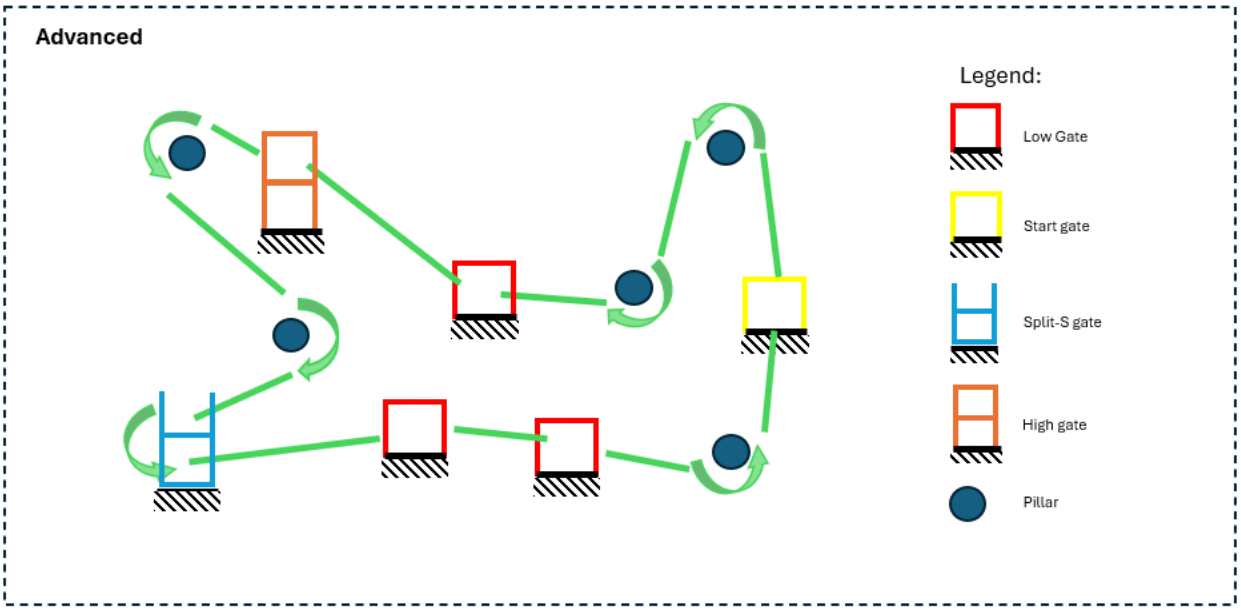
3. MISSION

The figure below shows the course layouts for Novice Category.



Note that the dimensions may vary, and organisers could adjust the layout of the tracks at their discretion. Participants are encouraged to be flexible and ready to adjust to any changes in track configuration that may occur before or during the competition.

The figure below shows the course layouts for Advanced Category.



Note that the dimensions may vary, and organisers could adjust the layout of the tracks at their discretion. Participants are encouraged to be flexible and ready to adjust to any changes in track configuration that may occur before or during the competition.

4. FLOW OF EVENTS

Once the teams have confirmed their registration for the competition. They are expected to commence on meeting the various competition requirements

4.1. PRE-RACE ADMINSTRATION & INSPECTION

Teams are expected to comply with the following during the competition segment:

1. Teams are to arrive at their designated reporting time.
2. Tables will be provided within the main competition hall for teams to work on their flying machines.
3. At the allocated competition schedule, the team shall report to the safety inspection point. A SAFMC official will check the aircraft for any violation of the category rules and regulations. Teams who do not pass the inspection will not be allowed to fly their aircraft in the challenge mission and may face immediate disqualification from the competition. The inspection will include, but is not limited to, the following check:
   - The maximum take off weight (MTOW) and size of the aircraft.
   - RC/ datalink/ video link transmitter and receiver are operating on allowed frequencies.
   - Electrical harnessing should be appropriately insulated and should not be chafed or broken. No exposed wires and connectors are permitted
   - All major assemblies and critical components must be securely fastened to the aircraft; loose items should be tied down and kept away from the propellers.
   - For aircraft operating on semi-autonomous / autonomous modes, it should allow complete manual pilot override on-demand via RC or GCS.
   - The aircraft must demonstrate failsafe capability in the event of a loss of link between the RC/GCS and the aircraft. The failsafe check procedure is as follows:
     - All propellers and releasable payloads are to be removed from the aircraft.
     - Aircraft will be armed.
     - Throttle will be applied to spin the motors. While the motors are still spinning in the same flight mode, the Wi-Fi router(s) will be switched off to simulate a link loss.
     - All motors should come to a complete stop immediately. The aircraft should not attempt a hover / controlled descent / to return home.
4. A SAFMC official will be with the student operator during the mission attempt. The official may give instructions to the student operator depending on the behaviour of the aircraft (e.g. to land immediately if the aircraft appears to be uncontrollable). The student operator is to comply immediately with all such instructions, which may include the activation of the failsafe to ground the aircraft.
5. The aircraft must demonstrate failsafe capability upon operator command. The failsafe check procedure is as follows:
   - All propellers and releasable payloads are to be removed from the platform.
   - Flight motors will be armed and throttled up.

- While the motors are still spinning in the same flight mode, the operator must be able to activate a kill-switch.
- All motors should come to a complete stop immediately. The aircraft should not attempt a hover / controlled descent / to return home.

6. Failsafe capability for the DJI Tello drones will be the OEM default failsafe logic. Any tampering or modifying of the OEM failsafe logic (unless it meets regulations 2.6 and 2.8), will result in a disqualification. Tello drones are exempt from regulations 2.6 and 2.8, because:
   - The Tello SDK does not allow for the expected failsafe behaviour to be configured.
   - DJI Tello drones do not allow motors to function when propellers are removed.
7. At the end of each mission attempt, the radio control transmitter, datalink transceiver, video receiver and any other wireless device for the flying machine must be switched off.

4.2. CONTROLLED PRACTISE

1. There will be at least 1 controlled practice sessions for Novice and Advanced category.
2. Pilots will be given TWO (2) minutes to practice and familiarise themselves with the course during each practice run.
3. Pilots will not be given additional time should they fail to complete their intended run, i.e. crashing out.
4. Pilots will report for their controlled practice runs as per the detailed competition schedule. Failure to report timely for any of the runs will result in the forfeiture of that run.
5. No lap timings from these practice runs will be considered for the eventual rankings.
6. No open self-practice is allowed at any time.
7. No Pilot will be allowed to power on their VTX at the pit area.
8. All decisions during the course of the runs by the Race Director or their designees will be final.

4.3. BEFORE THE START OF A RUN

1. All aircraft must be staged with the propellers parallel to the ground during the staging period. During arming period, pilots may angle their aircraft in preparation of launch but falling off or tipping over will be charged as a false start.
2. A pilot may notify the Race Director before the start of the run if he or she is unable to start, i.e. due to aircraft damage. The Race Director will then exercise discretion to either delay the start of the run by up to TWO (2) minutes or move the pilot to another run. All decisions made are final.
3. A pilot will need to be ready for his or her run by the stipulated timings. Failure to do so will result in the forfeiture of the run.

4.4. STARTING A RACE

1. False starts will result in a restart or a ONE (1) lap penalty at the Race Director's discretion.
2. If the aircraft fails to take off, it is deemed that the pilot is out of the particular run and not eligible for a re-run.
3. Crashing into aircraft will result in the pilot being taken out of the race with no re-run permissible.
4. The Race Director will exercise discretion for "Loss of video" scenarios to determine if a re-run is necessary.
5. Contact or crash just before the timing or start/finish gate will result in a restart or re-run as decided by the Race Director.
6. The Race Director has full authority to decide for other scenarios not stipulated above.

4.5. DURING A RUN

1. In the event of a collapsed obstacle or situations affecting part of the course, the Race Director will make a decision.
2. The Race Director will make a decision for incidents or disputes arising during the course of a run.

5. RANKING AND SCORING

5.1. CATEGORY FPV NOVICE - MOST LAPS WINS

1. No qualifying rounds
2. One controlled practice round
3. Two (2) mission runs
4. Final score from the best run out of TWO (2) mission runs.
5. Fixed time: TWO (2) minutes per run.
6. Only valid/completed laps are counted.
7. Finish last lap after timer sounds (lap is counted if it is finished)
8. Championship Award Winner has most laps from his/her best run.
9. Ties are determined by the fastest time of the best run.

5.2. CATEGORY FPV ADVANCED – QUALIFIERS & KNOCK-OUT SYSTEM

1. 1 controlled practice rounds
2. TWO (2) qualifying runs
3. Score from the best run out of TWO (2) qualifying runs.
4. Fixed time: TWO (2) minutes per run.
5. Only valid/completed laps are counted.
6. Finish last lap after timer sounds (lap is counted if it is finished)
7. Top EIGHT (8) with the greatest number of completed laps, from the qualifying runs, will compete in the semi-finals run.
8. Only ONE (1) semi-final run of TWO (2) minutes.
9. Top FOUR (4) with the greatest number of completed laps, from the semi-finals run, will compete in the finals run.
10. Only ONE (1) final run of TWO (2) minutes.
11. Championship Award Winner has most laps from the finals run.
12. Ties are determined by the fastest time completing the laps.

5.3. SCORING FOR GATES OR FLAGS

1. Pilots must go back and fly thorough missed gates or flags. Pilots are advised to navigate near the flag so that judges can accurately assess the turn.
2. The opening of a gate is defined as the interior perimeter of the opening that is perpendicular to the race line. The aircraft needs to breach this front plane for it to count as a pass.
3. Missing one or more gates or flags will invalidate the count of that particular lap towards the overall lap count.

6. RULES AND REGUALTIONS

6.1. GENERAL GUIDELINES

1. Pilots shall follow ALL instructions from the Race Director or their designees
2. All flying areas will be out of bounds while flying is undergoing.
3. Retrieval of aircraft can only be done upon the end of each run and when it has been powered down.
4. Pilots are only allowed to fly at designated areas and during designated times.
5. Pilots are to start and end their runs at the designated landing/take-off areas.
6. Pilots must be seated at the designated piloting area.
7. Pilots can only power up their aircraft/video transmitters during their runs. No powering up of aircraft/video transmitters are permitted at the pit area.

6.2. KEY OFFICIALS

1. The Race Director and their designees will have absolute authority in all decisions regarding disputes or situations requiring immediate controls.
2. The Technical Inspector will be responsible for all preflight inspections to ensure the competition worthiness of all participating aircraft.
3. Course Safety Officer will be stationed to manage the flying zone as well as provide support for downed aircraft.

6.3. KEY POINTS TO NOTE

Rules for personnel movement and communication during the setup time and the mission attempt are dictated in the following points:

1. Only members of the participating team are allowed to be inside the playing field at any one time, when the aircraft is not airborne.
2. No outside communication or assistance from the audience / spectators is allowed at any point. No headphones or earpieces are allowed to be worn by the operator/pilot. Teams who flout this rule may be disqualified. Communication amongst teammates is allowed.
3. All teammates are required to remain outside of the playing field and be behind the safety net when the aircraft is airborne.
4. Team members may enter the field to collect their aircraft, or to bring it out of the playing field to modify or repair (including changing batteries) after it has landed, and all aircrafts have been disarmed. Entry into the playing field is only allowed upon confirmation with SAFMC officials.
5. Multiple video receivers are allowed. Only ONE (1) video transmitter is allowed for each aircraft.
6. No radio control transmitters, datalink transmitters and video transmitters and receivers are to be switched on within the competition hall, unless permitted to do so in the holding area or playing field. All repairs / maintenance / troubleshooting should be done in Raceband channel 8 with VTX set to either 25mW or pit-stop mode. Non-compliance may lead to disqualification.

7. There will be a charging space allocated for teams to charge their batteries. Teams will have to bring their own charger/charging equipment should they plan to charge their batteries. At any point, there MUST be at least ONE (1) team member overseeing the charging. Failure to do so will result in disqualification.
8. Teams shall make sure that their designated representatives are contactable and should arrive at least TEN (10) minutes before any allocated timing. Latecomers may have their mission times shortened or may be disqualified.
9. Teams are expected to fully comply with safety rules. Failure to comply with safety rules after the initial warning will result in immediate disqualification and potential blacklisting from the competition. The organiser will also not be responsible for any injures or mishaps if any participant has disregarded the safety rules.
10. No trials will be allowed in the flying area unless specified by the officials.
11. The participants will acknowledge that there will be variations in environmental conditions between teams, despite best efforts to control them.

6.4. RACE COURSE SAFETY

1. The Race Course will be cordoned off to ensure safety.
2. No individuals, except for safety officials will be allowed within the Race Course when any multi-rotor is in flight.
3. Pilots will only take-off and land at the designated take-off/landing area.
4. Flying will only take place at designated timings as decided by the Race Director or their designees.
5. Retrieval of downed aircraft shall only be done by safety officials after flying has ceased.
6. All pilots will fly the same pre-defined course for both the controlled practice and mission runs.
7. No form of flying will take place outside the cordoned area.
8. Pilots operating their aircraft during their runs will only do so from the designated Pilot Area.
9. Human traffic areas will be cordoned off accordingly to manage flow.
10. Appropriate safety signs, fire mitigating aids and any necessary safety aids will be set-up within these areas.

7. TECHNICAL RULES & REGULATIONS

Participants are allowed to bring along either their homebuilt platforms or commercial off-the-shelf (COTS) platforms to the competition. Modifications to COTS platforms are also allowed. The racing platform must conform to the following specifications.

	Novice	Advanced
Frame	Ducted	No Restrictions
Motor	Brushed / Brushless	Brushless
Propellers	Diameter < 45mm	Diameter < 85mm
Weight	< 80g (with LiPo Battery)	< 200g (with LiPo Battery)
Battery	Max 2s LiPo	No Restrictions
VTX (5.6Ghz)	25mW	

1. For safety considerations, the total weight of the flying machine cannot exceed 80g (with LiPo) for Novice category and 200g (with LiPo) for Advanced category.
2. Teams can bring similar backup aircraft to replace any aircraft that has become incapable of flight. No changing of aircraft during runs is allowed. Teams can only change aircraft between runs.
3. Only electric-based flight propulsion is allowed. Both brushed and brushless motors are allowed. No modification to the motors is allowed.
4. No internal combustion or gasoline engines are allowed.
5. No tethering or umbilical wires to the aircraft are allowed during flight.

6. External aids such as markers, indicators etc. will be allowed only in the playing field and can only be placed when there are no platforms flying.
7. For safety considerations, the swarm must be able to stop the mission and power down.

7.1. AIR GATE SPECIFICATIONS

- All High Gates/Split S-Gates shall be at least 1m above the floor.
- Low Gates will have at least 1m in width and 1m in height.
- Pillars are 30cm by diameter and 2m in height.

7.2. BATTERY

There is no limit on the number of batteries used, in series or parallel. Participants should size their batteries and aircraft appropriately for the respective mission. Lithium-Polymer (LiPo) batteries are preferred.

Batteries must be properly strapped or locked onto the aircraft before launch.

7.3. FREQUENCY MANAGEMENT

No broadcasting of video is allowed unless consent is given by the Race Director. Pilots found to be broadcasting video when they are not supposed will be given a first warning and are subjected to disqualification for subsequent infractions as this will affect pilots currently flying.

Race-band frequencies (R1 to R8) will be preassigned. The list of frequencies is listed below:

Band	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
R	5658	5695	5732	5769	5806	5843	5880	5917

Pilots will only be given opportunities to change their frequencies at the Race Director’s discretion.

7.4. CAAS REGULATIONS

Participants are to ensure that they have registered their aircraft if the weight exceeds 250g.

For educational purposes, if the total weight of the aircraft exceeds 1.5kg, but is less than 7kg, a UA Basic Training Certificate or a UA Pilot License is required.

Please refer to the *UA Regulatory Requirements* on the CAAS Website for more details on Unmanned Aircraft regulations.

8. AVAILABLE RESOURCES

Indoor RC Racing Quads Suitable for SAFMC FPV (Novice).

Basic Quad (Mass participation and learning the basics. Can be upgraded for FPV racing in FPV Novice)

	Description	Price	Sellers	Remarks
1	Eachine E010 Quad	$24.42 $29.90	BangGood (Online) 65drone (Online)	Quad w/ Basic Tx
2	Eachine E011 Quad	$22.98 $33.00	Eachine (Online) 65drone (Online)	Quad w/ Basic TX * 7mm motor

FPV Racing peripherals (Equipment upgrade for FPV racing in FPV Novice)

	Description	Price	Sellers	Remarks
1	Eachine TX02 Cam/Vtx	$37.92	BangGood (Online)	Cam/Vtx
2	Eachine EV800D Goggle	$175.06	BangGood (Online)	Box goggle
3	Eachine EV100 Goggle	$183.82	BangGood (Online)	Semi pro goggle
4	Flysky FSi6 Transmitter	$81.69	BangGood (Online)	Hobby grade Tx

Complete Racing Quad (Complete package for FPV racing in FPV Novice)

	Description	Price	Sellers	Remarks
1	EMAX Ez Pilot	$311.99	Getfpv (Online)	W/ transporter 2 Goggles and transmitter

Disclaimer: All approximate prices indicated correct as of 24 October 2025 and meant to serve as a guide (exclusive of shipping where applicable).

1) Sample Quad with basic Transmitter (Tx) – Entry level mass participation.



2) Sample Quad with Hobby Grade Tx and Multi module – Upgrade to hobby level.



3) Sample Quad with Hobby grade Tx, Multi module, Cam/Vtx, Goggle and Monitor screen – Basic requirements for SAFMC FPV Novice competition.



Notes:

Recommendations based on getting the greatest number of participants by selection of entry level equipment with the lowest cost, students will learn to fly line-of-sight (LOS).

Upgrading of their entry level equipment is possible and recommended if the student wants to progress into FPV phase, Hobby grade equipment allows more precise control and a more robust Radio Frequency link between the Quad and Tx (Pilot).

With the addition of a Cam/Vtx, Goggle or Monitor, the student will have the basic equipment for participation in SAFMC FPV Novice event. It is assumed that these students are handy with a soldering iron and willing to research and/or google for instructions on how to put the upgrades together.