

Advisory Circular

PERMITS FOR UNMANNED AIRCRAFT OPERATIONS

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1. **GENERAL.** Pursuant to paragraph 88B of the Air Navigation Order, the Director-General of Civil Aviation (DGCA) may, from time to time, issue advisory circulars (ACs) on any aspect of safety in civil aviation. This AC contains information about standards, practices and procedures acceptable to CAAS. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.
2. **PURPOSE.** This AC provides guidance on unmanned aircraft (UA) operations in Singapore that will require permit(s).
3. **APPLICABILITY.** This AC applies to persons who want to, or are operating a UA in Singapore.
4. **CANCELLATION.** This AC supersedes AC UAS -1(0).
5. **EFFECTIVE DATE.** This AC is effective from 1 February 2017.
6. **REFERENCES.** Singapore Air Navigation Act (ANA), Air Navigation Order (ANO) and Public Order Act (POA).
7. **APPLICABILITY OF THE PERMITS.**
 - 7.1 From 2 June 2015, a person must obtain permit(s) from CAAS before operating a UA under certain circumstances in Singapore. This enhanced regulatory and permit framework aims to facilitate use of UA while mitigating risks to aviation safety, and public safety and security.

7.2 According to Part XA of the ANO, a person is not allowed to operate a UA with total mass exceeding 7kg **or** for a purpose that is neither a recreation purpose nor a research purpose, unless he holds the following permits:

- (a) A UA Operator Permit;
- (b) A Class 1 Activity Permit for each activity, or a block of the same activity, conducted with one or more types of UA specified in the UA Operator Permit.

The definitions of “recreation purpose” and “research purpose” from the ANO are reproduced in **Appendix 1**.

7.3 The use of a small UA (i.e. total mass of 7kg and less) for recreation or research purpose, will not require a UA Operator Permit and Class 1 Activity Permit, but will require a Class 2 Activity Permit if the UA is operated outdoors under any of the following conditions:

- (a) Exceeding 200 feet above mean sea level (AMSL); or
- (b) Within 5 km of a civil aerodrome or military airbase; or
- (c) Within any restricted area or danger area, as published in the Government Gazette.

Note: The restricted areas, danger areas, and areas within 5 km of an aerodrome are shown on the OneMap portal at www.onemap.sg

7.4 No permits are required for small UA operated indoors under any of the following conditions:

- (a) At a private residence; or
- (b) At an experimental site in connection with the construction or testing of that UA, and accessible only to the persons involved, and the flying does not affect the general public.

7.5 Operations of UA that do not require a permit should adhere to the guidelines in **Appendix 2**.

7.6 All UA operations are not allowed within a prohibited area, as gazetted under the Air Navigation Act.

8. UNMANNED AIRCRAFT WITH TOTAL MASS EXCEEDING 7KG.

8.1 A larger or heavier UA can pose greater safety risk. According to paragraph 72F(1) of the ANO, the operation of a UA with total mass exceeding 7kg for any purpose is not allowed except in accordance with a UA Operator Permit and the applicable Class 1 Activity Permit.

9 USE OF UA FOR PURPOSE THAT IS NEITHER RECREATION NOR RESEARCH.

9.1 The operation of a UA for a purpose that is neither recreation nor research (e.g. a person using his UA to offer wedding photography services), would require an Operator Permit and an Activity Permit. The objective of regulating such operations is to ensure that the UA is operated safely, and does not pose any safety risks to other aviation users and the public.

9.2 Even if the use of the UA is to perform work or carry out a task (in relation to a business, with no direct commercial gain per se), an Operator Permit and an Activity Permit is required. Some examples include:

- (a) A government agency using its UA to perform aerial surveillance, aerial fire-fighting or as part of the provision of emergency or essential services.
- (b) An energy utility company using its UA to carry out inspections of its power plants.

- (c) A farm (the business being agriculture) using its UA to survey crops or spray pesticides.
 - (d) A factory (or any organisation) using its UA to deliver small articles between various locations in its compound.
 - (e) A company's public communications department using its UA to take event photographs for its publicity effort.
- 9.3 The conduct of fee-based training courses or classes on flying of UA, incorporating a flight training module, would require a UA Operator Permit and a Class 1 Activity Permit. Exception applies when such classes are conducted as part of an educational institution's education curriculum, by an educational institution that is not a private school under the Private Education Act (Cap. 247A).

Note: An educational institution (school, polytechnic, or university etc.) may conduct R&D on designing or developing a UA, or conduct lessons about UA as part of its education curriculum, without having to apply for an Operator Permit. Such R&D provides room for students in learning and exploring this technology. It is assumed that the school will appropriately supervise the students as they experiment or test their creations, and ensure that CAAS guidelines in **Appendix 2** are adhered to. A Class 2 Activity Permit may be required depending where the UA is flown. An Operator Permit and Class 1 Activity Permit are required if the UA has a total mass exceeding 7kg. If the educational institution wishes to contract an external training service provider to conduct UA flying courses, the educational institution should ensure that it contracts a training service provider who has an Operator Permit.

- 9.4 While it is not the intent of CAAS to regulate the selling of UA, UA operations carried out by an individual or entity for demonstration or flight tests to prospective customers will also require the UA Operator Permit and Class 1 Activity Permit.

Flying Displays and Sporting Activities

- 9.5 A flying display refers to the flying of UA for exhibition or entertainment purposes, at a large-scale organised event. Some examples include:
- (a) A performance involving UA at Chingay Parade or National Day Parade;
 - (b) UA used as part of a show staged in the Singapore Indoor Stadium.
- 9.6 A UA sporting activity includes racing or other forms of competition or tournaments using UA.
- 9.7 Due to the safety risks posed to the spectators and participants of UA flying displays and sporting events, the event organiser is required to obtain a UA Operator Permit, and the relevant Activity Permit, if applicable. This is to ensure that the organiser of the event (the competition or tournament) has taken appropriate risk mitigating measures to ensure the safety of the participants and spectators.

10. UA OPERATOR PERMIT.

- 10.1 The UA Operator Permit allows CAAS to assess that the operator, its equipment and the personnel flying specified types of UA are fit and capable of conducting operations safely. A UA Operator Permit can be applied up front and will remain valid for up to a year. If, during the validity period, there are changes to either i) the types of UA; or ii) personnel piloting the UA or iii) the types of activities, the holder of the UA Operator Permit is required to submit an application to vary the scope of the approval granted in the Operator Permit.
- 10.2 The assessment of the UA Operator Permit consists of two main components with the respective scopes reflected below:

- (a) Assessment of UA Operator.
 - (i) Processes/systems to maintain operational control of the operations;
 - (ii) Process and procedures to ensure competency of personnel operating the UA;
 - (iii) Robustness of safety risk assessment contextual to the equipment used, competency of personnel, types of operations and the environment in which the operations would be conducted;
 - (iv) Knowledge/awareness of safety considerations and airspace usage; and
 - (v) Procedures to handle emergencies.
- (b) Assessment for each type of UA to be operated.

For type of UA:

- (i) Airworthiness, or fitness to fly;
- (ii) Navigational and control reliability (particularly with respect to the communications/ control link);
- (iii) Capabilities and performance limitations; and
- (iv) Maintenance regime.

For types of operations:

- (i) Flight profiles or manoeuvres that may be undertaken by the UA for that operation;
- (ii) Payloads;
- (iii) Whether UA is discharging items (subject to further permit);
- (iv) Safety risk assessment of that type of operations;
- (v) Operation procedures; and
- (vi) Limitations in relation to the type of UA deployed.

For personnel:

- (i) Qualification and training acquired; and
- (ii) Experience and competency in operating the UA.

- 10.3 Application for the UA Operator Permit can be submitted together with, or in advance of any Class 1 Activity Permit. Users of a UA with total mass exceeding 7kg should submit their UA Operator Permit applications early.
- 10.4 As part of the assessment of a UA Operator Permit application, the proposed pilot(s) to be included in the Permit may be required to perform a physical flight demonstration in the presence of a CAAS assessor. This flight demonstration is to determine the competency and ability of the pilot to operate the specific UA, to be included in the Permit. The demonstrations are typically scheduled on Tuesdays or Thursdays. Applicants are advised to make reservation for the slots to conduct demonstrations early to avoid delay in the approval of Operator Permit. CAAS may accept a UA licence granted by a foreign authority in place of the flight demonstrations.
- 10.5 The pilot is required to carry out manoeuvres with the specific UA, to be included in the Permit, and the manoeuvres may include hovering in various orientations, flying a square pattern, flying a figure of '8', and landing at a designated spot, etc. All the demonstration flight manoeuvres are to be performed without GPS assistance.
- 10.6 The operator may only conduct an operation that is within the scope granted in the UA Operator Permit, i.e. using the specific type(s) of UA for the type(s) of operations with the remote pilot(s) listed in his UA Operator Permit. Should there be a need to change or increase the scope, the operator may seek variation to his UA Operator Permit within the period of validity.

Note: The person required to hold the UA Operator Permit is the operator, not the client who engages the operator and pays for the service. The operator is the service provider or contractor.

11. CLASS 1 ACTIVITY PERMIT.

11.1 The holder of a UA Operator Permit must not operate a UA unless he has a Class 1 Activity Permit for that activity. Unlike the UA Operator Permit, which assesses the capability of the operator including his UA, personnel and procedures, in assuring safe operation, the Class 1 Activity Permit is for assessment on the specific aspects of the activity, such as:

- (a) The location where the UA is intended to be operated;
- (b) The type(s) of operation to be conducted;
- (c) The date(s)/time(s) during which the operation(s) will be performed at the location(s);
- (d) The maximum operating altitude;
- (e) Mitigation measures proposed by the operator to address site-specific circumstances such as nearby buildings/obstacles, crowds, visibility etc. at the time of operations; and
- (f) Activity applied for is within the capability of the operator as approved in the operator permit.

11.2 In the interest of aviation safety, the operation of a UA outdoors within 5 km of a civilian airport or military airbase is subject to more stringent safety assessment by CAAS. This is because the UA may interfere with manned aircraft operation due to disparities in the capability and reliability between unmanned and manned aircraft. Any UA operation within 5 km of an aerodrome will be required to de-conflict with manned aircraft and undertake robust safety measures to effectively mitigate any risk of a runaway UA affecting manned aircraft operations.

11.3 For convenience of the operator, CAAS may consider granting a single, block Class 1 Activity Permit that allows for the same UA operation to be carried out multiple times over an extended period of time by the same type of UA at the same location. Examples of such activities include:

- (a) A wedding photographer (the operator) who takes aerial photographs at Hotel A (specific location) between 5pm to 11pm on 5 Jan, 6 Jan, 12 Feb, 14 Feb and 20 Feb (specific dates/times).
- (b) A shipbuilder (the operator) performing aerial inspection of ships at Y shipyard (specific location) every day between 12pm and 4pm from 1 Jan to 31 Mar (a block duration).

Under a block permit, the operating periods will be subject to coordination with relevant authorities to ensure that the UA flights can be safely conducted.

11.4 Should there be a change in the date(s)/time(s) of a Class 1 Activity Permit before the last date/time has passed, the operator may seek a variation to the permit without an additional processing fee, at least one week prior to the affected date/time so that CAAS may be able to review the airspace usage and consult other agencies involved.

11.5 If the operator intends to conduct the same activity, i.e. same operation using same type of UA at same location albeit at later date(s), for which he had been granted a Class 1 Activity Permit previously, he may apply for a “repeat” **Class 1 Activity Permit**, for which a processing fee is applicable. Using the example from paragraph 11.3(b), the shipbuilder may

apply for a repeat Class 1 Activity Permit for the same aerial inspection at Y shipyard for a new period from 1 May to 31 July.

- 11.6 For multiple activity locations, a single Class 1 Activity Permit may be granted if the activity locations are within 2km to one another. However, if the locations are further apart and/or the type of operation varies between activity sites, an operator will have to apply for Class 1 Activity Permits for each location.

12. CLASS 2 ACTIVITY PERMIT.

- 12.1 The requirement for a Class 2 Activity Permit is described in paragraph 7.3.
- 12.2 In the interest of aviation safety, the operation of a UA outdoors within 5 km of a civilian airport or military airbase is subject to more stringent safety assessment by CAAS. This is because the UA may interfere with manned aircraft operation due to disparities in the capability and reliability between unmanned and manned aircraft. Any UA operation within 5km of an aerodrome will be required to de-conflict with manned aircraft and undertake robust safety measures to effectively mitigate any risk of a runaway UA affecting manned aircraft operations.
- 12.3 For convenience of the operator, CAAS may consider granting a single Class 2 Activity Permit that allows for the same UA operation to be carried out multiple times over an extended period of time by the same type of UA at the same location. This may be known as a block permit, under which the operating periods will be subject to coordination with relevant authorities to ensure that the UA flights can be safely conducted.
- 12.4 Should there be a change in the date(s)/time(s) of a Class 2 Activity Permit before the last date/time has passed, the operator may seek a variation to the permit without an additional processing fee, at least one week prior to the affected date/time so that CAAS may be able to review the airspace usage and consult other agencies involved.
- 12.5 If the operator intends to conduct the same activity, i.e. same operation using same type of UA at same location albeit at later date(s), for which he had been granted a Class 2 Activity Permit previously, he may apply for a “repeat” **Class 2 Activity Permit**, for which a processing fee is applicable.
- 12.6 For multiple activity locations, a single Class 2 Activity Permit may be granted if the activity locations are proximate to one another. However, if the locations are far apart and/or the type of operation varies between activity sites, an operator will have to apply for Class 2 Activity Permits for each location.

13. OTHER PERMITS.

- 13.1 Where necessary, the following permits may be issued together with the Class 1 or Class 2 Activity Permit:
- (a) A permit issued by the Singapore Police Force (SPF) pursuant to section 7 of the ANA for taking photographs of a protected area;
 - (b) A permit issued by SPF pursuant to section 7A of the ANA for overflying a protected area;
 - (c) A permit issued by SPF pursuant to section 26 of the POA for using UA in a special event area;
 - (d) A permit issued by CAAS pursuant to section 7C of the ANA for discharging a substance from a UA;

- (e) A permit for use of radio frequencies and power limits that do not comply with the Info-communications Media Development Authority of Singapore (IMDA) guidelines on radio frequencies and power limits for short range devices.
- 13.2 The applicant should therefore provide the necessary details and supporting documents to identify the necessity for the grant of such permits.

14. PERMIT APPLICATION.

- 14.1 Applications for permits are to be submitted through the CAAS website:

http://www.caas.gov.sg/caas/en/eServices_Forms/Application_for_Flying_of_Unmanned_Aircraft.html

The applicant should submit a satellite map of the site(s) for the intended UA activities with the launch/recovery point(s), flight path(s) and positions of the remote pilot and safety officer(s) depicted on the map. The applicant is reminded not to plan the activity over people not involved in the UA activity, or over any public road and pedestrian pathway.

- 14.2 CAAS will review the application upon receipt of the duly completed application form and the fees payable. Application fees made are not refundable nor transferable, regardless of the outcome of the application.
- 14.3 Operators are encouraged to submit their applications well in advance of their intended operations and factor processing time into their planning. The average processing time of an application is 5 to 10 working days, but a longer processing time may be required for complex operations, which will entail a more in-depth evaluation by CAAS and/or other agencies, or further discussions with the applicant.

15. OPERATOR IS RESPONSIBLE FOR SAFETY.

- 15.1 Despite having the permits, the operator remains responsible to ensure that the UA is operated in a safe manner and does not endanger the safety of any person, aircraft or property. The holder of a permit shall inform CAAS of any airworthiness and operational incidents/accidents.
- 15.2 Queries relating to UA permit application may be sent to CAAS via our website at www.caas.gov.sg/caas/en/ANS/unmanned-aircraft.html

APPENDIX 1 DEFINITIONS EXTRACTED FROM ANO

As reproduced from Paragraph 72L of the ANO.

“recreation purpose” means any pursuit or activity engaged in for enjoyment, relaxation or leisure, but not —

- (a) a sporting activity that forms part of an organised group activity or organised competition or tournament (such as a flying display); or
- (b) a recreational activity provided by a business, or in the course of business;

“research purpose” means —

- (a) any lecture, tutorial, seminar, demonstration, class or similar activity on unmanned aircraft provided by an educational institution referred to in section 72 of the Private Education Act (Cap. 247A); or
- (b) any research and development activity carried out by an educational institution referred to in section 72 of the Private Education Act with the object of acquiring knowledge that may be of use for the purpose of devising or developing a new or substantially improved product that is an unmanned aircraft;

APPENDIX 2 GUIDELINES FOR SAFE AND RESPONSIBLE OPERATION OF UNMANNED AIRCRAFT

- 1 When operating an unmanned aircraft, the operator should adhere to these guidelines (also referred to as operating guidelines). The operator should:
 - (a) Know the characteristics of the aircraft and how to fly it safely;
 - (b) Ensure that the aircraft is safe for flight before operating it;
 - (c) Fly only in good visibility and weather conditions;
 - (d) Keep the aircraft within visual sight at all times;
 - (e) Ensure the operation of transmitting devices of the unmanned aircraft system complies with IMDA requirements;
 - (f) Keep sufficient distance from people, property and other aircraft (manned or unmanned);
 - (g) Not fly an unmanned aircraft over any person;
 - (h) Not suspend, carry or attach any item to the unmanned aircraft, unless it is manufactured to do so; and
 - (i) Not fly where the unmanned aircraft may interfere with emergency service providers; or over moving vehicles where it might endanger or distract drivers.

- 2 The operator should be aware of the situations for which a permit or permits may be required. The operator must therefore not operate an unmanned aircraft under those situations unless he has the necessary permits to do so. As a reminder, the operator must:
 - (a) Not fly an unmanned aircraft that has a total mass exceeding 7kg, unless he has a permit allowing him to do so;
 - (b) Not fly the unmanned aircraft at any altitude in areas within 5km of any aerodrome (including military airbases) or higher than 200 feet AMSL outside of such areas, unless he has a permit allowing him to do so.
 - (c) Not fly the unmanned aircraft over or within restricted or danger or protected areas, unless he has a permit allowing him to do so; and
 - (d) Not drop or discharge any item or substance from the unmanned aircraft, unless he has a permit allowing him to do so.

- 3 The operator is not allowed to conduct unmanned aircraft operations:
 - (a) Involving the carriage of any hazardous substances using an unmanned aircraft; or
 - (b) Over or within the boundaries of any prohibited area.