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Australian Government
Civil Aviation Safety Authority

**ADVISORY CIRCULAR
AC 101-03 v2.0**

Flying a model aircraft or drone for recreation or education

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Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- people who build and fly model aircraft and/or drones for recreational use
- model aircraft and/or recreational drone clubs
- model aircraft associations
- schools and higher education providers who fly model aircraft and/or drones under 7 kg for educational, training and research purposes.

Purpose

This AC provides guidance on safely and lawfully flying model aircraft and drones recreationally or for education, training or research purposes in schools and higher education providers. It is also relevant to approved model aircraft administration organisations on the regulation of model aircraft/private drone activities. While this AC prescribes a means of compliance with legislation, alternate procedures demonstrating an equivalent or greater level of safety will be considered on a case-by-case basis.

For further information

For further information, go to [Drones | Civil Aviation Safety Authority \(casa.gov.au\)](#) or [Know Your Drone | Civil Aviation Safety Authority \(casa.gov.au\)](#). For any further information, contact CASA via the [website](#).

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Status

This version of the AC is approved by the Branch Manager, Emerging Technologies and Regulatory Change.

Note: Changes made in the current version are not annotated. The document should be read in full.

Table 1. Status

| Version | Date | Details |
|---------|-----------|---|
| v2.0 | May 2024 | Minor changes throughout to update and ensure that the advice remains consistent with the Part 101 regulations and other relevant legislation, updates relating to practices and policies, restructure and expansion of general rules, addition of aerodrome approach and departure path guidance, and updates to reflect changes to the Airspace Act 2007. |
| v1.1 | July 2018 | Minor changes throughout to update and ensure that the advice remains consistent with the Part 101 regulations and other relevant legislation. |
| (0) | July 2002 | First AC published on this subject. |

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Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Artwork: James Baban.

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Table 2. Acronyms

| Acronym | Description |
|---------|---|
| AC | advisory circular |
| AGL | above ground level |
| ATC | air traffic control |
| CAR | <i>Civil Aviation Regulations 1988</i> |
| CASA | Civil Aviation Safety Authority |
| CASR | <i>Civil Aviation Safety Regulations 1998</i> |
| FPV | first person view |
| HLS | helicopter landing site |
| RPA | remotely piloted aircraft |
| VLOS | visual line of sight |

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Table 3. Definitions

| Term | Definition |
|-----------------------------------|---|
| controlled airspace | Airspace of defined dimensions around towered aerodromes within which aircraft operations are subject to air traffic control. |
| model aircraft | An aircraft that is used for sport or recreational purposes and which cannot carry a person with a maximum gross weight of no more than 150 kilograms; or an aircraft operated by a school or higher education provider in connection with educational, training or research purposes and cannot carry a person with a maximum gross weight of not more than 7 kilograms. |
| non-controlled airspace (Class G) | Airspace in which the operation of aircraft is subject to the 'see and avoid principle'. Pilots and remote pilots are responsible for maintaining separation with other aircraft to avoid creating a collision hazard. |
| first person view | A style of flying where the use of goggles or a screen enables the flyer to view the flight, via a camera mounted on the drone, from the point-of-view of the drone. |

| Term | Definition |
|-------------------------------------|---|
| giant model aircraft | An unmanned aircraft that has a gross weight at take-off of more than 25 kilograms, but not more than 150 kilograms, that is flown for sport or recreation. |
| restricted area | An area declared under the Airspace Regulations 2007 for which permission must be granted by the controlling authority before an aircraft operation can take place in that area while it is active. |
| school or higher education provider | A school in relation to which there is an approved authority under the Australian Education Act 2013; or a higher education provider within the meaning of the Higher Education Support Act 2003. |
| sport or recreation | In relation to the flight of an uncrewed aircraft, a flight activity only for sport or recreational purposes, as defined in a standard dictionary. |
| populous area | An area [that] has a sufficient density of population for some aspect of the operation, or some event that might happen during the operation (in particular, a fault in, or failure of, the aircraft...) to pose an unreasonable risk to the life, safety or property of somebody who is in the area but is not connected with the operation. |
| visual line of sight (VLOS) | When flying a model aircraft/private drone, close enough to see, maintain orientation and achieve accurate flight and tracking. |
| military operating area | An airspace of defined dimensions, with specified conditions, established for hazardous military activities. |
| measurement point | Means any point on the actual or notional centreline of a runway between the 2 threshold centrepnts. |
| threshold centrepnts | For a runway, means the point on the threshold of the runway at which the centreline of the runway intersects (or would intersect if there were a centreline) the threshold. |
| threshold | For a runway, means the beginning of that portion of the runway usable for landing. |

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website <https://www.legislation.gov.au/>

Table 4. Legislation references

| Document | Title |
|--|--|
| Part 101 of CASR | Unmanned aircraft and rockets |
| CASA Instrument 22/22 | Operation of Certain Unmanned Aircraft - Renewal of Directions Instrument 2022 |
| <i>Civil Aviation Act 1988</i> | |
| <i>Airspace Act 2007</i> | |
| Airspace Amendment (Danger Areas) Regulations 2023 | |

Advisory material

CASA's advisory materials are available at <https://www.casa.gov.au/publications-and-resources/guidance-materials>

Table 5. Advisory material references

| Document | Title |
|---|--|
| AC 101-01 | Remotely piloted aircraft systems – licensing and operations |
| CASR Part 101 Plain English Guide (PEG) | Micro and excluded Remotely Piloted Aircraft operations |

1.4 Forms

CASA's forms are available at <http://www.casa.gov.au/forms>

Table 6. Forms

| Form number | Title |
|-------------|--|
| | Model aircraft flight authorisation – Area Approval/Permission |
| | RPAS Multi-purpose Form |

Note: Aviation Reference Number (ARN) applications can be made through the myCASA portal.

2 Introduction

- 2.1 Guidance in the body of this AC is applicable to all model aircraft in the wider sense of the term. The appendices contain guidance specific to the various types of model aircraft. Advice here is given beyond the statutory requirements, so that the experience of the model aircraft organisation can be of use to those new to flying model aircraft.
- 2.2 The term 'uncrewed' in this document has the same meaning as 'unmanned' in Part 101 of CASR.
- 2.3 The *Civil Aviation Act 1988 (the Act)* describes the conditions under which an aircraft may fly in Australia. For model aircraft and private drones, the rules governing flight are generally contained in Part 101 of the *Civil Aviation Safety Regulations 1998 (CASR)*. Nothing in this AC is intended to conflict with Part 101 or other legislation. If in doubt, Part 101 of CASR is overriding.
- 2.4 In the CASR, the term *model aircraft* means any aircraft, other than a balloon or kite, that cannot carry a person, and:
- weighs no more than 150 kg and is used for sport or recreation; or
 - weighs no more than 7 kg and is operated by schools and higher education providers in connection with educational, training and research purposes¹.
- 2.5 The term *model aircraft* includes drones, along with what are traditionally considered to be model aircraft such as radio-controlled models. The term *model aircraft* is used in this AC to differentiate drones and radio-controlled models used for sport or recreation from drones used for commercial or commercial-like purposes, known as remotely piloted aircraft (RPA) in the regulations, and which different rules apply.
- 2.6 Because the definition is based on use, at certain times the same aircraft can be deemed a model aircraft or an RPA under the regulations.. The only caveat is that an aircraft must be registered as an RPA to be used in RPA operations.

2.7 Sport or recreational purposes

- 2.7.1 'Sport or recreational purposes' means operating a model aircraft as a hobby or for pleasure and where the operation does not generate a commercial outcome of any sort—for the pilot or any third party.

2.8 Educational purposes

- 2.8.1 The operation of model aircraft with a gross weight of not more than 7 kg is permitted when operated in connection with the educational, training or research purposes of:
- a school in relation to which there is an approved authority under the *Australian Education Act 2013*
 - or
 - a higher education provider within the meaning of the *Higher Education Support Act 2003*.
- 2.8.2 Operations conducted by educational institutions on a contracted basis for industry or government are not considered model aircraft operations and must meet the requirements of excluded RPA operations or operate under a Remotely Piloted Aircraft Operating Certificate (ReOC).

¹ See regulation 101.023 of CASR.

- 2.8.3 Aircraft weighing more than 7 kg operated for training, educational or research purposes by a school or higher education provider fall under the rules and requirements of RPA. For information on the requirements for operating RPA, refer to AC 101-01 and the CASR Part 101 Plain English Guide for Micro and Excluded RPA Operations.

2.9 Classes of model aircraft

- 2.9.1 CASA classifies model aircraft by weight as follows:
- a. 250 grams or less – model aircraft, subject only to the general rules for uncrewed aircraft (subparts 101 A-C of CASR) and any CASA directions relevant to this class
 - b. more than 250 grams but not more than 25 kilograms – model aircraft, subject to the general rules, subpart 101.G and any CASA directions relevant to this class
 - c. more than 25 kilograms but not more than 150 kilograms – giant model aircraft (see Appendix E for more information).
- 2.9.2 Note that CASA directions current at time of publication are listed in the references section in 1.3

3 Safe operations of all model aircraft

3.1 Flight rules

3.1.1 Overview

- 3.1.1.1 The term *model aircraft* includes both drones and radio-controlled models (see Chapter 2 of this AC for more information). In addition to this chapter, radio-controlled, gas-turbine powered, free flight, and control-line model flyers should also refer to the appendices of this AC for more information on safe operations.
- 3.1.1.2 It is the responsibility of the flyer of a model aircraft to ensure the aircraft is flown safely and in accordance with the regulations.
- 3.1.1.3 Flying safely includes considering the skill level of the flyer when selecting an aircraft and location, as well as when flying the aircraft.
- 3.1.1.4 Model aircraft flyers may apply to CASA for an authorisation to operate their aircraft outside of certain rules, for example, fees apply to fly FPV or above 400 ft AGL. For more information, refer to 3.1.11 of this AC for more information.
- 3.1.1.5 Using a CASA-verified drone safety mobile or web app, which is available from the [CASA website](#), allows a model aircraft flyer to identify controlled airports, emergency or public safety operations, restricted airspace or military operating areas around the proposed location of operation.

3.1.2 Height limitations

- 3.1.2.1 Model aircraft are limited to a height of 400 ft (120 m) AGL unless operated in accordance with the rules and procedures of a model aircraft organisation that holds a CASA approval for this purpose, or a CASA approval issued to the model aircraft flyer.
- 3.1.2.2 400 ft (120 m) is measured from the point on the surface of the water or ground directly below the aircraft. Where there is an object on the surface of the earth, for example an office tower, the measurement point remains the surface of the earth (the base of the object).
- 3.1.2.3 Operations above 400 ft AGL may increase the chance of conflict with other airspace users. CASA expects that an application for operations above 400 ft AGL will include a review of local aviation traffic and the subsequent implementation of appropriate mitigators.
- 3.1.2.4 Model aircraft flyers should be aware of the potential increased ground hazard area of the model aircraft when operating at heights. For example, strong winds will increase the horizontal distance the model aircraft travels if it were to fail.

3.1.3 Operating near aerodromes

- 3.1.3.1 Aerodromes with an active air traffic control (ATC) tower are known as controlled aerodromes. The ATC tower at some towered aerodromes are not staffed at all times. An aerodrome without an ATC tower or with an ATC tower that is not staffed is known as a non-controlled aerodrome.
- 3.1.3.2 An aerodrome intended to be used wholly by helicopters is known as a helicopter landing site (HLS).
- 3.1.3.3 All aerodromes have no-fly zones where model aircraft are generally prohibited. The specific no-fly zone will depend on whether the aerodrome is controlled and if the aerodrome has runways or an HLS.
- 3.1.3.4 Details of the no-fly zones and approach and departure paths for each aerodrome type are included in Appendix H.

Controlled aerodromes

- 3.1.3.5 Model aircraft weighing more than 250 grams must not be operated within 3 NM (5.5 km) or over or within the approach and departure paths of a controlled aerodrome.
- 3.1.3.6 Model aircraft weighing 250 grams or less may be operated within 3 NM (5.5 km) of a controlled aerodrome, up to a height of 150 ft (45 m), provided they are not operated over or within the approach and departure paths, or within the aerodrome boundary.

Non-controlled aerodromes

- 3.1.3.7 During a relevant event, model aircraft must not be operated within 3 NM (5.5 km) of a non-controlled aerodrome, or within 0.75 NM (1.4 km) of a helicopter landing site (HLS). This means that model aircraft flyers must not commence a flight, and must land their aircraft, when they become aware of a crewed aircraft operating to or from the aerodrome or the HLS. Once the crewed aircraft has ceased operating or is outside of the vicinity of the aerodrome, flying can commence or recommence as applicable.
- 3.1.3.8 When operating within 3 NM (5.5 km) of a non-controlled aerodrome or within 0.75 NM (1.4 km) of a HLS, it is advisable to keep aircraft outside the approach and departure areas of the aerodrome, where possible, in case of a relevant event.

3.1.4 Prohibited, restricted and military operating areas

- 3.1.4.1 These are temporary and permanent prescribed areas of airspace in which flight is not permitted unless permission is granted from the controlling or administering authority for that area. A CASA-verified drone safety app can be used to identify these areas.
- 3.1.4.2 Permission to fly a model aircraft in a prohibited, restricted or military operating area should be sought from the controlling or administering authority of the area. Approved operations will be subject to any conditions imposed by the authority. Failure to comply with the conditions is a failure to comply with the regulations.

3.1.5 Operating near people and in populous areas

Minimum distance from people

- 3.1.5.1 Model aircraft cannot be operated within 30 m of a person unless the person has duties essential to the control and navigation of the aircraft².
- 3.1.5.2 The minimum distance from people is measured from the point on the ground directly below the model aircraft.
- 3.1.5.3 If a model aircraft is flown as part of a model flying competition, it may be flown within 30 m of a person who is judging the competition.

Populous areas

- 3.1.5.4 Operations are also prohibited over a populous area unless conducted at an altitude that would prevent the model aircraft injuring people or damaging property in the event of an aircraft or system failure³.
- 3.1.5.5 The populous area rule applies even where the operator meets the minimum distance (30 m) from people rule.
- 3.1.5.6 For example, if a multirotor model aircraft is flying at a relatively low height (i.e., 30 m/100 ft) directly above a single person not associated with the flight, it may be considered to be

² In accordance with section 7 of CASA 22/22.

³ In accordance with regulation 101.395 of CASR.

operating in a populous area due to the fact that a complete loss of power may cause injury to the person below. This interpretation would apply equally to higher flight over small or large public gatherings, or over built-up areas where there is a greater risk to property.

- 3.1.5.7 It is the responsibility of model aircraft flyers to ensure the flight does not take place unless it is compliant with the 'populous area' rule and to take sufficient precautions when operating in the vicinity of people and property.

3.1.6 Visual line of sight

- 3.1.6.1 Unless otherwise approved by CASA, the flyer of a model aircraft must maintain visual line of sight (VLOS) with the aircraft at all times during flight.
- 3.1.6.2 A model aircraft is being operated within the VLOS of the person operating the aircraft if the person can continually see, orient and navigate the aircraft to meet the person's separation and collision avoidance responsibilities, with or without corrective lenses, but without the use of binoculars, a telescope or other similar device.
- 3.1.6.3 The VLOS rule is more than a distance restriction. The requirement to be able to continually see the model aircraft requires that the flyer can maintain positive control. A model aircraft cannot be operated behind an object that obscures the flyer's view of the aircraft.
- 3.1.6.4 Electronic aids, such as on-screen or moving map displays, can be beneficial to improving situational awareness of the local environment for the flyer and, where available, may be used as risk mitigation tools. Such displays may be used as an additional aid to safety, but cannot be used instead of, or to replace, direct eye contact in VLOS operations.

First person view

- 3.1.6.5 First person view (FPV) is a style of flying specific to drones with an onboard camera. Flying FPV outdoors is possible if the flyer is able to view, navigate and orientate the aircraft with their own eyes. Flying FPV using goggles to solely rely on vision from the onboard camera is possible if the flyer is:
- a member of a model aircraft association that has approval to fly FPV
 - approved by CASA to fly FPV recreationally
 - flying indoors, provided the drone can't escape the building.

3.1.7 Operating at night

- 3.1.7.1 Model aircraft must not be operated at night, unless otherwise approved by CASA or operated in accordance with the rules and procedures of a model aircraft organisation that holds a CASA approval for this purpose.
- 3.1.7.2 Night means the period between the end of evening civil twilight and the beginning of the following morning civil twilight. Civil twilight is the time when the sun is just below the horizon but enough sunlight exists to carry out most outdoor activities.

3.1.8 Operating multiple RPA simultaneously

- 3.1.8.1 Unless otherwise approved by CASA, a model aircraft flyer is not permitted to operate more than one model aircraft at a time⁴.

⁴ In accordance with section 8 of CASA 22/22

3.1.9 Operating near public safety operations

- 3.1.9.1 Model aircraft must not be operated in the vicinity of a fire, police or other public safety or emergency operation, for example, bush fires, traffic accidents, search and rescue, unless approval has been obtained from the person in charge of the operation⁵.
- 3.1.9.2 Generally, approval will only be granted to persons with a duty related to the public safety or emergency operation.

3.1.10 Creating a hazard

- 3.1.10.1 There is a general prohibition from operating a model aircraft in a way that creates a hazard to another aircraft, another person, or property⁶.
- 3.1.10.2 The flyer of the model aircraft does not need to have intended to create a hazard to contravene the hazardous operation rule.
- 3.1.10.3 The following are examples of the types of conduct that may be contravene the hazardous operation rule include:
- flying a model aircraft at speed directly toward a person or their property
 - flying close to another aircraft in a dangerous manner
 - flying in weather unsuitable for the aircraft or operation (refer to 3.2.2 for more information).
- 3.1.10.4 The regulations do not empower CASA to approve a hazardous operation.

3.1.11 Model aircraft flight authorisations

- 3.1.11.1 An application for a model aircraft flight authorisation should be made using the appropriate application form which is available from the [CASA website](#).
- 3.1.11.2 It is recommended that applications are submitted 60 days ahead of the proposed operation date to allow CASA time to process and assess the application.
- 3.1.11.3 When a complete application is received by CASA, the applicant will be given an estimate of the application cost. As a guide, for CASA to process a model aircraft flight authorisation application the cost is typically estimated between \$300 to \$1000. CASA is required to charge at a rate of \$160 per hour to process and assess an application. Upon payment of the estimate, the application will be assigned to a CASA RPAS Inspector for assessment. There may be delays if all the required information is not included when the application is submitted.
- 3.1.11.4 CASA is unable to make any assessment or provide significant advice without first providing an estimate of costs and receiving payment.
- 3.1.11.5 CASA will issue a revised estimate if it becomes evident that the final charges to assess the application will exceed the previous estimate issued. The revised estimate must be paid before assessment can proceed.

3.2 Other considerations

- 3.2.1 When selecting a location to fly, an unobstructed site should be chosen. A model aircraft flyer should keep their aircraft a safe distance from structures (natural and man-made). In addition to the aircraft causing a hazard to property, operating around structures can interfere with VLOS and the control link between controller and aircraft.

⁵ In accordance with section 6 of CASA 22/22

⁶ In accordance with regulation 101.055 of CASR

- 3.2.2 Model aircraft should only be flown in suitable weather. Operating in conditions that are unsuitable, for example, high winds, increases the likelihood that the aircraft becomes a hazard to other people, property or aircraft. Additionally, extreme temperatures can affect the battery life and performance of the aircraft. Model aircraft flyers should refer to their aircraft's manufacturers information for guidance on weather limitations.
- 3.2.3 Local councils and national park authorities may have their own rules in relation to radio-controlled models and drones operating on their land. Local laws should be checked before flying.
- 3.2.4 The following factors also form part of relevant consideration prior to flight:
 - a. incorporation of an appropriate 'fail-safe' mechanism on the aircraft, for example, 'return to home' function for when the control link is lost.
 - b. ensuring that any load, such as a camera, carried on the aircraft is secure.
 - c. aircraft should be thoroughly checked prior to each flying session and after any hard landing. Damage to the aircraft or any of its components may cause the aircraft to become a hazard to other people, property or aircraft.
- 3.2.5 Caution should be taken to avoid flying under or near power lines. If an aircraft is tangled in or has damaged electricity wires, the model aircraft flyer and any by-standers should stay clear, and a call to the electricity supply authority should be made. In the interests of safety, an attempt to 'rescue' the aircraft should never be made, even with a wooden pole or other supposed 'non-conductor' of electricity as under some weather conditions, many materials will conduct high voltage electricity.

4 Commercial activities

4.1 Regulatory requirements

- 4.1.1 A model aircraft is, by definition⁷, one flown for sport or recreation, or for educational, training or research purposes by a school or higher education provider. Refer to AC 101-01 and the CASR Part 101 Plain English Guide for Micro and Excluded RPA Operations if you are considering flying uncrewed aircraft for other purposes.
- 4.1.2 Learning to fly model aircraft or providing instruction do not require a CASA authorisation where there is no financial reward.
- 4.1.3 A person conducting commercial activities must do so in accordance with the rules applicable to Remotely Piloted Aircraft (RPA) and must either have a Remote Pilot Licence (RePL) and an operating certificate issued by CASA or qualify to operate under the 'Excluded RPA' provisions. The requirements for obtaining a Remotely Piloted Aircraft Operating Certificate (ReOC) and RePL are contained in subpart 101.F of CASR, the Part 101 MOS and with guidance published in AC 101-01.

⁷ In accordance with regulation 101.023 of CASR.

Appendix A

Radio-controlled models (general)

A.1 Learning to fly radio-controlled models

A.1.1 Local model flying clubs

A.1.1.1 Local model flying clubs can provide a great opportunity to learn to fly in a dedicated space with other model aircraft enthusiasts and flyers. There are numerous model flying clubs throughout Australia and most offer training in radio-controlled flying to beginners in the sport.

A.1.1.2 Details of local clubs can be obtained from local model shops, or online.

A.1.2 Learning to fly without a model flying club

A.1.2.1 If there are no local clubs in your area, an experienced model flyer may be of assistance. Alternatively, many models are available in computer simulator programs, but this is no substitute for face-to-face training.

A.1.2.2 Appendix B provides basic advice on radio-controlled helicopter flying and should be read in conjunction with this appendix.

A.1.3 Professional model flying training

A.1.3.1 There are a number of organisations and individuals which offer commercial model flying training.

A.1.3.2 Details of these organisations are listed in specialist model flying magazines or can be obtained from local model aircraft supply shops and model flying associations.

A.2 General

A.2.1 **In addition to flying** with regard to the general regulations covered in Chapter 3, the following guidance is provided to flyers of radio-controlled models:

- Spotters are recommended to assist with surveillance of people and aircraft entering the area.
- Sites should be selected which are of a suitable size in relation to the type of manoeuvres to be flown by the model.
- Only fly after it has been ensured that any spectators are well clear of the intended flight path of the model.
- All radio-controlled models are subject to in-flight vibration, landing knocks, transport damage etc. It should be ensured that receivers and batteries are well protected, servos are fixed securely, control linkages (pushrods, snakes, closed loop etc) are robust enough for their purpose, are properly supported where necessary and are as free as possible from damage and that all control surface hinges and horns are fitted correctly.
- It is recommended that soldered connections re-chargeable battery packs are used in radio control equipment. Dry batteries may be adequate for use in transmitters but their use in airborne battery packs is not recommended.
- With new or repaired radio control equipment, a ground range check should be performed, preferably with the equipment installed in a model. With the majority of radio equipment look

for a minimum ground range of around 50 and the model's controls still functioning correctly with no vibration.

- It is also good practice to carry out a ground range check on your radio equipment at regular intervals, at least every few months, and a check is advisable if the equipment has not been used for a month or two.
- When starting an engine, the model should be restrained so it cannot move forward. It is recommended to use a chicken stick or electric starter for IC engine aircraft, to reduce the likelihood of fingers or other apparel coming into contact with the propeller.
- When preparing for a flight, a check should be done to ensure that transmitter trims, rate switches etc. are in their correct positions and that each control surface on the model moves freely and in the correct sense. Further, it should be checked that the correct model has been selected in the transmitter.
- Immediately before take-off, flight controls should be checked again for full, free and correct movement under full power if applicable. If there are any doubts as to their operation, do not fly.
- Familiarisation with the flying area is advised, noting where the no-fly areas are. These can include overflights of the pits and spectator areas. Also, any access driveways or footpaths in the area should be noted. These may be unrestricted public use facilities.
- Before take-off, the ground and sky should be checked to ensure they are clear. The model should never take off or land towards other pilots, spectators or the 'pits' area.
- The flyer should maintain a clear view of the model and allow plenty of room between the flight path and spectators, other flyers or model 'pit' areas. Flying the aircraft between the flyer and spectator or 'pit' areas should be avoided, especially when landing.
- It's important for the flyer to announce their intentions, especially when landing or taking off. Other model aircraft pilots should be alerted that a model is either taking off or landing by verbal means. This will ensure that the landing area and take-off path can remain clear and safe to use.
- Model aircraft must not be flown over populous areas, such as houses, domestic gardens, car parks, traffic or spectators. Care should be taken to not overfly people, who may walk by at a reasonable distance from the take-off/landing area.
- At any sign of malfunction or an unexpected loss of the model's parts, the model should be landed as soon as it is safe to do so.
- When the decision to land is made, it should never be assumed that the landing area is clear. Flyers should always look and be prepared to land in an alternative safe place away from the planned landing area if necessary. In all cases, the safety of people is paramount.

A.3 Pre-flying session checks

A.3.1 On arrival at the flying site, the following should be checked:

- the airframe and power source for any transit damage.
- that servos, linkages and any hatches are secure.
- the undercarriage for secure fixing and correct alignment.
- the propeller for damage and secure fixing
- that control surfaces are secure and move freely.
- the engine is securely attached to the airframe.

A.3.2 Check before each flight

A.3.2.1 Before flying, the following checks should occur:

- If frequency control is in operation, obtain clearance to transmit.
- Switch transmitter ON, then receiver ON. Check that all controls operate freely and in the correct sense. Check that all control surfaces are in their correct positions with the transmitter trims at neutral.
- Look for any minor radio malfunctions such as slow or 'jittery' servos, glitches etc. If in doubt, do not fly.
- After starting a liquid-fuelled engine, allow it to warm up, check that the pick-up from idle to full power is satisfactory. Hold the model with its nose pointing upwards at a steep climbing angle for ten or fifteen seconds and check engine operation at full power. If an engine falters or cuts it is usually set too lean and must be re-tuned. Repeat the test until the engine runs correctly in the nose-up attitude.
- With the aircraft held securely on the ground, open up again to full power and recheck all flying controls again.
- Double check that all transmitter trims, rate switches, mixers etc. are in their correct positions and that the transmitter meter is 'in the green'.

A.3.3 Before flying

A.3.3.1 Be S.M.A.R.T. with the transmitter:

- Switch on
- Meter in the green (battery indicator level)
- Aerial secure
- Rate switches in all correct positions
- Trims all in correct position.

A.3.4 Checks after each flight

A.3.4.1 After each flight, the following checks should occur:

- Receiver OFF then transmitter OFF.
- Clear the frequency control system if it is in operation.
- Check propeller, airframe, undercarriage, wing fixing etc. for security of fastening and for possible flight or landing damage.

A.3.4.2 Remember – avoid flying with a damaged aircraft or propeller, or with any possible radio problem.

A.4 Finding model aircraft operating areas

A.4.1 Operation of model aircraft flying below 400 ft AGL is possible in most areas of Australia provided that the model is kept away from areas where crewed operations occur at low altitudes, for example, aerodromes, emergency operations, and populous areas.

A.4.2 Operators of all uncrewed aircraft, including models, are required to obtain permission before flying a model above 400 ft AGL unless operating under a specific CASA authorisation for this purpose. Such flights should generally be conducted in an ongoing approved area, for example, model aircraft club grounds, but one-off permissions for specific events may be issued by CASA.

- A.4.3 While this means that a model aircraft may be flown above 400 ft AGL in certain circumstances, there are advantages in seeking approval for a permanent model aircraft operating area. Publication of the details of a model aircraft operating area means that other users of airspace will be advised where there is potential for conflict with model aircraft. It is recommended for flyers to fly at these sites rather than applying for individual permissions.
- A.4.4 A written permission for the use of a site may have conditions, such as a height limit and times of use. There may also be a requirement to notify air traffic control when the site is actually being used. There are many sites already established for this purpose.

Appendix B

Radio-controlled helicopters

B.1 General

- B.1.1 In addition to flying with regard to the general regulations concerning radio-controlled flying covered in Chapter 3 of this AC and Appendix A, the following is recommended for flyers of radio-controlled helicopters:
- When starting an engine-driven model in the pits, hold the rotor head firmly. When the engine is running carry the model a sensible distance from other people before running up or flying.
 - Do not release the rotor of the model until you are sure that it is safe to do so.
 - Never hold the model overhead to run up the engine or run the engine with no rotor blades fitted.
 - Rotor blades should be carefully balanced before use.
- B.1.2 A model helicopter should not be flown or run up:
- In or near the 'pits' area or close to any spectators.
 - Except as part of a manoeuvre well away from other people, they are not to be flown directly towards the pits area or any spectators.
 - With knife-sharp leading edges on main or tail rotors.
 - With damaged or out of balance rotor blades.
 - With radio in good condition and as per manufacturers guidelines.
- B.1.3 Checks before a flying session
- Check all ball links for slop and change as necessary.
 - Check that all rotor blades are in good condition with no damage.
 - Check for loose or missing nuts and bolts.
 - Check that there is no backlash in the drive system apart from gear backlash which should not be excessive.
 - Check that servos are secure.
 - Check that the fuel tank (if fitted), fuel line and all piping is secure and in good condition.
 - Check that the receiver aerial is secure and in good condition with no chafing or damage
 - Check that batteries are properly charged and not damaged.
- B.1.4 Checks before each flight
- If a helicopter suffers damage or a heavy landing, re-do all the pre-flying session checks.
 - Check all controls before starting especially for binding links or slowing of servos.
 - Check that the receiver aerial cannot become entangled with any moving or rotating part.
 - Re-check controls at high rotor rpm just after take-off. At the same time check main rotor blades for true tracking (the rotor disk should be clear and steady). Any excessive vibration should be eliminated before landing, and ensure gyro is operating correctly.

- Double check that all switches on the transmitter are in their correct positions before **EVERY** flight.

Appendix C

Radio-controlled silent flight (gliders and electric-powered models)

C.1 General

- C.1.1 Flying radio-controlled gliders and electrically powered models are essentially safe pastimes provided a few basic safety precautions are taken.
- C.1.2 Passers-by and others who may be watching the flying, particularly at slope soaring sites, tend to be unaware of the presence of gliders because gliders do not have engines or propellers and so do not make a noise. The flyer must, exercise even greater caution and awareness when flying on sites where the public are likely to be present.
- C.1.3 Before you even buy a model, local club members will be happy to advise on the best type of model to build and fly. They can advise on finishing the model and, most importantly, they can 'trim' the model for you so that it will fly safely.

C.2 Flying the glider

C.2.1 Launching

- C.2.1.1 When using a towline or bungee to fly from a flat field, always ensure that no other model is endangered by checking above and behind before releasing the model. Models landing always have priority over models launching.
- C.2.1.2 Ensure that any spectators are standing behind the launch point so that if the model veers to either side, the spectators are not at risk.
- C.2.1.3 When setting out the bungee or towline, make sure that, when it disengages from the model, it will not fall across powerlines, or adjacent roads or pathways where passing vehicles or pedestrians could become entangled.
- C.2.1.4 Check the proper operation of the radio and the movable surfaces of the model before any launch. A previous hard landing may have caused some unseen damage. Such a check will safeguard your model and will also minimise the risk to bystanders, nearby property and vehicles.
- C.2.1.5 If in doubt, do not fly.

C.2.2 Flying

- C.2.2.1 When learning to fly, try to keep the model upwind and leave yourself with plenty of altitude to make a proper landing approach.
- C.2.2.2 Avoid flying the model directly into or across the sun; the glare may cause you to lose sight of the model and effective control may be lost. Good sunglasses can minimise this problem and also protect your eyes.
- C.2.2.3 Do not let the model fly too far downwind. The smaller the model appears, the more difficult it is to fly, and orientation becomes more of a problem. Know the limitations of your eyesight and always fly within 'easy' visual range.

C.2.3 Landing

- C.2.3.1 Before launching, select your landing area. This should be free of obstructions on the approach, which should always be into wind so as to reduce the speed of the model over the ground.
- C.2.3.2 Try to stay away from trees, buildings and other structures which may cause turbulence, making the model difficult to control.
- C.2.3.3 Be particularly vigilant for bystanders – especially children – who may be unaware of the presence of the model as it lands.

C.3 Electric-powered models

- C.3.1 For electrically powered models, all the safe operating conditions described in Appendix A of this AC apply. In addition:
- When fast charging batteries, use a battery charger equipped with either a timer or a voltage or temperature-controlled cut-off. Overcharging batteries at high currents can be dangerous. Lithium-Polymer (LiPo) batteries can be very dangerous if they are not treated with care. A hard-landing or crash may render a battery unsafe. Do not store damaged batteries.
 - Ensure batteries are fully discharged before recycling them.
 - Burial in sand is a good way to extinguish a LiPo battery fire. Do **NOT** use water or salt water.
 - Lithium batteries/cells require a special charger, or they may catch fire/explode. Do not fly with unsafe batteries. This includes puffed and damaged cells.
 - It is recommended that LiPo batteries are kept balanced and not over-discharged.
 - LiPo battery-powered model aircraft should not be flown during periods of total fire bans.
 - Ensure that the 'bind' sequence has been completed and the model responds to all intended commands.
 - If the receiver has a programmable 'fail-safe', ensure that the throttle is set to 'stop'.
 - Check carefully that motor operation does not interfere with the radio control equipment in the model. A range check with the motor on and off should be carried out with all new installations. If in doubt, do not fly.
 - Current flows in the battery-controller-motor setup of electric-powered models can be extremely high. Make sure that all cables and connectors are in good order and are robust enough to perform without overheating.
 - Take great care when handling any electric-powered model that has its batteries fitted. The power and torque of electric motors can be very high, and contact between a turning propeller and any obstruction will not stop the motor but will just make it try to turn harder.
 - If possible use a speed controller or transmitter that incorporates a 'safety circuit' that will not allow the motor to start unless the throttle has been brought back to the 'stop' position.
 - Disconnect your power pack as soon as possible after you have finished flying.
 - Do not leave you model 'armed' if unattended.

Appendix D

Gas turbine-powered model aircraft

D.1 Introduction

- D.1.1 Safety in the operation of any model aircraft is paramount, and even more so when using a turbine engine for propulsion. A turbine powered model aircraft is a very complicated and technical piece of equipment and is not recommended for a beginner to model aviation.
- D.1.2 Aircraft powered by gas turbine engines can be very dangerous in the hands of inexperienced operators and without specific safety precautions being in place. The engines operate at very high speed, over 240,000 revolutions per minute, and at very high internal temperatures. It is imperative that the builder has a very good working knowledge of the operation the engine being used. The airframe has to be built to a very high standard and this requires the builder being conversant with the use of materials such as composites, epoxy and polyester resins.
- D.1.3 In addition, the aircraft are generally capable of flying at speeds up to 400 km per hour and are extremely agile. The high speed and high kinetic energy of turbine powered model aircraft require corresponding anticipation and skill to prevent the model exceeding altitude limits or infringing safety zones. The level of competence required to enable someone to fly a turbine powered aircraft is very high.
- D.1.4 The operation of gas turbine-powered aircraft can be dangerous for both the operators and the public.
- D.1.5 It is strongly recommended that a model aviation organisation with comprehensive safety precautions be contacted in order for the flyer to be trained in the requirements. The model and the operating and flying ability of the flyer will almost certainly be checked before being allowed to fly.

D.1.6 General

- D.1.6.1 In addition to the provisions in Appendix A, the following safety provisions should be observed when operating gas turbine powered model aircraft:
- Engine(s) should be in standard production configuration with no modifications other than those tested, documented, and approved in writing by the manufacturer.
 - Engines should be operated in accordance with the manufacturer's operating guidelines at all times.
 - Only fuels such as kerosene, propane, dieseline, Jet A and gasoline should be used.
 - Tailpipes should be directed away from other personnel and public.
 - A fire extinguisher should be present during all operations.
 - Gas turbine-powered model aircraft should not be flown during periods of total fire bans.
 - Refuelling areas should be established well clear of people and operating aircraft.
 - Any engine involved in a crash should not be operated until inspected by the manufacturer or approved service centre, prior to operating and flying again.

D.1.7 Aircraft

- D.1.7.1 In addition to standard engine fuel control, a fail-safe FUEL SHUTOFF VALVE should be installed for remote operation by the pilot.

- D.1.7.2 Wheel brakes should be fitted if the aircraft cannot remain at rest without external restraint when the engine is at idle speed.

Appendix E

Giant model aircraft over 25 kg

E.1 Regulatory requirements

- E.1.1 Model aircraft, including both remote-controlled models and drones, weighing more than 25 kg but not more than 150 kg are termed 'giant model aircraft' and are subject to all of the safety rules of Part 101 of CASR.
- E.1.2 A giant model aircraft can only be operated under the rules and procedures of a model aircraft organisation that holds a CASA approval for this purpose, or with CASA approval. More information about the process to apply for a CASA approval or authorisation can be found in Section 3.1.48 of this AC.
- E.1.3 Model aircraft that weigh more than 150 kg are large RPA and require the operator to hold a RePL and ReOC. Refer to AC 101.01 for more information on large RPA.

E.2 Design and build advice and inspection

- E.2.1 A model aircraft organisation may be able to advise on the availability of a member in the builder's area who will be able to supervise and assist with the project.
- E.2.2 The assisting member will confirm satisfactory design and build standards, it is particularly important to build to a schedule if the construction does not readily allow access to all parts of the model for a final inspection, such as box sections.
- E.2.3 Assistance and advice may be subject to membership of an appropriate association.
- E.2.4 Any special operating conditions applicable to the model can also be recommended at this stage.

Appendix F

Free-flight and control line models

F.1 Free-flight models

F.1.1 A free-flight model is a model aircraft that has no active means of control after launch.

F.1.2 In addition to relevant considerations outlined in Appendix A, only fly:

- On sites that are clear and open with adequate open space downwind of the launch point (with a strong wind this distance could be considerable).
- In good visibility.
- After you have ensured that any spectators are clear of the intended flight path of the model.
- With due consideration for other people and property.

F.2 Control line models

F.2.1 Control line models are model aircraft that are controlled by one or more cables or wires, connected from the aircraft to a handle held by the flyer. A control line model aircraft is limited to flying in a circle by the cables or wires.

F.2.2 In addition to relevant considerations outlined in Appendix A, only fly:

- Only fly on sites that are **WELL CLEAR OF ANY OVERHEAD CABLES**. Even low-level electrical cables on wooden poles carry **LETHAL** voltages. **KEEP CLEAR!**
- Take care that the site you choose is clear and open and of a size suitable for the flying of control line models.
- Do not fly until you have ensured that any spectators are well clear of the intended flight path of the model.
- Before each flying session check that all controls, control lines, linkages etc. are in good condition and safe to use.
- Before each flight, re-check control lines for damage.
- If someone strays into the circle while you are flying, fly high to avoid them and stay high until the circle has been cleared.

Appendix G

Model displays

G.1 General

- G.1.1 This section provides general guidance for planning and organising a model flying display. As the size and nature of such events varies considerably it is only possible to incorporate in this publication general pointers in terms of safety and control. It is recommended that groups contemplating holding a model flying display should also refer to regulation 101.410 of CASR.
- G.1.2 A model flying display may also be conducted if it is held in an approved area and in accordance with the relevant procedures of a model aircraft organisation that holds a CASA approval for this purpose.
- G.1.3 Model displays that do not meet the conditions above must apply for CASA approval in accordance with subregulation 101.410 (3) of CASR This includes giving CASA at least 21 days' notice of the intended model display. Refer to Section 3.1.48 of this AC for more information on model aircraft flight authorisations.

G.1.4 Display guidance

- G.1.4.1 All organisers of model flying displays should consider the following guidance.

G.1.5 Organisation

- G.1.5.1 It is essential that any group contemplating holding a model flying display appoint the following:
- An Events Director, who will assume overall responsibility for the planning, organisation and subsequent running of the event.
 - A Flight Line Director who will assist in the planning of the flying, the briefing of pilots and who will take full control of all flying activities.
- G.1.5.2 The organisers should:
- Determine whether the site permits the separation distances that will be required for the type(s) of model that are to be flown or, if not, whether CASA would allow an exception to be made in this instance.
 - Ensure that arrangements are made for:
 - spectator control or, in the case of an event at which model flying is part of a larger function, the siting of the model flying area in relation to spectator enclosures, car parks etc.
 - verification of the competence of all pilots taking part in the display
 - effective transmitter control and frequency monitoring facilities in the case of radio control flying
 - airworthiness and safety checking of all model aircraft and equipment to be used in the display
 - verification of third-party public liability insurance covering individual flyers, any model flying clubs involved in the display and the display organisers
 - liaison with the police and local authorities if required or, in the case where model flying is part of a larger function, written notification to the function organisers of any special requirements.

G.1.6 Flight line Director

G.1.6.1 The Flight Line Director is responsible for the flight safety of the display and must exercise authority over all flying matters. They must not hesitate to discipline pilots if necessary and they have the final say on all matters on the flight line.

G.1.7 Radio control display sites

- G.1.7.1 The area should be suitable for the type and speed of the aircraft used. For example, a firm surface or mown grass area for take-off and landing of recommended minimum size 100 x 40 m should be available, with the 100 m direction substantially into wind.
- G.1.7.2 It is recommended that safety zones should be established for a minimum of 150 m both upwind and downwind of the take-off and landing area and that there should be no spectators, moving vehicles or other obstructions within these safety zones.
- G.1.7.3 The site should be positioned so that flying may generally take place without car parks or spectator areas being overflown.
- G.1.7.4 Spectators should be behind a barrier located parallel to the take-off and landing direction. They should be only on one side of the flying area for radio-controlled aircraft. In no circumstances should take-off and landing be performed towards spectator or nearby car park areas.
- G.1.7.5 The distance of models from spectators should not be less than 30 m for all operations including take-off or landing. Refer to figure 1.

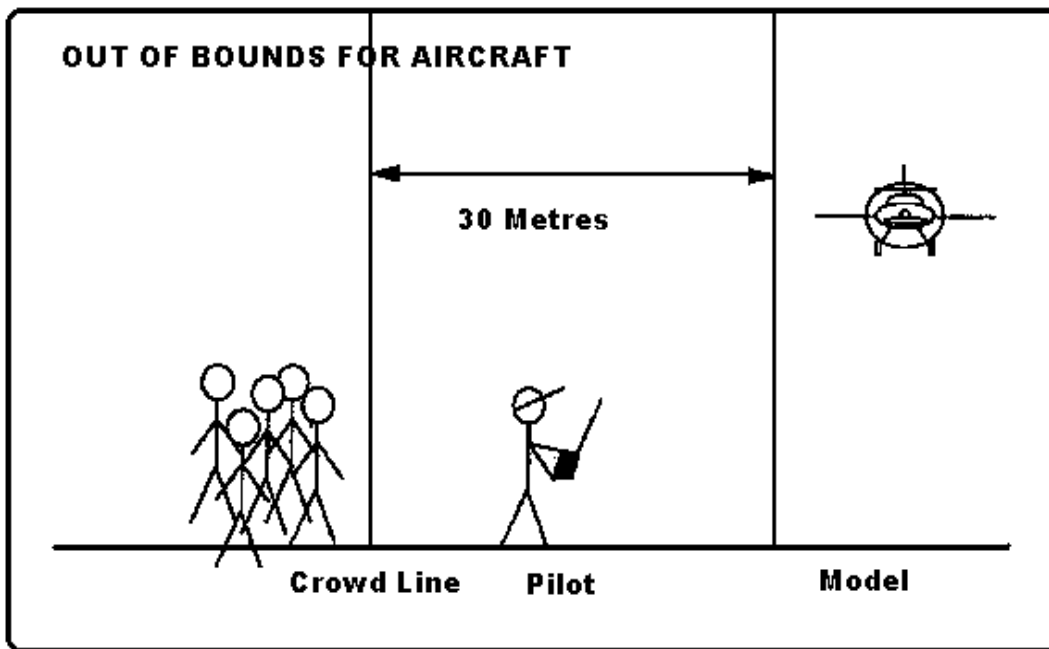


Figure 1. 30 metre measurement from spectators

G.1.8 Site layout

G.1.8.1 The layout depicted in Figure 2 is a standard type which may have to be modified slightly depending upon site conditions and the number of spectators expected. Areas should be allocated for the flight lines, pits, start-up positions and pilots' box, with safety being the prime consideration.

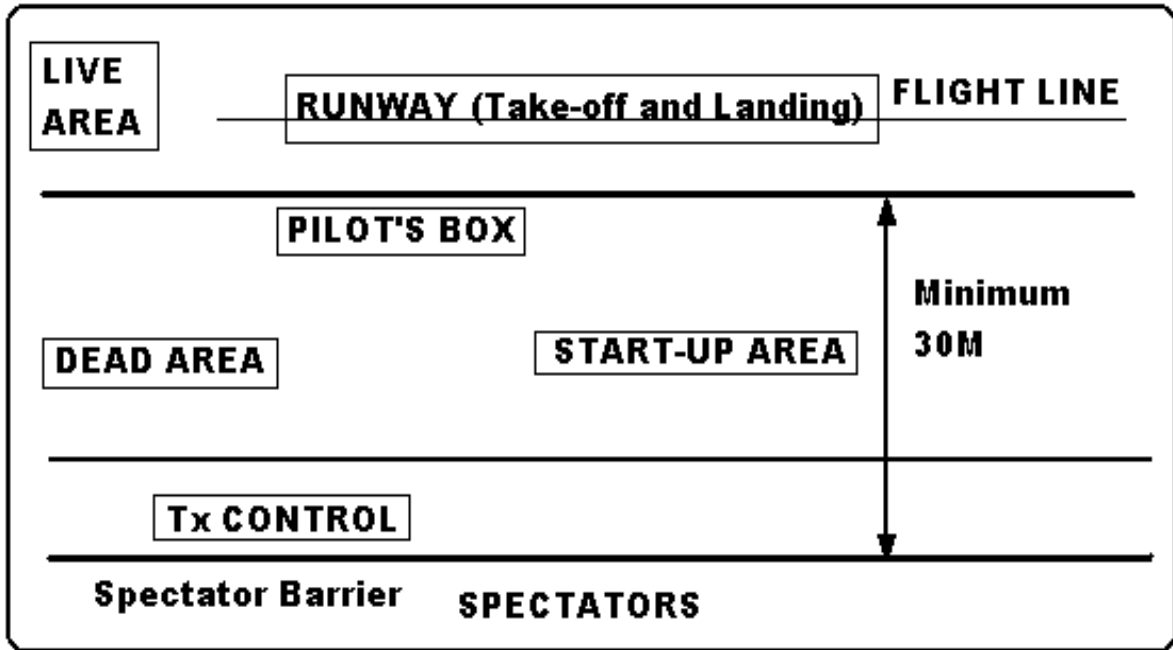


Figure 2. Standard site layout

G.1.9 Model flying at crewed aircraft displays

G.1.9.1 Any model flying at a crewed air display is subject to the display organiser's directions.

Appendix H

Part 101 MOS approach and departure paths for aerodromes

H.1 Controlled aerodrome no-fly zone and approach and departure paths

- H.1.1 Figure 3 shows the approach and departure paths of a controlled aerodrome. A model aircraft may be flown in the grey shaded areas only with prior approval from CASA.
- H.1.2 These are strict limits and suitable buffers should be used to ensure the model aircraft does not enter the restricted airspace zones. The restrictions apply to each runway of the aerodrome, including any, and each, cross runway.
- H.1.3 Model aircraft flyers may operate in the black area and above 45 m (150 ft) (based on the aerodrome elevation) in the grey area provided they hold, and comply with, a CASA approval for this purpose (CASA co-ordinates with air traffic services).
- H.1.4 Near the extremes of the approach and departure paths the model aircraft must remain below 300ft until more than 8.5 km (~4.5 NM) from the runway threshold to ensure separation with aerodrome traffic. Outside these areas, the general 120 m (400 ft) limit applies.
- H.1.5 Model aircraft that weigh not more than 250 grams may be operated in the grey area up to 45 m (150 ft), provided they do not operate within the aerodrome boundary.

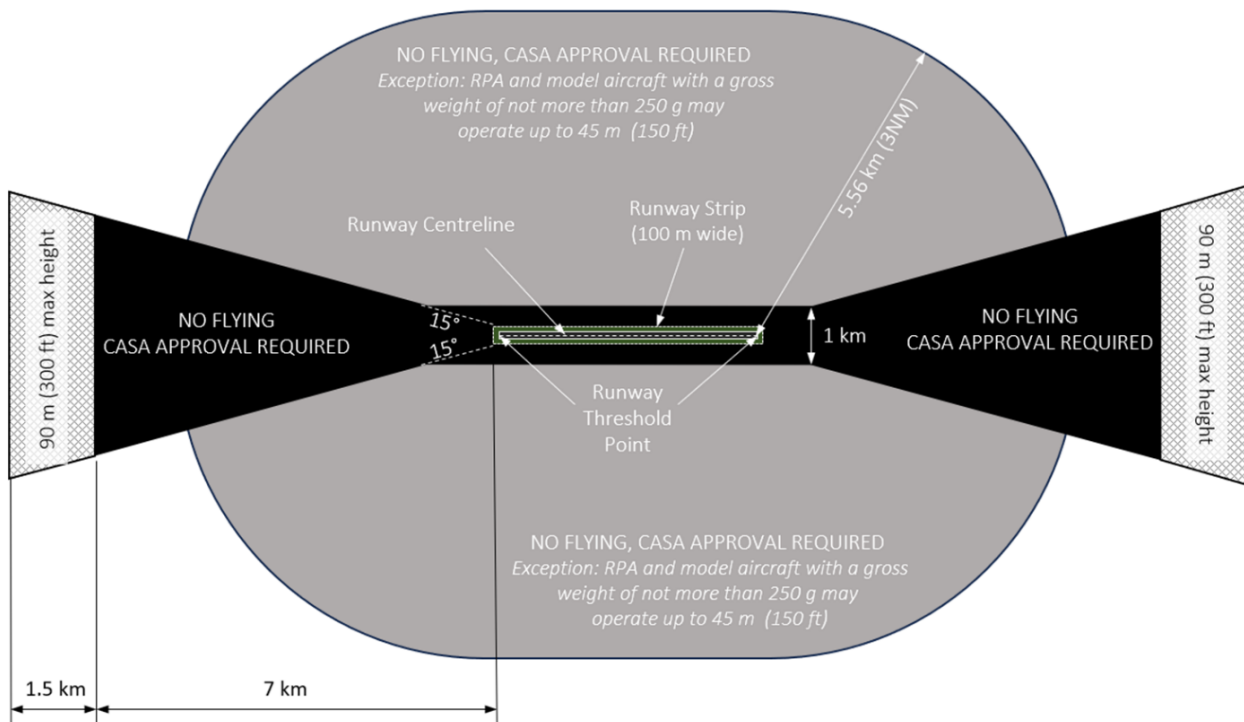


Figure 3. Controlled aerodromes approach and departure paths

H.1.6 Multiple or cross runways

H.1.6.1 Figure 4 depicts the application of the no-fly and restricted height zones for multiple or cross runways.

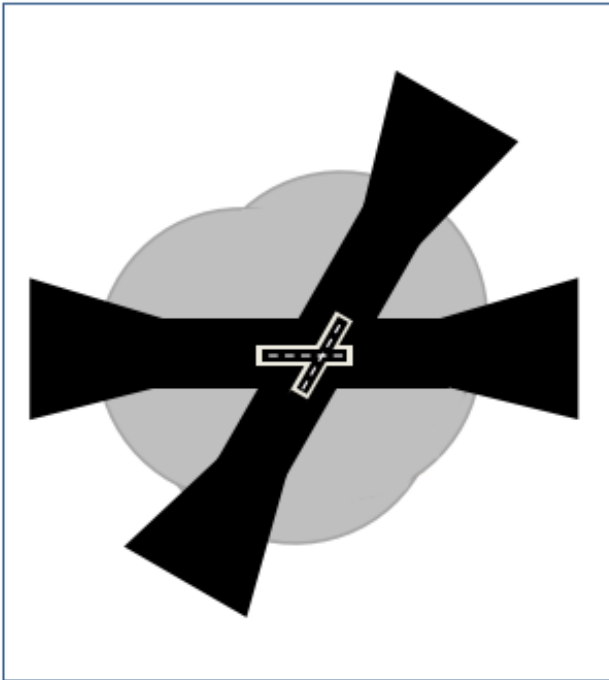


Figure 4. Example of cross runways

H.1.7 Non-controlled aerodrome no-fly zone and approach and departure paths

- H.1.7.1 Figure 5 shows the approach and departure paths of a non-controlled aerodrome. A model aircraft can be flown in the grey and black shaded areas only if the flight or operation does not occur during a relevant event.
- H.1.7.2 If the model aircraft flyer becomes aware that a relevant event is occurring, or is about to occur, the model aircraft must not be launched. If the model aircraft is already airborne, the flyer must safely manoeuvre the model aircraft away from the path of the crewed aircraft and land the model aircraft as soon as safely possible.
- H.1.7.3 A model aircraft may be flown in the black or grey shaded areas during a relevant event if the model aircraft is flown exclusively indoors, or if the model aircraft flyer holds a CASA-issued approval.

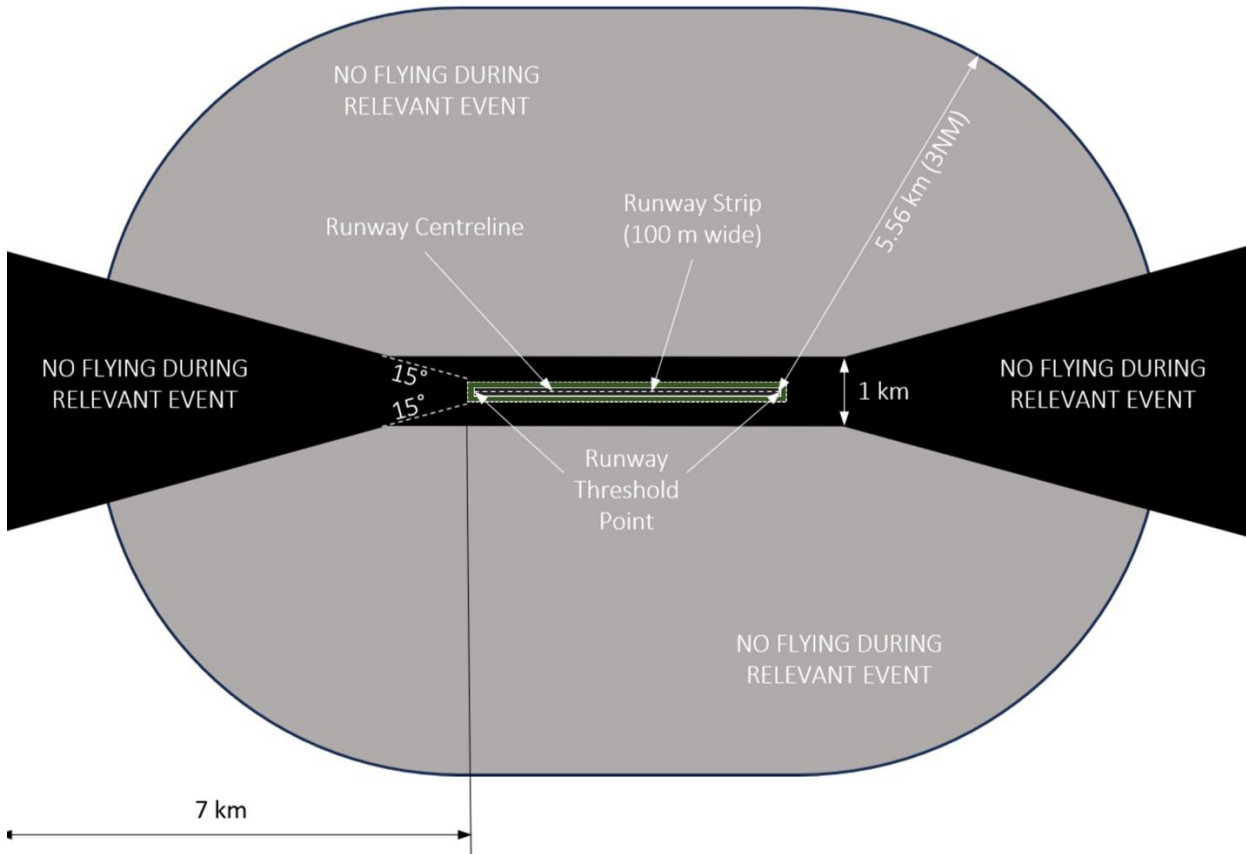


Figure 5. Non-controlled aerodromes approach and departure paths

H.1.8 Multiple or cross runways

H.1.8.1 Figure 6 depicts the application of the no-fly zones for multiple or cross runways.

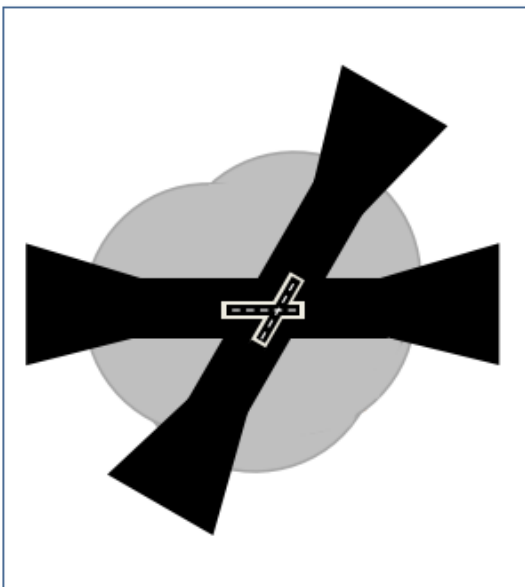


Figure 6. Example of cross runways

H.1.9 Helicopter landing site no-fly zones

- H.1.9.1 Figure 7 depicts the no-fly zone of an HLS.
- H.1.9.2 If the model aircraft flyer becomes aware that a relevant event is occurring, or is about to occur, the model aircraft must not be launched. If the model aircraft is already airborne, the model aircraft flyer must safely manoeuvre the model aircraft away from the path of the crewed aircraft and land the model aircraft as soon as safely possible.
- H.1.9.3 A model aircraft may be flown in the grey shaded area during a relevant event if the RPA operation is exclusively indoors, or if the model aircraft flyer holds a CASA-issued approval.

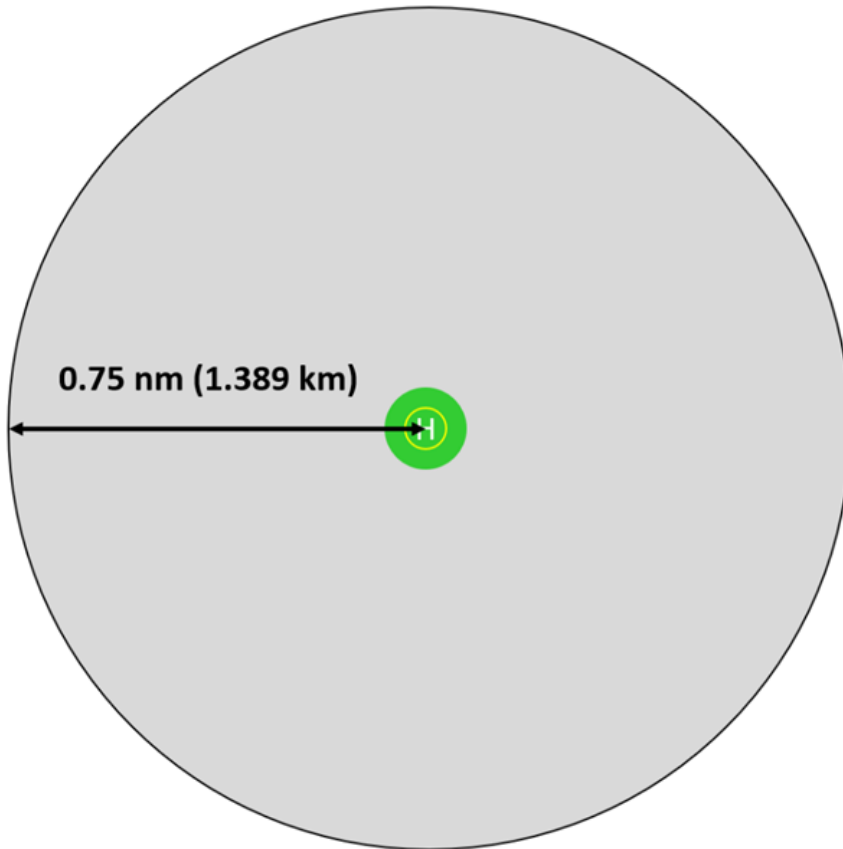


Figure 7. HLS no-fly zone