OPERATIONAL RULES

6. Classification of operation

Aircraft to be flown under the VFR or IFR (91.270)

An aircraft may only be flown under either the visual flight rules (VFR) or the instrument flight rules (IFR).

A Part 103 aircraft may only be flown by day under the VFR.

A Part 131 aircraft may only be flown under the VFR.

All flights – airspeed limits (91.090)

You must fly an aircraft within the airspeed limits provided in the MOS 4.02.

Flight to be within indicated airspeed limits (MOS 4.02)

Unless it is required for aviation safety, you must not exceed the speed limits set out in the following Table.

Note: Other sections in the MOS prescribe certain airspeed requirements in addition to the table below.

Table 8: Airspeed limits – all flights

Class of airspace	Flight rules	Maximum indicated airspeed
Class C	VFR	Below 10,000 ft above mean sea level (AMSL) – 250 knots
Class D	IFR or VFR	250 knots, or 200 knots if at or below 2,500 ft above aerodrome elevation within 4 NM of the primary aerodrome in that airspace
Class G or E	IFR or VFR	below 10,000 ft AMSL – 250 knots

You must advise air traffic control (ATC) if you cannot comply with an ATC speed instruction or you cannot meet an arrival or departure speed constraint; or you cannot operate within the airspeed limits tabled above.

VFR flights – aircraft not to exceed certain speeds (91.283)

You must not fly an aircraft operating under the VFR at a transonic or supersonic speed.

VFR flights – compliance with VMC criteria (91.280)

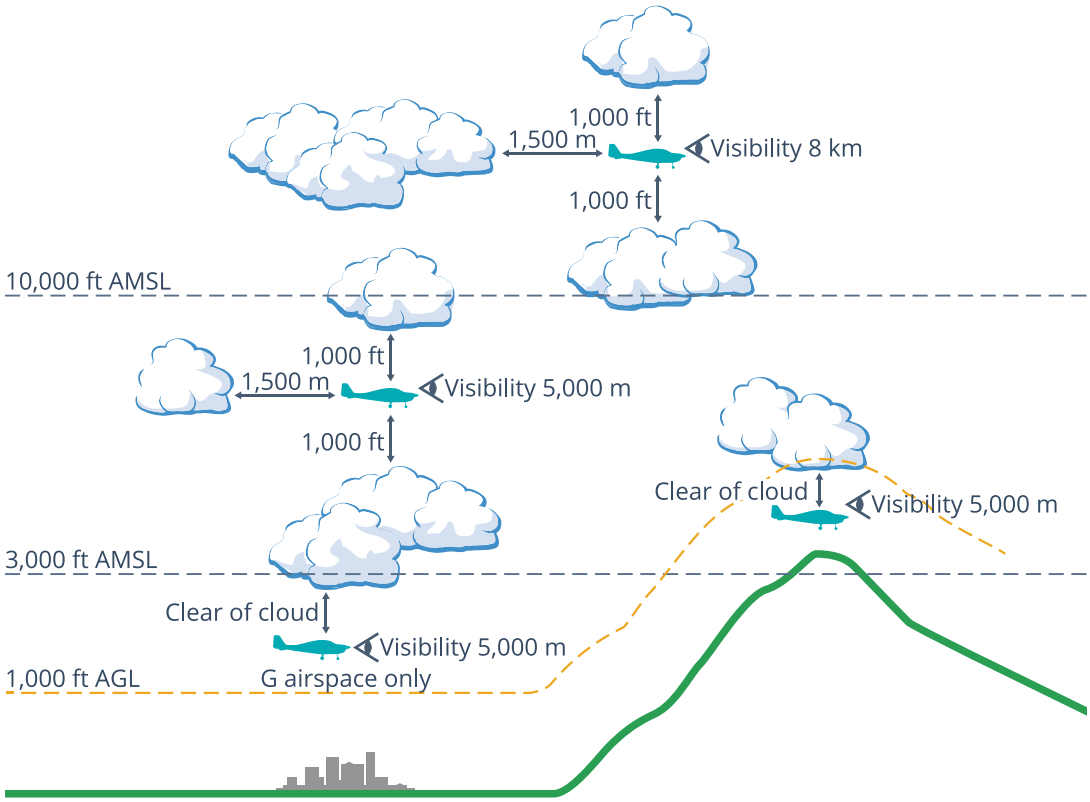
You may only fly an aircraft under the VFR in accordance with the VMC criteria for the aircraft and airspace in which you are flying.

> **Exception:** *This requirement does not apply if you have a clearance from air traffic control (ATC) to conduct the flight under the special VFR and you comply with the special VFR.*

VMC Criteria (MOS 2.07)

VMC criteria means, the meteorological conditions expressed in terms of flight visibility and the horizontal and vertical distance from cloud. See Figures 3, 4 & 5 for the application of VMC criteria in various airspace classifications.

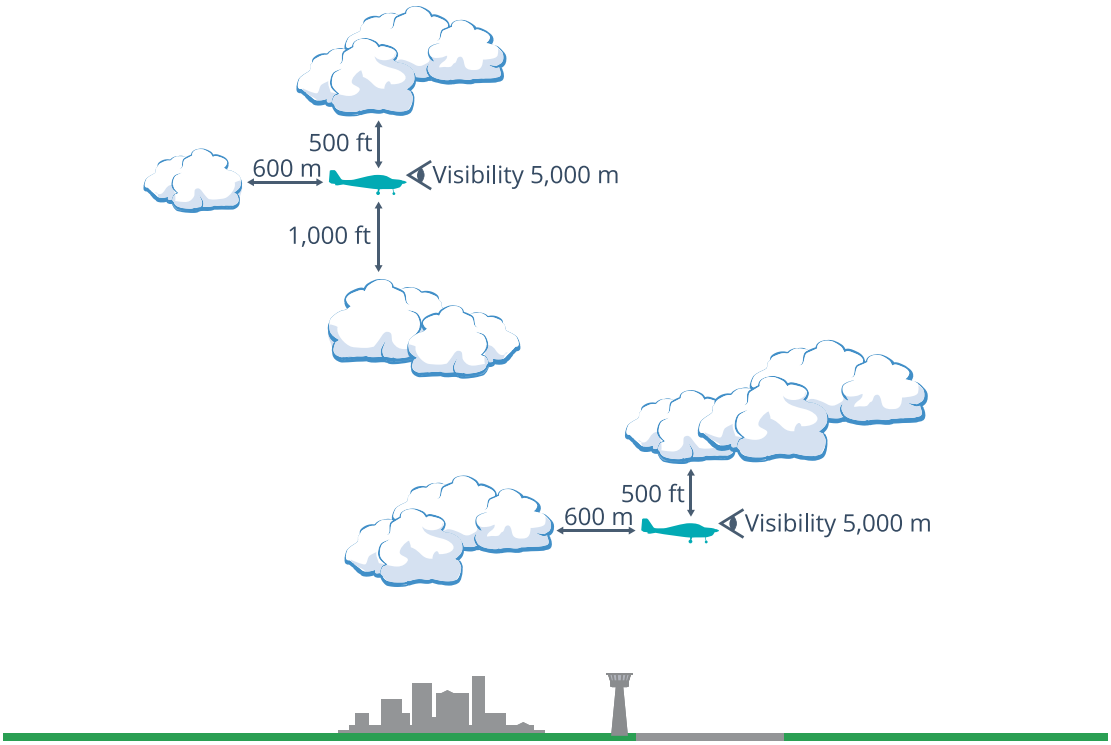
Figure 3: VMC criteria all aircraft Class A, B, C, E and G (MOS Table 2.07)



Class of airspace	Height	Flight visibility	Distance from cloud	Operational requirements
A, B , C, E or G	At or above 10,000 ft AMSL	8,000 m (8 km)	1,500 m horizontal 1,000 ft vertical	
A, B, C, E or G	Below 10,000 ft AMSL	5,000 m (5 km)	1,500 m horizontal 1,000 ft vertical	
G	At or below whichever is the higher of: › 3,000 ft AMSL › 1,000 ft AGL	5,000 m (5 km)	Clear of cloud	In sight of ground or water Radio must be carried and used on appropriate frequency (MOS 26.18)

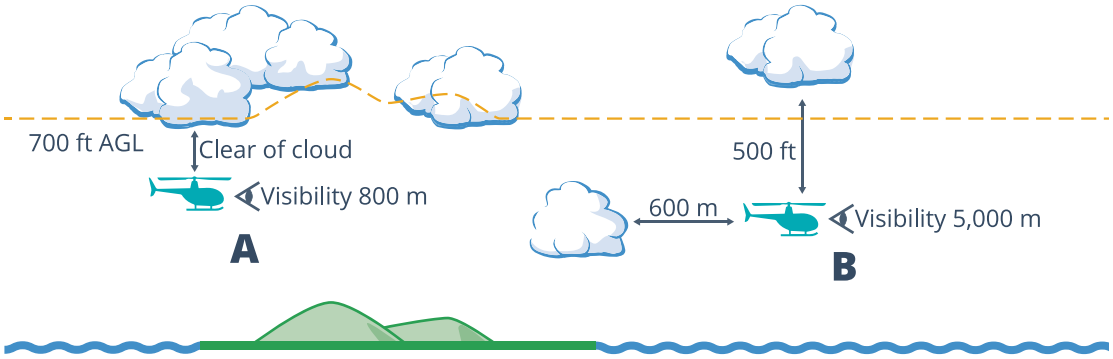
For VMC criteria limitations and conditions that apply to NVIS flights (91.085) see Chapter 18 of this guide and appendix B.

Figure 4: VMC criteria all aircraft for Class D controlled airspace (MOS Table 2.07)



Class of airspace	Height	Flight visibility	Distance from cloud	Operational requirements
D	All heights	5,000 m (5 km)	600 m horizontal 1,000 ft vertical above cloud 500 ft vertical below cloud	

Figure 5: VMC criteria for rotorcraft in Class G uncontrolled airspace (MOS Table 2.07)



A. Overland with/without track guidance or overwater with track guidance from navigation system.

B. Overwater without track guidance from navigation system.

Class of airspace	Height	Flight visibility	Distance from cloud	Operational requirements
G	Rotorcraft A Below 700 ft over land Below 700 ft over water with track guidance from navigation system	800 m	Clear of cloud	Applicable only if the rotorcraft is operated: › by day › at a speed that allows the pilot to see obstructions or other traffic in sufficient time to avoid collision, and › if within 10 NM of an aerodrome with an instrument approach, in a way that ensures the flight maintains separation of at least 500 ft vertically from any aircraft flying under the IFR that is also within 10 NM of the aerodrome.
	Rotorcraft B Below 700 ft over water without track guidance from navigation system	5,000 (5 km)	600 m horizontal and 500 ft vertical	

Special VFR (MOS 2.01)

By day only, on request, ATC may issue you with a 'special VFR clearance' that will allow you to fly below the VMC criteria provided:

› you keep clear of cloud

› the flight visibility is at least:

» for an aeroplane – 1,600 m

» for a rotorcraft – 800 m and you operate at a speed that allows you to see obstructions or other traffic in sufficient time to avoid a collision.

VFR flights – flights in Class A airspace (91.285)

You must not fly under the VFR in Class A airspace unless you hold an approval.

Under the ICAO airspace classification, Class A airspace is designed for the traffic management of aircraft flying under the IFR only. However, there are occasions where the pilot of an aircraft flying under the VFR may wish to fly in Class A airspace; therefore, the regulation allows for an approval in limited or certain circumstances. For example, gliders may be approved to fly in Class A airspace in special circumstances.

7. Rules to prevent collision

Basic rule (91.325)

During a flight, a flight crew member must maintain vigilance, so far as weather conditions permit, to see and avoid other aircraft.

See AC 91-10 – *Operations in the vicinity of non-controlled aerodromes* and AC 91-14 – *Pilots responsibility for collision avoidance for information on and the limitations of 'see and avoid'.*

Right-of-way rules (91.330)

When taking evasive action because of a collision risk with another aircraft, you must follow the right-of-way rules shown in the following Table and Figures 6, 7, 8 and 9.

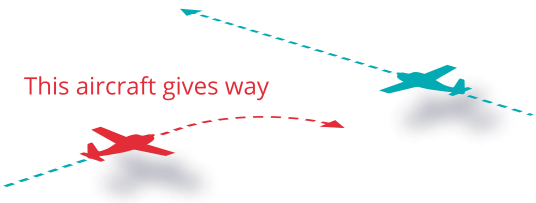
Table 9: Right-of-way rules

Item	Circumstance	Right-of-way rule
1	An aircraft is in an emergency and compelled to land	All aircraft must give way to the aircraft compelled to land.
2	An aircraft is landing	Any other aircraft (whether in flight, or operating on the ground or water) must give way to the landing aircraft.
3	Two heavier-than-air aircraft are on approach to land at an aerodrome	The following rules apply: › the higher aircraft must give way to the lower aircraft › however, if the higher aircraft is in the final stages of an approach to land, the lower aircraft must not take advantage of the higher aircraft's requirement to give way to the lower aircraft and cut in front of the higher aircraft › a power-driven heavier-than-air aircraft must give way to an unpowered glider.
4	An aircraft is overtaking another aircraft	The overtaking aircraft must give way to the aircraft being overtaken
5	Aircraft is in the same vicinity	The following shows right-of -way in descending order: › balloon › parachute descent › unpowered glider › airship › an aircraft that is towing something (including another aircraft) › power-driven aircraft.
6	Two aircraft are on converging headings at approximately the same altitude	The aircraft that has the other aircraft on its right must give way to the other aircraft.

Exception: *Although the right-of-way rules apply, you may take whatever action is necessary to avoid a collision.*

Additional right-of-way rules (91.335)

Figure 6: Aircraft with right-of-way to maintain heading and speed



Where there is a collision risk, the aircraft that has the right-of-way to another aircraft must maintain the same heading and speed until there is no longer a risk of collision.

Figure 7: Overtaking aircraft to keep clear and to the right

When overtaking another aircraft, whether climbing, descending or in level flight, you must keep out of the way of the other aircraft, even if it alters course while being overtaken; pass on the right, and remain on the right until well clear.

Figure 8: Aircraft approaching head-on to alter heading to the right

Where 2 aircraft are approaching head-on, or approximately head-on, each aircraft must alter heading to the right.

Figure 9: Aircraft giving way not to create collision risk

Where an aircraft is required to give way to another aircraft, the aircraft must not be flown so that it passes ahead, or directly over, or under the other aircraft so close that there is a collision risk.

> **Exception 1:** *If necessary, you may take whatever action is necessary to avoid a collision.*
>
> **Exception 2:** *The right-of-way and additional right-of-way rules do not apply if you are responding to a command of the aircraft's airborne collision avoidance system (ACAS) and manoeuvring is necessary to ensure the safety of the aircraft.*

Right-of-way rules for take-off and landing (91.340)

During a take-off or landing you must not fly an aircraft in a way that creates a risk of collision with another aircraft, person, vessel, vehicle or structure.

Compliance with international regulations (91.345)

An aircraft operating on water must comply with the requirements of the *International regulation for preventing collisions at sea, 1972*, except where they are inconsistent with regulation 91.355 *Giving way on water*.

Giving way to vessels (91.350)

When in level flight or manoeuvring near the surface of the water, you must, as far as possible, keep clear of a vessel, or avoid impeding its navigation.

Giving way on water (91.355)

You must give way to, and keep well clear of, an aircraft or vessel converging from the right.

You must turn to the right to keep well clear of an aircraft or vessel that is approaching head-on, or approximately head-on.

If you are overtaking a vessel or another aircraft, you must give way to the vessel or aircraft being overtaken, by altering your heading to keep well clear.

Exception: *If necessary, you may take whatever action is necessary to avoid a collision.*

The civil aviation safety regulations for avoiding collision on water are consistent with marine regulations.

Image | Cessna Caravan | Textron Aviation

8. Communication

Use of radio – qualifications (91.625) (MOS 21.01)

A person must be qualified before transmitting on a radio frequency published in the AAI that is used:

- by air traffic services (ATS)
- in aeronautical emergencies
- for communication at:
  - a certified, military aerodrome, or
  - an aerodrome prescribed as a designated non - controlled aerodrome by the MOS (MOS 17.01).
- at a non-controlled aerodrome – the common traffic advisory frequency (CTAF)
- in a mandatory broadcast area (MBA).

Pilots should:

- *send radio messages clearly and concisely using standard phraseology, or if this is not practical, use plain English*
- *plan the content of their message*
- *listen out before transmitting to avoid interfering with other radio transmissions*
- *ensure their message has been correctly received.*

Use of radio – broadcasts and reports (91.630) (MOS 21.02)

When flying an aircraft that is fitted with or carries a radio, you must ensure the broadcasts or reports relating to the flight are made.

Note: 91.675 specifies that certain reports to air traffic service (ATS) or aerodrome operators may need to be made regarding hazards to air navigation.

The following should be read in conjunction with MOS 26.18 and 26.19 (see appendix A) which describe the operational requirement for the carriage of radio and when you may fly with an inoperative radio.

Prescribed broadcasts and reports – general (MOS 21.03)

You must make broadcasts and reports on the relevant published radio frequency unless ATS agrees to the use of a different frequency for special flight circumstances.

Note: Special flight circumstances include, for example, descent from controlled to non-controlled airspace, formation flights, and search and rescue, police and security operations. You may initiate a request to ATS to agree to a changed radio frequency for special flight circumstances.

Non-controlled aerodromes – prescribed broadcasts (MOS 21.04)

You must ensure broadcasts are made on the CTAF according to the following table if:

- you are flying in the vicinity of a non-controlled aerodrome, including a certified or military aerodrome, and
- the aircraft is equipped with a very high frequency (VHF) radio.

Table 10: Broadcasts – aircraft at or in the vicinity of, a non-controlled aerodrome (including a certified or military aerodrome when non-controlled) (MOS Table 21.04)

Situation	Frequency	Broadcast/ report
When you consider it reasonably necessary to broadcast to avoid the risk of a collision with another aircraft	CTAF	Broadcast

Note: See additional requirements apply for a non-controlled aerodrome in a mandatory broadcast area – see MOS 21.09.

Note: For an aircraft that must be equipped with a VHF radio, see MOS Chapter 26.

For the definition of – in the vicinity of a non-controlled aerodrome *see 91.360*

Mandatory broadcast area requirements MOS 11.10A

You must comply with the requirements in the table following for an MBA in G airspace.

Note: The geographic boundaries of a MBA are specified in the AIP.

Note: This section contains MBA requirements other than the specific radio broadcasts or reports required to be made in relation to an MBA, or the radio carriage or fitment requirements for flight within an MBA. Radio broadcast and report requirements for MBA are contained in MOS 21.09. Radio carriage or fitment requirements for MBA are in MOS 26.18.

Table 10A: Broadcast area requirements

Broadcast area	Requirements
Ayers Rock BA	Nil
Ballina/Byron Gateway BA	When surveillance flight information service (SFIS) is active for this MBA, operations in the MBA, or immediately before entering the MBA, must make the calls as described in the Table 10B
Port Hedland BA	Nil

Flights in a mandatory broadcast area – prescribed broadcasts and reports (MOS 21.09)

If you are intending to fly in an MBA you must broadcast and report in accordance with:

- Table 10B if an SFIS is not active for the MBA, and
- the requirements specified in the AIP if an SFIS is active for the MBA.

You must also ensure that, when making a broadcast or a report, it contains the following information, in the following order:

- the name of the relevant aerodrome followed by the word TRAFFIC
- the aircraft type and callsign
- for an MBA where an SFIS is not active immediately before entering the MBA
  - » the aircraft's present altitude (where appropriate), and
  - » the situation-based information required by Table 10B
- for an MBA where an SFIS is active immediately before to entering the MBA, the information required by the AIP for the SFIS is the name of the relevant aerodrome.
- You must ensure that reports and broadcasts are made in accordance with the other applicable provisions of this section.

Note: Certain other operational requirements for MBA are contained in MOS 11.10A. The requirement to have a radio in an MBA is contained in MOS 26.18.

Table 10B: Broadcasts in relation to a MBA

Situation	Broadcast
Before or immediately after entering an MBA	Broadcast your intended use of the MBA
Joining a circuit	Broadcast the situation, and indicate the leg on which the aircraft will join
Conducting a straight-in approach	No later than 3 NM from the runway threshold – broad-cast the situation
Passing the final approach fix of an in-strument approach procedure	Broadcast the situation
Commencing a missed approach	Broadcast the situation
After landing and clear of the active runway(s)	Broadcast the situation
Starting to taxi	Broadcast the situation, and the following information: › that the flight is to be conducted under the IFR, if that is the case; › for any flight, either: » the planned destination aerodrome for the flight; or » the direction in which you intend to fly from the aerodrome; or » the nature of operation (e.g. circuits); › the runway proposed to be used for take-off.
Immediately before entering the run-way to be used for take-off	Broadcast the following: › a statement that the aircraft is entering the runway; › the runway identifier.

Controlled aerodromes and controlled airspace – prescribed reports (MOS 21.05)

When on the ground at a controlled aerodrome or flying in Class A, B, C or D airspace, or under the IFR in Class E airspace, you must report and broadcast to ATC according to the following table.

To ensure that you do not compromise separation with any aircraft flying near the base of controlled airspace, the required report is to be made to the ATS for the G airspace that the the aircraft will descend into after leaving controlled airspace.

The Australian flight information region (FIR) does not have Class B airspace.

Table 11: An aircraft in Class A, C or D airspace, or an IFR aircraft in Class E airspace (MOS Table 21.05 and AIP ENR 1.1)

Situation	Report
Ready to taxi	Report the situation
Airborne	Report the situation
Departure	Report the situation
Position report when required by ATC, or route, reporting requirements in the AIP	Report the situation
Previously reported position estimate is more than 2 minutes in error	Report the corrected position estimate
Sustained variation of more than 10 knots or Mach 0.02 from any previously notified speed or any standard descent profile agreed between the aircraft operator and ATS	Report the situation
Aircraft performance degraded below: › the level required for the airspace in which it is operating, or › the capability reported in the flight notification	Report the situation
Leaving a level or reaching an assigned level	Report the situation
Unable to comply with an ATC clearance or instructions	Report the situation
Arrival	If cancelling SARWATCH: report cancellation
Runway braking action encountered not as good as reported by ATC	Report actual braking action using the prefix AIREP SPECIAL.

Note: Degraded means to the degradation of aircraft performance because of the failure or degradation of navigation, communication, altimetry (including reduced vertical separation minimum (RVSM) capability), flight control or other systems.

IFR aircraft in Class G airspace – prescribed reports (MOS 21.06)

When flying under the IFR in Class G airspace, you must broadcast and report to ATS according to the table below and other applicable tables in this sections.

Exception: *If you are flying an aircraft under the IFR in Class G airspace and are unable to make contact with the ATS in relation to the report required, you may taxi and take-off provided:*

- *broadcasts are made in place of the required reports, and*
- *contact with ATS is established as soon as possible after take-off, and*

In addition:

- *for an operator that is an AOC holder, aerial work certificate holder or Part 141 certificate holder – you must be assured of radio contact with the operator, or their representative who has immediate access to a serviceable telephone, until contact is made with ATS.*
- *except for Part 121 operations conducted using aircraft with a MOPSC greater than 19 seats – a SARTIME for departure, that is a maximum of 30 minutes after commencing to taxi, has been established with the ATS.*

In some circumstances, an aircraft reporting its position by ADS-C my not be required to advise ATC of revised waypoint estimates. Refer to AIP GEN.

Table 12: IFR aircraft in Class G airspace (MOS Table 21.06)

Situation	Report
Taxiing	Report the situation
Departure	Report the situation
Reaching cruising level	Report the situation
Position report when required by ATC, or route reporting requirements of the AIP	Report the situation
Previously reported position estimate is more than 2 minutes in error	Report the situation
Before changing level	Report the situation
Before changing frequency	Report the situation
Requiring clearance into controlled airspace	Report the situation
Before leaving controlled airspace on descent	Report the situation
Before changing to CTAF (when not monitoring the ATS frequency on a second communication system)	Report the situation
After landing	If cancelling SARWATCH: report cancellation

VFR aircraft in Class E or G airspace – prescribed reports (MOS 21.07)

When flying under the VFR in Class E or G airspace, you must ensure reports and broadcasts are made to ATS according to the following table.

Table 13: VFR aircraft in Classes E and G airspace (MOS Table 21.07)

Situation	Report
Requiring clearance into controlled airspace	Report the situation
Before, and on completion of, over-water stage	Report in accordance with search and rescue (SAR) reporting schedules if arranged before the over-water stage

Flights in RVSM airspace – prescribed reports (MOS 21.08)

When in RVSM airspace, regardless of the cause you must ensure that a report all deviations of 300 ft or more from your assigned level, regardless of the cause of deviation, is made in accordance with the procedures published in the AAI.

If you cannot maintain your assigned flight level, you must inform ATC as soon as possible (see MOS 11.07).

Communication monitoring in controlled airspace (91.635)

When flying in controlled airspace, you or another pilot occupying a pilot seat must continuously monitor the primary communications medium used by ATC (EX81/21).

The primary communications medium would normally be the ATC VHF radio frequency (but could also be high frequency (HF)/datalink) but in the event of radio failure light signals could become the primary communications medium.

Communicating at certified, military or designated non-controlled aerodromes (91.400)

An aircraft must have a VHF radio when operating on the manoeuvring area, or in the vicinity of a non-controlled aerodrome that is:

- certified, or
- military, or
- prescribed as a designated non-controlled aerodrome by the MOS.

Exception: *However, at a non-controlled aerodrome described above, you may operate with an inoperative radio if you are flying during the day in VMC, in company with another aircraft that is carrying a radio.*

There are currently no designated non-controlled aerodromes prescribed in the MOS (MOS 17.01 is Reserved)

When in the vicinity of an aerodrome, if the radio has become inoperative, or the purpose of the flight is to take the radio to a place for repairs, you must join the circuit on either the crosswind or downwind leg, and if the aircraft is equipped, ensure the:

› landing lights are switched on

› anti-collision lights are switched on

› secondary surveillance radar transponder is switched on.

Air traffic services – prescribed requirements (91.255)

When you operate at a controlled aerodrome or in a control zone, control area, class of airspace or in a prohibited, restricted or danger area, it must be in accordance with the instructions below.

Controlled aerodromes (MOS 11.13)

You must operate at a controlled aerodrome in accordance with the AIP.

When operating at a controlled aerodrome (when ATC is active) you must obtain ATC clearance when:

› taxiing on any part of the manoeuvring area

› entering, crossing, or backtracking on a runway

› taking off

› landing.

When taxiing on the manoeuvring area of a controlled aerodrome, you must stop and hold at all illuminated stop bars. You may only proceed beyond the stop bars when the stop bar lights are switched off.

> **Exception:** *You may proceed beyond a lighted stop bar if ATC advises you that stop bar contingency measures are in effect for the lighted stop bar, and ATC has identified the relevant lighted stop bar to you by reference to the specific holding position and instructs you to cross it.*

Controlled aerodromes – other requirements (MOS 11.14)

Reserved

Control zones and areas – entry into Class A, B, C, D or E airspace (MOS 11.15)

You must not enter a control zone or a control area that is Class A, B, C , D or E airspace without ATC clearance.

> **Exception:** *VFR flights do not require clearance to enter Class E airspace.*
>
> **Exception:** *A clearance is not required when an ATC service is not in operation for a control zone.*

Control zones and control areas – operating in Class A, B, C, D, or E airspace (MOS 11.16)

When flying in a control zone or a control area, you must fly in accordance with the procedures published in the AAI and take positive action to regain the cleared track as soon as you recognise a deviation.

You must immediately notify ATC if the aircraft's deviation from track exceeds any of the following navigation tolerances:

- *for PBN operations, the RNP value for the segment of the IAP being conducted*
- *for VOR or localiser, full-scale deflection of the course deviation indicator (Note: you must notify ATC at half-scale deflection or more of the course deviation indicator. AIP ENR refers.)*
- *for NDB, + or - 5 degrees or more from the specified bearing*
- *for DME, + or - 2 NM or more from the required arc*
- *for visual navigation, more than 1 NM from the cleared track.*

Further, relevant procedures and navigational requirements for operations in a control area or control zone, are published in the AAI. These publications are available through the Airservices Australia website: www.airservicesaustralia.com

Control areas – IFR flights, VFR climb/ descend and VFR-on-top (MOS 11.17)

Only when flying under the IFR in Class D or E airspace , you have the option to climb or descend VFR. You must request a clearance for a VFR climb or VFR descent

During the VFR climb or VFR descent, you must:

- always remain in VMC
- comply with the IFR reporting and communication requirements
- maintain separation from other aircraft
- visually maintain obstacle clearance.

When flying under the IFR in E airspace you have an option to fly VFR-on-top, you must request a clearance to fly VFR on top.

When flying VFR-on-top, you must:

- always remain in VMC
- comply with the IFR reporting and communication requirement
- maintain separation from other aircraft and apply wake turbulence separation
- fly at a specified VFR cruising level.

You must obtain an ATC clearance to cancel the climb or descent VFR, or VFR-on-top.

In Class D or E airspace when weather conditions permit, the option of a specific clearance under the IFR, known as a VFR climb or descent may facilitate a climb or descent to your planned cruising level.

Similarly, in Class E airspace when weather conditions permit under the IFR, the option of a specific clearance to fly at a VFR cruising level on top of cloud may provide operational efficiencies.

In both these circumstances ATC will not apply IFR terrain or traffic separation; therefore it is emphasised you must visually maintain obstacle clearance, be vigilant to see and avoid and maintain wake turbulence separation from other aircraft.

Readback of ATC clearances and instructions (MOS 11.12)

- When in a control zone, a control area, or a controlled aerodrome, you must ensure that you, or another member of the flight crew (if any) reads back the safety-related parts of any spoken ATC clearance or instruction.
- In addition, the following parts of an ATC clearance or instruction must always be read back:
  - ATC route clearances, including any amendments

    Note: ATC route clearances include departure, en route, arrival and approach clearances.
  - en route holding instructions
  - route and runway-holding positions specified in a taxi clearance
  - clearances, conditional clearances and instructions to taxi on, enter, line up on, wait on, land on, take-off from, hold short of, cross, or backtrack on, any runway, and
  - the assigned runway or helicopter landing site (HLS), altimeter settings, Mode A transponder codes, data link logon addresses, altitude instructions, heading and speed instructions
  - radio frequency instructions.

Airborne collision avoidance system (ACAS) resolution advisory (MOS 11.06)

In the event of an ACAS resolution advisory (RA), you must:

- respond immediately by following the RA as indicated, unless doing so would jeopardise the safety of the aircraft
- follow the RA even if there is a conflict between the RA and an ATC instruction to manoeuvre
- limit the alterations of the flight path to the minimum extent necessary to comply with the RA
- promptly return to the last assigned level when the conflict is resolved
- notify ATS when returning to the last assigned level.

A pilot who complies with an RA does not breach the requirement to comply with an ATC clearance or instruction (91.257).

Unauthorised entry into prohibited or restricted areas (91.260)

If you become aware your aircraft is in an active prohibited or restricted area, and you are able to communicate, you must inform ATS, or the controlling authority specified in the AAI and:

- fly out of the area, or
- for balloons and hot air airships (Part 131 aircraft) unable to fly out of the area, land and then inform the controlling authority as soon as practicable.

CASA may declare an area to be a prohibited area for reasons of military necessity.

CASA may declare an area to be a restricted area, if CASA believes it is necessary to restrict flight in accordance with specified conditions for public safety or to protect the environment.

Prohibited and restricted areas declared for 3 months or longer are published in the AAI (AIP). For shorter periods they are published by NOTAM (see regulation 7 of the Airspace Regulations 2007).

Prohibited areas (MOS 11.20)

A flight must not enter a prohibited area in any circumstance.

Restricted areas (MOS 11.21)

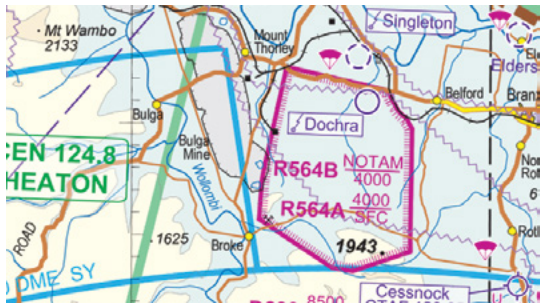
A flight must not enter an active restricted area without approval of the controlling authority (see Figure 10).

Note: On 15 June 2023 Australia's Airspace Regulations 2007 were amended so that in international airspace (airspace outside Australian territory) areas designated as restricted have been redesignated as danger areas. This included military exercise areas and military training areas..

Australian territory means:

- the territory of Australia and every external territory
- the territorial sea of Australia and each external territory
- the airspace over any such territory or sea

Figure 10: Restricted area



R564A 4000 / SFC — **Must NOT operate without permission**

R564B NOTAM / 4000 — **May operate ABOVE 4,000 ft without permission provided not activated by NOTAM**

Sydney VNC chart

SFC/4000 shown in the picture means R564A extends from surface level to 4,000 ft AMSL when active.

When ATS is available within an activated restricted area, ATS may approve your flight within or across the area if you request clearance in the same way as for entering controlled airspace.

A clearance may be withheld when hazardous activities are taking place or when those activities require priority.

Provided you receive an ATC clearance, you may fly:

- *from controlled airspace into an adjoining activated restricted area, or*
- *through an activated restricted area into adjoining controlled airspace, or*
- *through an activated restricted area within controlled airspace.*

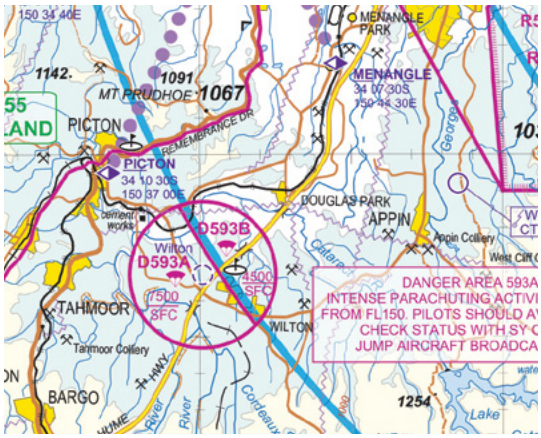
Danger areas (MOS 11.22)

You may fly in a danger area. You should be aware of the specific activity which causes an area to be designated as a danger area (see Figure 11).

Note: Danger areas in international airspace may lie in controlled airspace.

Details on prohibited, restricted and danger areas can be found in the relevant aeronautical charts, NOTAMS, the En Route Supplement Australia (ERSA-SUA) and the Designated Airspace Handbook (DAH).

Figure 11: Danger area



Military operating areas (MOAs) have been established at the following military bases and are distinguished with an 'M' prefix: Cerberus (Vic), Edinburgh (SA), East Sale (Vic), Nowra (NSW) and Williamtown (NSW). See current aeronautical information circulars (AIC).

MOAs are a subset of danger areas and require Australian registered aircraft to request a clearance to transit a MOA and comply with any conditions of entry. Foreign registered aircraft can transit a MOA outside Australian territory without a clearance. Within Australian territory however, a clearance must be requested, and conditions of entry may be imposed.

RVSM airspace (MOS 11.07)

If you fly in RVSM airspace, you must operate in accordance with the procedures in the AAI.

When changing levels in RVSM airspace, you must ensure that that you do not overshoot or undershoot your cleared flight level by more than 150 ft.

If the cleared flight level cannot be maintained, you must inform ATC as soon as possible of the circumstances, and either:

- obtain a revised clearance before initiating any deviation from the cleared route or flight level, or
- if a revised clearance cannot be obtained before the deviation, obtain a revised clearance as soon as possible after the deviation.

If it is not possible to obtain a revised clearance within RVSM airspace in an oceanic control area (OCA) in an Australian flight information region (FIR), you may initiate a temporary lateral offset procedure with the intention of returning to the cleared route as soon as possible.

CASA approval required for flight in the North Atlantic Track – High Level Airspace (NAT-HLA) (MOS 11.08)

You may only operate an Australian aircraft in a portion of a class of the NAT-HLA if:

- the aircraft meets all the requirements for operational approval and the aircraft systems for flight in the NAT-HLA specified in NAT Doc 007, North Atlantic Operations and Airspace Manual (as in force from time to time) and
- evidence of this compliance in one or more of the following documents:
  - the AFM
  - an original equipment manufacturer service letter
  - any other document from the entity responsible for the design approval of the equipment
  - if the operator holds an AOC, aerial work certificate or Part 141 certificate:
    - the operator's exposition, operations manual or AOC or
    - any other civil aviation authorisation held by the operator.

Note: NAT Doc 007, North Atlantic Operations and Airspace Manual contains requirements relating to, but not limited to, flight rules, flight plans, communications, navigation (PBN), surveillance, air traffic service provision, safety monitoring, air traffic flow management, special procedures, phraseology, SAR, meteorology and aeronautical information services.

The North Atlantic Track-High Level Airspace (NAT-HLA) is the airspace between North America and Europe. Approximately three thousand aircraft fly the North Atlantic daily. To operate in NAT-HLA operators are required to be approved for RNP 10 or RNP 4 with RNP 2 probably being required in the future.

Performance-based communication and surveillance requirements (MOS 11.09)

This section applies to a flight of an aircraft within any class of airspace, whether controlled or uncontrolled, that involves:

- the conduct of datalink operations using FANS 1/A and
- the declaration of RCP or RSP capabilities for the aircraft on the flight plan for the flight.

Definitions for this section:

automatic dependent surveillance - contract (ADS-C) means a contract between ATC and an aircraft's system:

- for the reporting of aircraft position and other data via a datalink and
- which specifies:
  - under what conditions ADS-C reports are to be initiated and
  - what data is to be contained in the reports.

CSP, or communication services provider, means any public or private entity which, under a contract or agreement, provides communication services for general air traffic which may include services provided by a satellite service provider (SSP) or services provided by the CSP in its own capacity as an SSP.

controller-pilot datalink communications (CPDLC) is the means of communication between ATC and a pilot, using datalink for ATC communications.

datalink operations means aircraft operations using FANS 1/A avionics.

FANS 1/A, which is taken to include FANS1/A+,is a direct datalink communication between the pilot of an aircraft and ATC via FANS 1/A avionics and FANS 1/A ground end systems, based on EUROCAE ED-100A/RTCA DO-258A, or a later version as in force from time to time.

performance-based communication (PBC) means communication based on performance specifications applied to the provision of air traffic services.

performance-based communications and surveillance (PBCS) means the application of required communication performance (RCP) and required surveillance performance (RSP) specifications to ensure appropriate performance levels for relevant air traffic management operations.

performance-based surveillance (PBS) means surveillance based on performance specifications applied to the provision of air traffic services.

RCP 240 is the value for the communication expiry time (namely 240 seconds) after which the initiator of the communication is required to revert to an alternative procedure.

Note: In the context of RCP, the initiator is normally an air traffic controller.

RCP allocation is a portion of an RCP parameter and is a time value assigned to a specific component of the communication system used for transferring messages between aircraft and ATC.

RCP parameters are performance characteristics that:

- provide the basis for developing an RCP specification; and
- include RCP transaction time, RCP continuity, RCP availability and RCP integrity.

RCP pilot operational response time, or RCP PORT, is an RCP allocation that specifies the maximum time for a flight crew member to recognise and respond to an ATC instruction.

required communication performance (RCP) specification means the requirements needed to support PBC, being requirements for the following:

- ATC and associated ground equipment
- the communication service provider
- aircraft equipment
- flight crew members.

required surveillance performance (RSP) specification means the requirements needed to support PBS, being requirements for the following:

- ATC and associated ground equipment
- the communication service provider
- aircraft equipment.

RSP 180 is the value for the surveillance data delivery time (namely 180 seconds) at which the surveillance data delivery is considered overdue.

Note: RSP 180 means that 99.9% of surveillance data must be delivered in less than 180 seconds.

RSP allocation is a portion of an RSP parameter and is a time value assigned to a specific component of the communication system used for transferring surveillance reports from aircraft to ATC.

RSP parameters are performance characteristics that:

› provide the basis for developing an RSP specification; and

› include RSP data delivery time, RSP continuity, RSP availability and RSP integrity.

satellite service provider (SSP) means an entity or group of entities that provide the portion of the communication system that involves the operation of 1 or more satellites.

Flight plan declaration of capability

Prior to declaring RCP 240 or RSP 180 capabilities on a flight plan, you must:

› check with the operator of the aircraft whether they have received advice from Airservices Australia that the relevant aircraft has consistently not met the operational criteria of RCP 240 and RSP 180 specifications,and

› if such advice was received – be reasonably satisfied that the operator of the aircraft has ensured that the aircraft consistently meets the operational criteria of the specifications.

Note: Airservices Australia monitors datalink communications in Australian-administered airspace and advises when operational criteria of RCP 240 and RSP 180 specifications are consistently not met.

A declaration must not be made on a flight plan, submitted to ATS, that the aircraft has RCP capability or RSP capability unless:

› the declaration relates solely to RCP 240 or RSP 180 capabilities, and

› the requirements in this section are complied with at the time of the declaration.

Note: It is ultimately a matter for the relevant aviation authority to be satisfied that an aircraft operator's declaration is, in actual fact, valid for the relevant aircraft at the time of any declaration, audit or inspection. A false declaration would constitute an offence under regulation 11.255 of the Civil Aviation Safety Regulations 1998 and could result m other legal consequences under the Civil Aviation Act 1988.

Equipment

The aircraft must be equipped with avionics supporting ADS-C and CPDLC applications over FANS 1/A (the equipment), and be operative for the flight.

Aircraft documentation

One of the following documents:

› the AFM

› an original equipment manufacturer service letter

› any other document from the entity responsible for the design approval of the aircraft datalink communications equipment must include a statement of compliance (a SOC) indicating that:

› the aircraft system is approved for datalink communications using FANS 1/A avionics, and

› the aircraft datalink system meets the aircraft-allocated requirements of the RCP 240 and RSP 180 specifications.

However, if the AFM or original manufacturer's service letter or any other document from the designer of the datalink communications equipment do not include an SOC, a temporary substitute document may be referenced instead. Whilst formal issue of the SOC is pending and if no indication of non-compliance has been given by the State of Design a written and dated copy of the operator's request for the SOC may act as a temporary substitute for the SOC provided it indicates that:

› the aircraft system is approved for datalink communications using FANS 1/A avionics: and

› the aircraft datalink system meets the aircraft-allocated requirements of the RCP 240 and RSP 180 specifications.

Note: Allocation requirements for RCP 240 and RSP 180 specifications are as defined in ICAO Doc 9869, Performance-based Communications and Surveillance (PBCS) Manual.

Communication service provider agreement

Subject to the terms of the agreement between the operator of the aircraft and the CSP (below) you must reasonably satisfied that an agreement is in place between the aircraft operator and the CSP that includes the following terms and conditions:

- that there is adequate subnetwork coverage in the route flown
- that there is to be notification of coverage and performance failures
- that there is to be recording of datalink messages for 30 days
- that datalink messages mentioned in the dot point immediately above will be available on written request by:
  - CASA, or
  - the national aviation authority responsible for the regulation of flight plans to whom the declaration of an RCP or RSP capability on the flight plan is made
- that datalink messages will not be manipulated or altered
- that network-allocated requirements for the RCP 240 and RSP 180 specification are met according to the definitions contained in ICAO Doc 9869, Performance-based Communications and Surveillance (PBCS) Manual.

If the agreement between the operator of the aircraft and the CSP does not include the terms and conditions mentioned above, the following may act as a temporary substitute pending the formal issue of an agreement that does include the terms and conditions under a revised agreement – a copy of the relevant operator's written and dated request to the appropriate CSP for a revised agreement.

Australian domestic airspace – inoperative radio requirements (MOS 11.10)

The following requirements apply to a flight within any class of airspace, whether controlled or uncontrolled, that is within an Australian FIR and is not specified in the AAI as an oceanic control area.

Note: The Designated Airspace Handbook (DAH) specifies the geographic boundaries of oceanic control areas.

If the radio fails during a flight, you must:

- if operating under the VFR in Class G or Class E airspace:
  - select code 7600 on the transponder (if fitted)
  - remain outside controlled airspace
  - assume the radio is broadcasting and broadcast position and intentions on the frequency appropriate to the area of operation
  - as soon as practicable, descend below 5,000 ft to continue flight under the VFR
- if operating under the VFR in Class A, B, C or D airspace or in a restricted area, or if operating under the IFR in any class of airspace:
  - select code 7600 on transponder (if fitted)
  - assume the radio is functioning and broadcast position and intentions on the frequency prescribed in the AAI
  - if the aircraft is in VMC and certain of maintaining VMC, remain in VMC and land at the most suitable aerodrome
  - if the aircraft is in IMC or is uncertain of maintaining VMC:
    - maintain the last assigned altitude or level (or LSALT if higher) for 3 minutes
    - maintain the last assigned vector for 2 minutes or fly one more holding pattern
    - after complying with the above two points, proceed in accordance with the latest ATC route clearance acknowledged
    - commence descent in accordance with the latest ATC route clearance acknowledged
    - conduct the most suitable instrument approach procedure.

Certain oceanic control areas – inoperative radio requirements (MOS 11.18)

If you are flying within Australian-administered airspace specified as an oceanic control area and your radio fails during the flight, you must:

- set code 7600 on the transponder (if fitted)
- assume the radio can transmit on the frequency appropriate to the area of operation, and broadcast your intentions and make normal position reports
- keep a lookout for conflicting traffic, including by reference to ACAS and traffic displays
- as far as practicable, turn on all exterior aircraft lights
- maintain the last assigned speed and level for a period of 60 minutes following the aircraft's failure to report its position over a compulsory reporting point (including automatic dependent surveillance contract (ADS-C) flights), and thereafter revert to your flight planned speed and altitude
- upon exiting the oceanic control area, conform, as far as practicable, to the relevant state procedures and regulations.

Air traffic control clearances and instructions (91.257)

You must comply with an ATC clearance or instruction.

> **Exception:** *If it is not practicable to obtain a new or amended clearance you may deviate from an existing clearance or instruction, provided it is for the safety of the aircraft and its occupants, and you advise ATC as soon as possible.*

Use of radio outside controlled airspaces – listening watch of radio transmissions (91.640)

When operating outside controlled airspace in an aircraft with a radio, you must ensure that any radio transmissions are monitored continuously by you or another qualified pilot.

Gliders and manned free balloons which carry a radio will maintain a listening watch on the following frequencies:

- *in controlled airspace-the relevant ATC frequency*
- *in Class G, above 5,000 ft AMSL – the relevant area frequency or one of the following glider specific frequencies (122.5; 122.7; 122.9 MHz)*
- *in Class G, below 5,000 ft AMSL – 126.7 MHz*
- *in the vicinity of a non-controlled aerodrome – the CTAF or 126.7MHz if no CTAF is specified.*

Image | CASA

Standard visual signals (91.670)

When marshalling an aircraft other than a glider, a person must display standard visual signals.

A person must not display a standard visual signal if it is likely to endanger the safety of the aircraft, any person or property as a result.

You must comply with a standard visual signal during a flight unless you reasonably believe that doing so is likely to endanger the safety of the aircraft, any person or property.

Standard visual signals include light signals, ground marks and hand signals.

For standard visual signal (MOS 2.03)

The following details the light, projectile, ground and hand signals and the requirements and circumstances for their display.

Light or projectile signals to aircraft on an aerodrome or in flight (MOS 2.04)

The following table shows prescribed aircraft light signals.

Table 14: Light signals to aircraft on an aerodrome or in flight

On ground	Light mode	In flight
Authorised to take-off if pilot is satisfied that no collision risk exists	 Green	Authorised to **land** if pilot is satisfied that no collision risk exists
Authorised to taxi if pilot is satisfied that no collision risk exists	 Green flashing	**Return** for landing
Stop	 Red	**Give way** to other aircraft **Continue** circling
Taxi clear of landing area In use	 Red flashing	**Do not land** Aerodrome unsafe
Return to starting point on aerodrome	 White flashing	

A series of projectiles, each discharged at intervals of 10 seconds, showing, on bursting, red or green lights, or stars, may be used to indicate that an aircraft is flying in or about to enter a prohibited, restricted or danger area and you must take such remedial action as may be necessary.

Ground signals for aircraft at aerodromes (MOS 2.05)

The standard ground signals for aircraft at aerodromes are set out in the following table.

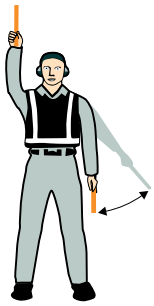
Table 15: Ground signals for aircraft at aerodromes

Ground signal		
		
Description		
White cross	White double cross	Horizontal white dumbbell
Where displayed		
› Adjacent to wind direction indicator › On manoeuvring area	Adjacent to wind direction indicator	Adjacent to wind direction indicator
Meaning		
› Aerodrome completely unserviceable › An area marked by a cross or crosses with the limit delineated by markers is unfit for use by aircraft	Gliding operations in progress	› Use only hard surface movement areas › Where there are sealed and gravel manoeuvring areas, use only the sealed surfaces › Where there are constructed gravel and natural surface manoeuvring areas, use only the gravel surfaces (see *ERSA* FAC for any local information relating to the dumbbell signal)

Image | CASA

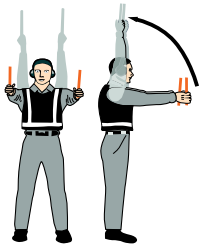
Hand signals for marshalling aircraft at aerodromes (MOS 2.06)

The hand signals depicted and described in the following diagrams are those prescribed for ground personnel (**signallers**) marshalling aircraft at an aerodrome.

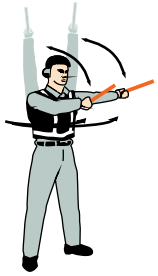


1. Wing-walker/guide
Raise right hand above head level with wand pointing up; move left hand with wand pointing down and repeatedly wave to and from the body.

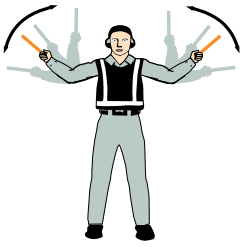
Note: This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/marshaller or push-back operator, that the aircraft movement on/off a parking position would be unobstructed.



2. Identify gate
Raise fully extended arms straight above head with wands pointing up.

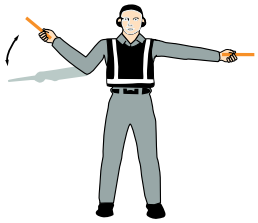


3. Proceed to next signaller or as directed by tower/ground control
Point both arms upward; move and extend arms outward to sides of body and point with wands to direction of next signaller or taxi area.

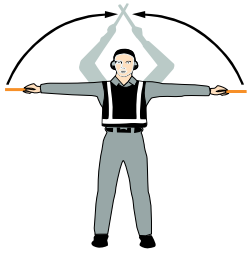


4. Come straight ahead
Bend extended arms at elbows and move wands up and down from chest height to head.

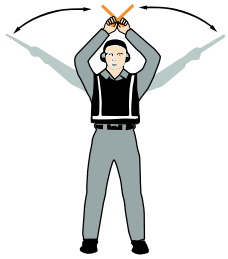
5a. Turn left (from pilot's viewpoint)
With right arm and wand extended at a 90-degree angle to body, make 'come ahead' signal with left hand. The rate of signal motion indicates the rate of aircraft turn to the pilot.



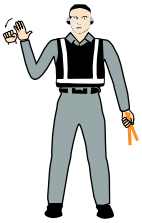
5b. Turn right (from pilot's viewpoint)
With left arm and wand extended at a 90-degree angle to body, make 'come ahead' signal with right hand. The rate of signal motion indicates the rate of aircraft turn to the pilot.



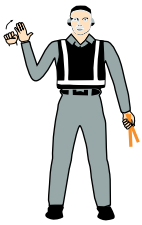
6. Normal stop
Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross.



7. Emergency stop
Abruptly extend arms and wands to top of head, crossing wands.



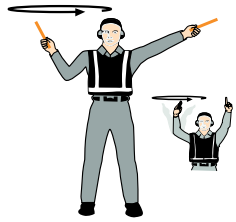
8. Set brakes
Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do not move until receipt of 'thumbs-up' acknowledgement from flight crew.



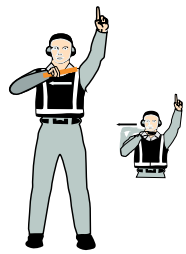
9. Release brakes
Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of 'thumbs-up' acknowledgement from flight crew.

10. Chocks inserted
With arms and wands fully extended above head, move wands inward in a jabbing motion until wands touch. Ensure acknowledgement is received from flight crew.

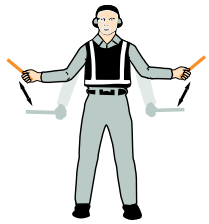
11. Chocks removed
With arms and wands fully extended above head, move wands outward in a jabbing motion. Do not remove chocks until authorised by flight crew.



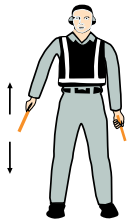
12. Start engine(s)
Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.



13. Cut engines
Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.



14. Slow down
Move extended arms downwards in a patting gesture, moving wands up and down from waist to knees.

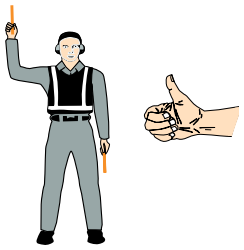


15. Slow down engine(s) on indicated side
With arms down and wands towards ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.

16. Move back
With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use the *Emergency stop or Set brakes signal.*

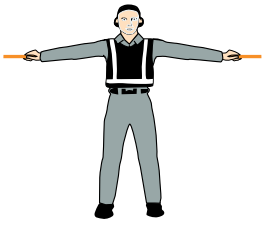
17. Turns while backing (for tail to starboard)
Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.

18. Turns while backing (for tail to port)
Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.

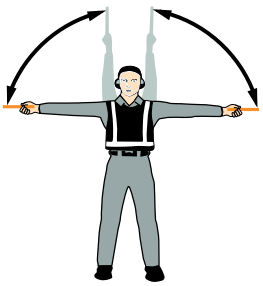


19. Affirmative/all-clear
Raise right arm to head level with wand pointing up or display hand with 'thumbs-up'; left arm remains at side by knee.

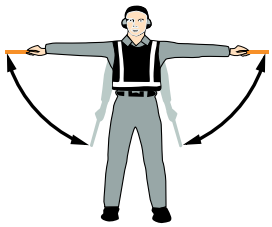
Note: This signal is also used as a technical/servicing communication signal.



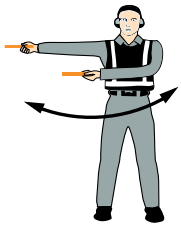
20. Hover (rotorcraft)
Fully extend arms and wands at a 90-degree angle to sides.



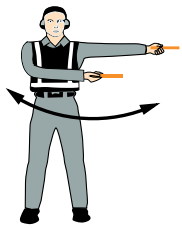
21. Move upwards (rotorcraft)
Fully extend arms and wands at a 90-degree angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.



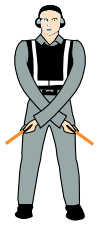
22. Move downwards (rotorcraft)
Fully extend arms and wands at a 90-degree angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.



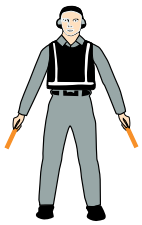
23. Move horizontally left (from pilot's point of view) (rotorcraft)
Extend arm horizontally at a 90-degree angle to right side of body. Move other arm in same direction in a sweeping motion.



24. Move horizontally right (from pilot's point of view) (rotorcraft)
Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.

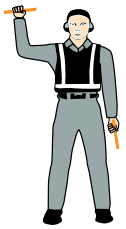


25. Land (rotorcraft)
Cross arms with wands downwards and in front of body.

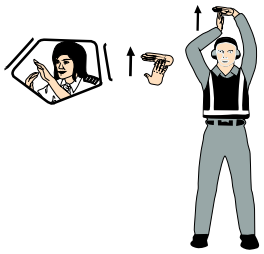


26. Hold position/standby
Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.

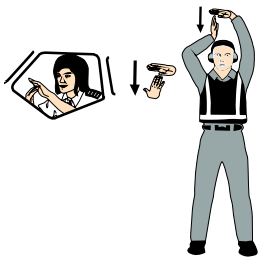
27. Dispatch aircraft
Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.



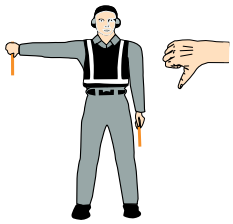
28. Do not touch controls (technical/servicing communication signal)
Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.



29. Connect ground power (technical/servicing communication signal)
Hold arms fully extended above head; open left hand horizontally and move fingertips of right hand into and touch open palm of left hand (forming a 'T'). At night, illuminated wands can also be used to form the 'T' above head.



30. Disconnect power (technical/servicing communication signal)
Hold arms fully extended above head with fingertips of right hand touching open horizontal palm of left hand (forming a 'T'); then move right hand away from the left. Do not disconnect power until authorised by flight crew. At night, illuminated wands can also be used to form the 'T' above head.



31. Negative (technical/servicing communication signal)
Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with 'thumbs down'; left hand remains at side by knee.

32. Establish communication via interphone (technical/servicing communication signal)
Extend both arms at 90 degrees from body and move hands to cup both ears.

33. Open/close stairs (technical/servicing communication signal)
With right arm at side and left arm raised above head at a 45-degree angle, move right arm in a sweeping motion towards top of left shoulder.

Note: This signal is intended mainly for aircraft with the set of integral stairs at the front.

There are specific hand signals for emergency communications between the aircraft rescue and firefighting (ARFF) incident commander/ARFF firefighters and the cockpit and/or cabin crews of the incident aircraft. ARFF emergency hand signals should be given from the left front side of the aircraft for the flight crew.

Note: To communicate more effectively with cabin crew, ARFF firefighters may give emergency hand signals from other positions.

1. Recommend evacuation

Evacuation recommended based on ARFF and incident commander's assessment of external situation.

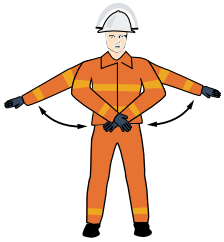
Arm extended from body and held horizontal with hand upraised at eye level. Execute beckoning arm motion angled backward. Non-beckoning arm held against body. Night signal, the same with wands.

2. Recommended stop

Recommend evacuation in progress be halted. Stop aircraft movement or other activity in progress.

Arms in front of head, crossed at wrists.

Night signal, the same with wands.



3. Emergency contained

No outside evidence of dangerous conditions or 'all-clear'.

Arms extended outward and down at a 45-degree angle. Arms moved inward below waistline simultaneously until wrists crossed, then extended outward to starting position (umpire's 'safe' signal).

Night signal, the same with wands.

4. Fire

Move right hand in a fanning motion from shoulder to knee, while at the same time pointing with left hand to area of fire.

Night signal, the same with wands.

Note: Bare hands, gloved hands, bats, wands, or torches may be used to provide the hand signal.

The signals are designed for use by the signaller with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position:

- for an aeroplane – on the left side of the aeroplane where the signaller can best be seen by the pilot
- for a rotorcraft – where the signaller can best be seen by the pilot
- for an emergency – as far as practicable, in front of the aircraft's port wing where the signaller, including rescue and firefighting personnel, can best be seen by the pilot or cabin crew as required.

For a signaller facing an aircraft, the engines are numbered from right to left as viewed by the signaller, so that the pilot's port (left) outer engine is the signaller's No. 1 engine.

Interception of aircraft (91.695)

If you are ever intercepted by another aircraft, you must comply with the MOS procedures of this section.

Interception of aircraft (MOS 23.02)

- International Civil Aviation Organization (ICAO) Annex 2 – Appendix 1 – Signals – Section 2 – Signals for use in the event of interception
- ICAO Annex 2 – Appendix 2 – Interception of Civil Aircraft, Attachment A – Interception of Civil Aircraft.

The ICAO procedures referred to above may also be found in the AAI publication.

Pilot in command to report hazards to air navigation (91.675)

If you become aware of a hazard to air navigation that is not published in the AAI, as soon as circumstances permit you must report the hazard to:

- ATS
- the aerodrome operator if the hazard is on an aerodrome.

Exception: *If you reasonably believe the hazard has already been reported there is no need to make the report.*

There may be times when it is necessary for pilots to not follow aviation safety rules in order to respond to a sudden or extraordinary emergency. Please refer to www.casa.gov.au/operations-safety-and-travel/safety-advice/mercy-fights-and-operating-emergency.

Pilot in command to report emergencies (91.680)

If practicable and you have a means of communicating with ATS, you must inform them of any threat to the safety of the aircraft or its occupants (an emergency). If dangerous goods are carried, you must also advise ATS of the nature and state of the goods.

Pilot in command to report contraventions relating to emergencies (91.690)

If an emergency occurs and the flying pilot has acted in contravention of a regulation, you or the operator must notify CASA in writing of the contravention, and the circumstances, within 2 business days after the day of the emergency.

You are not excused from giving notice by claiming that giving the notice or information might tend to incriminate or expose you to a penalty.

The information in the notice, or any document or thing provided, directly or indirectly, is not admissible in evidence in criminal proceedings.

However, providing false or misleading information or documents is an offence under the Criminal Code (see sections 136.1, 137.1 and 137.2).

Aviation distress signals (91.700)

If a person has made an aviation distress signal and the reason for making the signal no longer exists they must, as soon as the circumstances permit, cancel the signal, if the aircraft's location and state of the radio allow it to be cancelled.

9. Fuel

Fuel requirements (91.455)

You must comply with the fuel requirements set out in the MOS including (but not limited to):

- matters that must be considered when determining whether the aircraft has enough fuel to complete the flight safely
- determining the quantity of fuel you must carry
- monitoring fuel quantity
- what to do when fuel reaches a specified quantity.

Definitions of final reserve fuel and contingency fuel (MOS 19.02)

You must carry the final reserve and contingency fuel amounts set out in the following table.

Table 16: Final reserve fuel and contingency fuel requirements

Aircraft category	Flight rules	Final reserve	Contingency
Aeroplane with a MTOW equal to and less than, 5,700 kg (piston engine or turbo-prop)	VFR	30 minutes	N/A
Aeroplane with a MTOW, equal to and less than 5,700 kg (piston engine or turbo-prop)	Night VFR	45 minutes	N/A
Aeroplane with a MTOW, equal to and less than 5,700 kg (piston engine or turbo-prop)	IFR	45 minutes	N/A
Turbojet aeroplane with MTOW greater than 5,700 kg	IFR or VFR	30 minutes	5% of trip fuel
Piston engine aeroplane with MTOW greater than 5,700 kg	IFR or VFR	45 minutes	5% of trip fuel
Rotorcraft	VFR	20 minutes	N/A
Rotorcraft	Night VFR	30 minutes	N/A
Rotorcraft	IFR	30 minutes	N/A

General requirements (MOS 19.03)

Fuel consumption data

When determining the amount of usable fuel required you must use one of the following fuel consumption data sources:

- the most recent aircraft specific fuel consumption data derived from the fuel consumption monitoring system used by the operator of the aircraft (if available)
- the aircraft manufacturer's data for the aircraft.

Note: The aircraft manufacturer's data includes electronic flight planning data. The manufacturer's data may be in the AFM, cruise performance manuals or other publications.

Operational requirements

When determining the amount of usable fuel required you must also consider the effect of the following:

- the operating conditions for the proposed flight, including the:
  - actual weight (if known or available), or the anticipated weight of the aircraft
  - relevant NOTAMs
  - relevant authorised weather forecasts and authorised weather reports
  - relevant ATS procedures, restrictions and anticipated delays
  - effects of deferred maintenance items and configuration deviations
- the potential for deviations from the planned flight because of unforeseen factors.

Amount of fuel that must be carried for a flight (MOS 19.04)

At commencement of a flight
The minimum amount of usable fuel required to be onboard at the commencement of a flight must be the sum of:

- taxi fuel
- trip fuel
- destination alternate fuel (if required)
- holding fuel (if required)
- contingency fuel (if applicable)
- final reserve fuel
- additional fuel (if applicable).

At the point of inflight replanning (if any)
The minimum required amount of usable fuel to be onboard to continue a flight, from the 'point of in-flight replanning' must include:

- trip fuel from that point
- destination alternate fuel (if required)
- holding fuel (if required)
- contingency fuel (if applicable)
- final reserve fuel
- additional fuel (if applicable).

Continuation of flight at any time
The minimum required amount of usable fuel to be onboard at any time to continue a flight safely must include:

- trip fuel from that time
- destination alternate fuel (if required)
- holding fuel (if required)
- final reserve fuel
- additional fuel (if applicable).

If fuel is used after a flight commences for purposes other than originally intended during pre-flight planning, you must re-analyse the planned use of fuel for the remainder of the flight and adjust the flight parameters if necessary, to remain compliant with the fuel requirements.

If your flight:

- has been unable to land at the planned destination aerodrome, and
- you are diverting to the planned destination alternate aerodrome *(that was required for the flight – as applicable)* then you must ensure the aircraft is carrying at least the following useable fuel:
  - destination alternate fuel from the time of commencing the diversion
  - holding fuel (if required)
  - final reserve fuel.

Procedures for determining fuel before flight and fuel monitoring during a flight (MOS 19.05)

You must ensure that the amount of usable fuel onboard the aircraft is determined before the flight commences.

You must ensure that the amount of fuel is checked at regular intervals throughout a flight, and that the usable fuel remaining is evaluated to:

- compare planned fuel consumption with actual fuel consumption
- determine whether the remaining usable fuel is sufficient to meet the fuel requirements (as applicable):
  - when replanning from any point in-flight, and
  - for continuation of flight at any time
- determine the amount of usable fuel expected to be remaining when the aircraft lands at the destination aerodrome.

Procedures if fuel reaches specified amounts (MOS 19.06)

If an in-flight fuel quantity check shows that the usable fuel on landing at the destination aerodrome will or is likely to be less than the fuel required for continuation of flight at any time you must consider the likely air traffic and operational conditions on arrival at:

- the destination aerodrome
- the destination alternate (if required)
- any en route alternate aerodrome, and
  - proceed to an aerodrome that will enable you to continue to meet all the requirements *for amounts of fuel that must be carried for a flight* in MOS 19.04 as applicable.

You must request from air traffic services the duration of any likely delay in landing if unforeseen factors could result in landing at the destination aerodrome with less than the following amounts of fuel remaining:

- the final reserve fuel
- the destination alternate fuel (if required).

You must declare to air traffic services a 'minimum fuel' state if:

- you are committed to land the aircraft at an aerodrome
- it is determined that if there is any change to the existing air traffic control clearance issued to the aircraft in relation to that aerodrome, the aircraft will land with less than the final reserve fuel remaining.

If, at any time during a flight, the amount of usable fuel remaining on landing at the nearest aerodrome where a safe landing can be made, will be, or is likely to be, less than the final reserve fuel, then you must declare a situation of 'emergency fuel' by broadcasting 'MAYDAY, MAYDAY, MAYDAY FUEL'.

Note 1: The declaration of 'minimum fuel' informs air traffic services that all planned aerodrome options have been reduced to a specific aerodrome of intended landing, and any change to the existing clearance may result in landing with less than the final reserve fuel. This is not an emergency situation, but an indication that an emergency situation is possible should any additional delay occur.

Note 2: A pilot should not expect any form of priority handling because of a 'minimum fuel' declaration. Air traffic services will, however, advise the flight crew of any additional expected delays, and coordinate when transferring control of the aircraft to ensure other air traffic control units are aware of the aircraft's fuel state.

Note 3: The emergency fuel declaration is a distress message.

Why declare 'MAYDAY FUEL'?

The 'MAYDAY, MAYDAY, MAYDAY FUEL' declaration aims to increase safety. It alerts other airspace users to a potential fuel problem facing an aircraft in their vicinity and ensures priority is given to the aircraft making the declaration to reduce the chances of an accident.

The declaration is an internationally recognised standard aligning Australia with the International Civil Aviation Organization standards designed to manage aviation safety risks.

Mandating the declaration of 'MAYDAY FUEL' is not aimed at setting conditions to prosecute pilots or operators, nor does it automatically mean that emergency services will be mobilised.

It is fundamental to flight safety that you have enough fuel before you depart to allow you to land with at least your final reserve intact. Thorough fuel planning and in-flight fuel management must be a high priority for any pilot.

Preserving final fuel reserve is a foundation for in-flight fuel decision-making which leads to safer operations. This does not mean that in all instances preserving your final fuel reserve is the highest priority. There may be occasions where it is more important to exercise judgement to determine the safest outcome, which may include landing with less than final fuel reserve.

Refer AC 91-15 - Guidelines for aircraft fuel requirements and its associated documents - for further guidance. See the following links:

- https://www.casa.gov.au/sites/default/files/2021-09/advisory-circular-91-15-guidelines-aircraft-fuel-requirements.PDF
- https://www.casa.gov.au/sites/default/files/2021-08/advisory-circular-91-15-annex-a-sample-fuel-calculations-single-engine-piston-aeroplane.PDF
- https://www.casa.gov.au/sites/default/files/2021-08/advisory-circular-91-15-annex-b-sample-fuel-calculations-multi-engine-turboprop-aeroplane.PDF

Operational variations – procedures and requirements (MOS 19.07)

An operator under Part 141/142 (flight training), Part 137 (aerial application) and Part 138 (aerial work) may provide an operational variation to the *general fuel requirements* (under MOS 19.03) and the amounts that must be carried for a flight (under MOS 19.04).

The operations manual must detail the procedures for the operational variation relating to the calculation of any of the following:

- taxi fuel
- trip fuel
- contingency fuel (if any)
- destination alternate fuel
- additional fuel.

An operator must not include an operational variation relating to the calculation of holding fuel.

An aerial application or aerial work operator may include a variation relating to the calculation of final reserve fuel in their operations manual, provided that only flight crew members are carried for the operation.

If an operator intends to provide an operational variation, the operator must submit to CASA at least 28 days before using the variation a copy of the operator's procedures in relation to the operational variation, along with evidence, of at least 1 of the following which demonstrates how the variation will maintain or improve aviation safety:

- documented in-service experience
- the results of a specific safety risk assessment conducted by the operator that meets the following requirements and includes at least:
  - » flight fuel calculations
  - » the capabilities of the operator, including:
    - – a data-driven method that includes a fuel consumption monitoring program
    - – the use of sophisticated techniques for determining the suitability of alternate aerodromes
    - – specific risk mitigating measures.

Note: Under regulations 137.080, 137.085, 137.090, 138.068, 141.100 and 142.155 of CASR (as applicable), CASA may direct the operator to remove or revise the operational variation, if CASA were to find there was insufficient evidence that it would maintain or improve aviation safety.

Oil requirements (91.460)

You must ensure an aircraft carries enough oil to complete the flight safely.

Contaminated, degraded or inappropriate fuels (91.465)

The pilot and the operator must ensure that an aircraft has not been fuelled with contaminated, degraded or inappropriate fuel.

A person must not supply or fuel an aircraft with contaminated, degraded or inappropriate fuel.

Exception: *This regulation does not apply to a person supplying fuel for a Part 131 aircraft.*

Where various fuel types are available there is a risk of fuelling with an incorrect type. An aircraft's fuel system may still have enough fuel of the correct type to allow start, taxi and take-off – only to have the engine fail or develop partial power soon thereafter.

Before your next flight you should take a sample of fuel from your aircraft by draining a small amount of fuel from each drain point on the aircraft into a clear container to check for water contamination. Normally water will show up by a separation in the bottom of the fuel sample. If this occurs, you should continue to drain the tank or line from where the sample was contaminated until you are obtaining a clear uncontaminated sample of fuel only. If there is still any doubt that the fuel is contaminated, do not take -off. You may need to seek maintenance of the fuel system.

Often contamination of fuel by water can occur because of a poor fitting fuel cap therefore if you have washed your aircraft or it has been parked in the open and there has been rain or frost on the aircraft take particular care to check for water contamination.

Fuel from drums should be checked for contamination before it is pumped into your aircraft. Testing for the presence of water in fuel should be done using a water detecting paste, paper or other positive methods.

In the case of turbine fuel, you should watch for signs of cloudiness or other indications of the presence of suspended water droplets. Compared to Avgas the presence of water contamination may not show up for some time after refuelling.

Always follow any flight manual instructions where provided.

See AC 91-25 Fuel and oil safety

Fire hazards (91.470)

When an aircraft is being fuelled, a person must not create a fire hazard, or allow a fire hazard to exist, within 15 m of the aircraft or equipment used to fuel the aircraft.

All reasonable precautions against fire hazards should be taken. All equipment should be of sound design and should be maintained in safe working condition. Give attention to sources of ignition such as:

- *persons smoking*
- *incandescent carbon or naked flame which could be emitted from the engine or associated equipment*
- *arcing between metallic parts of electrical circuits and components caused by:*
  - *operation of switch contacts*
  - *faulty cable terminals*
  - *breakdown of electrical insulation*
  - *moving contacts, or rotary electrical equipment*
  - *accidental short circuiting or open circuiting*
  - *exposure of hot parts to combustible matter*
  - *overheating of working parts to the ignition temperature of any oils, fuel or other combustible matter in the vicinity of the engines.*

In the event of a fuel spillage, measuring more than 2 m in diameter, the fuelling overseer should:

- *consider evacuation of the area (it is generally safer to evacuate upwind and upslope of any fuel spillage)*
- *notify the aerodrome rescue and firefighting service and comply with laid-down aerodrome procedures*
- *prevent the movement of persons or vehicles into the affected area and restrict all activities in the vicinity to reduce the risk of ignition.*

You should not start a vehicle engine within 6 m of a spillage until the area is declared safe.

Fuelling aircraft – firefighting equipment (91.475)

A person who fuels an aircraft must ensure at least 2 fire extinguishers are readily available and positioned not less than 6 m but not more than 15 m from the fuelling point. Each fire extinguisher must be of a type and capacity suitable for extinguishing fuel and electrical fire. A fuelling operation in Australia must comply with Australian/New Zealand Standard AS/NZS 1841.

Exception: *For a Part 131 aircraft, 1 fire extinguisher only is required to be positioned not less than 6 m but not more than 15 m from the fuelling point.*

The joint Australian and New Zealand Standard AS/NZS-1841 is the standard that applies to portable fire extinguishers that are to be available for use during a fuelling operation.

Fuelling aircraft – electrical bonding (91.480)

A person who fuels an aircraft must ensure the aircraft and equipment used to fuel the aircraft are electrically bonded.

Electrical bonding is important to equalise the electrical potential (charge) between the aircraft, the fuel tanks and the fuelling equipment so as to prevent any static electrical discharge between them. Before fuelling, the fuelling equipment must be bonded to the aircraft, and the filler nozzle must be bonded to the aircraft before removing the filler cap. Once fuelling has stopped, and the filler cap is replaced, all bonding can be removed.

Equipment or electronic devices operating near aircraft (91.485)

Operation of equipment or electronic device near aircraft during fuelling
When an aircraft is being fuelled a person must not operate equipment or an electronic device within 15 m of a critical fuelling point for the aircraft.

Fuelling aircraft while equipment or electronic device is operated near aircraft
A person must not fuel an aircraft when equipment or an electronic device is being operated within 15 m of a critical fuelling point of the aircraft.

> **Exception:** *The above requirements do not apply if the equipment or electronic device:*
>
> - *is part of the aircraft or the aircraft's fuelling equipment, or*
> - *is designed for use during fuelling operations, or*
> - *performs an aircraft servicing function and is safe for use within 15 m of a critical fuelling point for the fuelling of the aircraft, or*
> - *complies with an industry standard about the safe use of equipment or electronic devices within 15 m of a critical fuelling point for the fuelling of the aircraft.*
>
> **Exception:** *The auxiliary power unit (APU) of the aircraft may be operated during fuelling if it is permitted by the AFM and it is started before fuelling begins.*
>
> **Exception:** *An operating electronic device, hazardous to the process of fuelling only because it is designed to produce radio emissions (within the meaning of the Radiocommunications Act 1992), may be used but must be at least 6 m from each critical fuelling point when fuelling the aircraft.*

Fuelling turbine-engine aircraft – low-risk electronic devices (91.490)

Use of device inside cabin of aircraft
A person may only operate a low-risk electronic device inside the cabin of a turbine-engine aircraft being fuelled when you have given permission, and each cabin door within 3 m of a critical fuelling point is closed.

Use of device outside cabin of aircraft
A person may only operate a low-risk electronic device outside the cabin of a turbine-engine aircraft while it is being fuelled if the device is operated more than 3 m from each critical fuelling point.

> **Exception:** *A person may operate a low-risk electronic device outside the cabin of a turbine-engine aircraft while it is being fuelled, less than 3 m from each critical fuelling point, if:*
>
> - *the person is employed or engaged by the operator, and they have been trained:*
> - *to operate the device in such areas*
> - *to avoid the risks associated with being distracted when doing so, and*
> - *the operator has assessed the person's competence to comply with the fuelling regulations as set out in this section.*

Only turbine-engine aircraft to be hot fuelled (91.495)

Only a turbine-engine aircraft may be hot fuelled.

See CASR 138.300 for an exception in certain circumstances .

Hot fuelling aircraft – general (91.500)

Hot fuelling of an aircraft means the fuelling of an aircraft with an engine running.

An auxiliary power unit (APU) is not considered to be an engine unless it is capable of propelling an aircraft (MOS 26.37).

Before hot fuelling, an aircraft you must ensure:

- it is safe to do so
- if it is a turbine propeller-driven aeroplane:
  - any propeller of an aeroplane is not within 2.5 m of the fuelling point used for the hot fuelling
  - a person using the fuelling point is separated from the propeller by a part of the aeroplane's structure (such as a wing)
  - a person must not be able to move directly into the propeller's arc from the fuelling point
- the doors on the fuelling side of the aircraft are closed
- at least 1 door is open on the non-fuelling side of the aircraft

- the fuelling system does not allow fuel to be exposed to the atmosphere
- the person fuelling the aircraft has a means available for quickly cutting off the fuel supply at its point of entry into the aircraft's fuel tank
- the person in charge of the aircraft, or the person at the aircraft's controls, maintains communication with the person fuelling the aircraft by means of an electronic communication system, or visual contact and an agreed system of signals.

Hot fuelling aircraft – procedures (91.505)

You must ensure that hot fuelling of an aircraft is only undertaken if the aircraft flight manual contains:

- procedures for and circumstances of when it can occur
- procedures if an emergency occurs.

You must also ensure that a person who is directly involved in hot fuelling is briefed about compliance with the procedures and circumstances.

Hot fuelling is a hazardous activity. It should not be attempted without considerable thought given to the inherent risk, compliance with the AFM procedures, preparation and briefing.

Exception: *A pilot who is flying a turbine powered aeroplane operated under an approval issued by a Part 105 ASAO to conduct parachute operations is exempted from this rule.*

The Part 105 ASAO exposition must have hot fuelling requirements equivalent to those under 138.300, to cover:

- *the procedures for the hot fuelling of the aircraft*
- *the circumstances in which the aircraft can be hot fuelled*
- *the procedures to be followed if an emergency occurs during hot fuelling*
- *procedures to ensure a person involved in hot fuelling the aircraft is trained and competent to be involved in hot fuelling the aircraft.*

The operator must require the pilot to comply and the pilot must comply with the requirements. (EX81/21)

Fuelling aircraft – persons on aircraft, boarding or disembarking (91.510)

Highly volatile fuel

When fuelling an aircraft with highly volatile fuel, you must ensure that no person, other than a crew member is onboard, boarding, or disembarking from the aircraft.

Other than highly volatile fuel

When fuelling an aircraft with other than highly volatile fuel, you or the operator must hold an approval to do so when a person other than a crew member is onboard, boarding, or is disembarking.

Exception: *This regulation does not apply to the replacement of fuel cylinders on a balloon or hot air airship (a Part 131 aircraft).*

A highly volatile fuel is one which easily evaporates when brought into contact with the air. In aviation, this generally refers to AVGAS or MOGAS fuel. Fuel 'other than highly volatile' generally refers to AVTUR or kerosene (also see the definition of 'highly volatile fuel' in the CASR Dictionary).

Although the regulations provide for the pilot and operator to be approved when fuelling, with other than highly volatile fuel, when a person other than a crew member is onboard, boarding or disembarking the aircraft, CASA does not recommend such activities under Part 91.

Fuelling aircraft if fuel vapour detected (91.515)

When fuelling, if fuel vapour is detected in the aircraft and a person other than a crew member is onboard, boarding or disembarking, you and the operator must ensure that fuelling is stopped.

10. Pre-flight planning and preparation

Flight preparation requirements – weather assessment (91.230)

You must comply with the following flight preparation requirements.

Forecasts for flight planning (MOS 7.02)

You must study the authorised weather forecasts and reports for the route, and for the departure, the planned destination and any planned alternate aerodrome to be used, as well as any other reasonably available relevant weather information for your intended flight. If you first study the forecasts more than one hour before commencing a flight you must review an update to that information before the flight begins.

Note: If the aerodrome forecasts above are not available you must nominate a destination alternate aerodrome.

An authorised weather forecast must cover the whole period of the flight, and include a wind and temperature forecast and one of the following:

- for a flight at or below 10,000 ft above mean sea level (AMSL), a graphical area forecast (GAF) or general aviation meteorological (GAMET) area forecast
- for a flight above 10,000 ft AMSL, a significant weather (SIGWX) forecast
- for any operation – a flight forecast.

For IFR flights except those under Part 121– to a planned destination or a planned alternate with an instrument approach procedure that you can conduct – the forecast must be an aerodrome forecast or an ICAO landing forecast.

For IFR flights except those under Part 121– to a planned destination without an instrument approach procedure or where the pilot is unqualified to fly the instrument approach – the forecasts must be:

- for the planned destination aerodrome – an aerodrome forecast or an ICAO landing forecast or a GAF or GAMET area forecast
- for a planned alternate aerodrome – an aerodrome forecast or an ICAO landing forecast.

An authorised weather forecast used to satisfy the requirements for the departure, planned destination and planned alternate aerodromes nominated in a flight plan, must be valid for at least 30 minutes before, and 60 minutes after, the planned estimated time of arrival (ETA).

You may obtain a wind and temperature forecast from wind and temperature charts, grid point wind and temperature charts, route sector wind and temperature forecasts, a National Aeronautical Information Processing System (NAIPS) wind and temperature profile, as well as from approved flight planning systems deriving data from the Bureau of Meteorology or the World Area Forecast System.

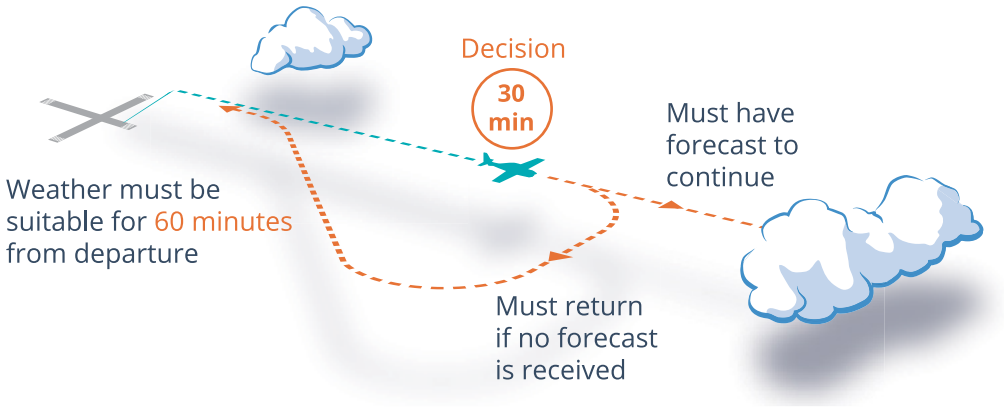
The term GAMET is not used in Australia but is of relevance to Australian aircraft operating overseas.

Flights unable to obtain an authorised weather forecast before departure (MOS 7.03)

If a weather forecast or report is not available, you may depart, provided you reasonably consider that the weather conditions at the departure aerodrome will allow you to return and land safely within 1 hour after take-off; however, you must return to the departure aerodrome if you do not obtain a weather forecast within 30 minutes after take-off (see Figure 12).

> **Exception:** *For a Part 121 operation you must return to the departure aerodrome if you do not obtain a weather forecast within 30 minutes after take-off unless you satisfy the Part 121.170 Flight preparation alternate aerodromes requirements.*

Figure 12: Departure aerodrome return decision



Flight preparation requirements – alternate aerodromes (91.235)

If you are required to plan for an alternate aerodrome, you must comply with the following flight preparation (alternate aerodrome) requirements:

Destination alternate aerodromes – weather (MOS 8.04)

Terminal area forecast (TAF) (MOS 8.02)
You must nominate a destination alternate aerodrome if the ETA at the planned destination aerodrome is during the period that begins 30 minutes before or ends 30 minutes after the following weather conditions are forecast:

› cloud – more than scattered (SCT) below the alternate minima

Note: For alternate minima see Table 17.

- visibility – either:
  - less than the alternate minima or
  - equal to or more than the alternate minima but with a forecast of at least a 30% probability (PROB) of fog, mist, dust or any other phenomenon restricting visibility below the alternate minima
- wind – a headwind, crosswind or downwind component more than the maximum for the aircraft
- a thunderstorm or its associated severe turbulence, or a forecast of at least 30% PROB of their occurrence (see Figure 13).

Note: PROB is used in a TAF to indicate an expected 30% or 40% probability of an occurrence.

TAF3 or ICAO landing forecast (MOS 8.02)

If flight planning is based on a TAF3 or ICAO landing forecast, you must nominate a destination alternate aerodrome if the above weather conditions are forecast at your destination at the estimated time of your arrival (ETA):

- your ETA must be within the first 3 hours of the validity period of the TAF3 but not outside the end time (if any) specified for the TAF3 service
- you may ignore meteorological conditions described as probable (PROB)
- the 30-minute buffer periods typically applicable to the commencement and cessation of weather conditions forecast in a TAF, do not need to be applied to the forecast commencement and cessation of those weather conditions in a TAF3.

Forecasts not available

Where a forecast that is required for a planned destination (see MOS 7.02) is not available then you must nominate a destination alternate aerodrome.

Destination alternate not required

The nomination of a destination alternate is not required if:

- you are flying under the VFR by day within 50 NM of the departure aerodrome, or
- weather conditions exist that require the planning of a destination alternate aerodrome but you ensure that enough fuel is carried to permit the aircraft to hold at the destination aerodrome until 30 minutes after the forecast end of the weather conditions, or

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- an aerodrome forecast contains INTER or TEMPO weather conditions which require the planning of a destination alternate aerodrome but you ensure enough fuel is carried to permit the aircraft to hold for:
  - 30 minutes – when the forecast is endorsed INTER
  - 60 minutes – when the forecast is endorsed TEMPO
  - for a forecast that has a multiple INTER or TEMPO endorsements, the fuel for holding must be that for the most limiting requirement.

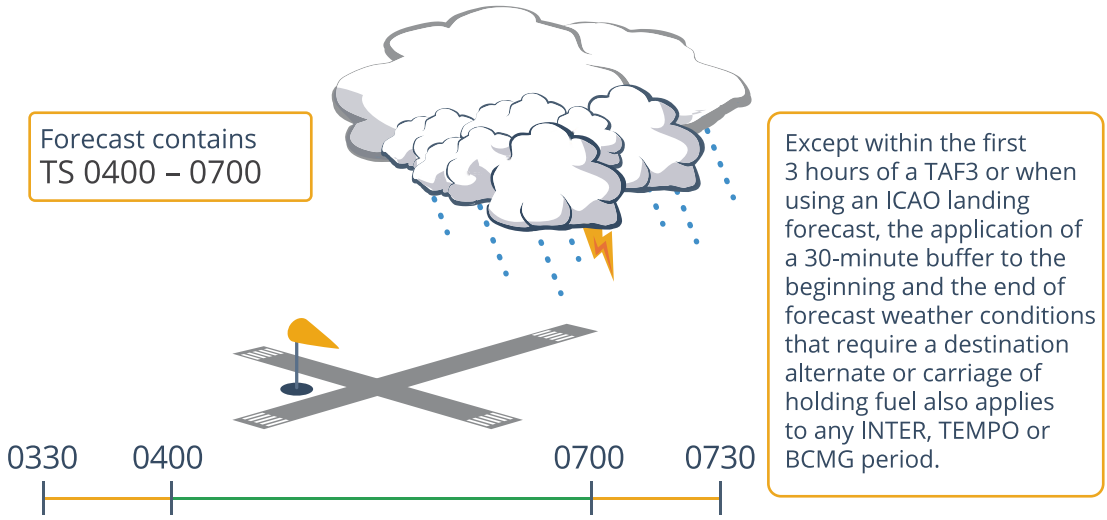
A forecast that includes the change indicator BECMG

For a forecast that includes a BECMG period, deteriorating weather conditions are taken to commence at the start of the BECMG period and improving weather conditions are to be taken to commence at the end of the BECMG period.

Buffer periods

Except within the first 3 hours of a TAF3 or when using an ICAO landing forecast, the application of a 30-minute buffer to the beginning and the end of forecast weather conditions that require a destination alternate or carriage of holding fuel also applies to any INTER, TEMPO or BECMG period.

Figure 13: Example of the application of the TAF buffer period



Destination alternate aerodromes – navigation (MOS 8.05)

For a flight under the IFR by night, you must nominate a destination alternate aerodrome for a planned destination aerodrome that is:

- not served by an IAP, or
- is served by an IAP that you are not able to conduct.

For a flight under the VFR by night, you must nominate a destination alternate aerodrome that is within 1 hour's flight time of the planned destination aerodrome unless:

- the destination is served by a ground-based radio navigation aid and the appropriate radio navigation system is fitted to the aircraft and you are competent to use the aid, or
- the aircraft is fitted with an approved global navigation satellite system (GNSS), and you are competent to use the GNSS.

If aircraft navigation is to be conducted using a GNSS certified only to technical standard order (TSO) C-129, navigation to a destination alternate aerodrome must be planned to use a navigation system other than GNSS.

Destination alternate aerodromes – aerodrome lighting (MOS 8.06)

For this section, a qualified and responsible person means a person who is instructed in, and is competent to display, the standard runway lighting with portable lights.

If a flight is planned to land at night at an aerodrome that only has portable runway lighting, you must nominate a destination alternate aerodrome unless:

- reliable arrangements have been made for a qualified and responsible person to:
  - attend the aerodrome during the period from at least 30 minutes before the ETA, to completion of landing and taxiing, and
  - display the portable lighting.

If a flight is planned to land at night at an aerodrome with electric runway lighting, but without standby power, you must nominate a destination alternate aerodrome unless:

- portable runway lights are available, and
- reliable arrangements have been made for a qualified and responsible person to:
  - attend the aerodrome during landing and taxiing, and
  - display the portable lighting in the event of a failure of the primary lighting.

> **Exception:** *The destination alternate aerodrome is not required to have standby power or portable runway lighting.*

If a flight is planned to land at night at an aerodrome with a pilot-activated lighting (PAL) system, you must nominate a destination alternate aerodrome unless reliable arrangements have been made for a qualified and responsible person to:

- attend the aerodrome during landing and taxiing, and
- manually switch on the runway lighting in the event of a failure of the PAL.

> **Exception:** *The destination alternate aerodrome is not required to have standby power or portable runway lighting.*

For an aircraft fitted with a single VHF radio you may only nominate an aerodrome with PAL as an alternate aerodrome if:

- reliable arrangements have been made for a qualified and responsible person to be available to manually switch on the aerodrome lighting, and
- the aircraft has:
  - a high frequency (HF) radio
  - 30 minutes of holding fuel.

Note: There is no requirement for a responsible person to be in attendance at the aerodrome. The requirement for holding fuel will allow ground staff to be alerted in the event of a failure of the aircraft's VHF radio.

> **Exception:** *The nomination of a destination alternate aerodrome for lighting is not required if you ensure that sufficient fuel is carried to permit the aircraft to hold until first-light plus 10 minutes.*

Destination alternate aerodromes – restrictions (MOS 8.07)

A destination alternate aerodrome may only be nominated if it is:

- suitable as a destination aerodrome
- not itself an aerodrome which would require a destination alternate
- not a helideck.

Image | CASA

Alternate minima – Australian aerodromes (MOS 8.08)

The following Table sets out for an aeroplane and rotorcraft the alternate meteorological minima for altitude and visibility for aerodromes in Australian territory.

Table 17: Alternate minima at Australian aerodromes (MOS 8.08)

Type of aircraft	Type of operation	Cloud ceiling	Visibility	Additional requirements
Aeroplane or rotorcraft	IFR to aerodrome with IAP	The alternate minima published on the instrument approach chart		
Aeroplane or rotorcraft	(a) Day IFR to an aerodrome without IAP, or (b) Day IFR to an aerodrome with one or more IAP's, none of which the pilot is able to conduct	LSALT for the final route segment plus 500 ft	8 km	See MOS 8.05 for IFR by night.
Aeroplane	Day VFR and night VFR	1,500 ft	8 km	
Rotorcraft	Day VFR	1,000 ft	3 km	Only for aerodromes in Class G airspace
	Day VFR and night VFR	1,500 ft	8 km	Only for aerodromes in airspace other than Class G
	Night VFR	1,500 ft	8 km	

Special alternate minima are available for operations by aircraft fitted with at least:

- 2 instrument landing systems (ILS)
- 2 VORs
- one of the following combinations of distance measuring systems:
  - 2 DME, or
  - 2 GNSS, or
  - 1 DME and 1 GNSS.

The special alternate minima where available are depicted in the notes on the IAP chart.

Cloud ceiling in a TAF is expressed above ground level (AGL).

Special alternate minima must not be used in any of the following circumstances:

- when an aerodrome control service is not provided
- when an authorised weather forecast or report is not available for the aerodrome
- when ground equipment associated with the approach aid has been unserviceable for more than 7 days and continues to be unserviceable.

Note: The non-availability of special alternate minima will be published in NOTAMs.

Alternate minima – at foreign aerodromes (MOS 8.09)

The relevant IAP for an aerodrome outside Australian territory is the IAP that has the second lowest minimum descent altitude for the IAP available and which the pilot is able to conduct. The IAP available must not rely on the same navigation system except if minimum altitudes for precision approach procedures are used. However, Category (CAT) II and CAT III minimum altitudes must not be used in determining the alternate minima (MOS 8.03).

The alternate minima for an aerodrome outside Australian territory are whichever one of the following provides the highest minima:

- the official alternate minima published by the state in which the aerodrome is located
- the circling minima for the aerodrome, plus:
  - a cloud ceiling increment of 500 ft
  - a visibility increment of 2 km
- the landing minima of the relevant IAP for the aerodrome, plus:
  - where the state's increments are published – those increments, or
  - where the state's increments are not published, or if the availability or reliability of the approach aid is doubtful:
    - a cloud ceiling increment of 500 ft
    - a visibility increment of 2 km
- if the relevant IAP is a precision approach procedure:
  - a cloud ceiling of 400 ft
  - a visibility of 1,600 m
- if the relevant IAP is not a precision approach procedure:
  - a cloud ceiling of 800 ft
  - visibility of 3,000 m

If the aerodrome has straight-in procedures to a runway that is not suitable for the operation, and circling is permitted, then:

- the alternate minima must not be lower than the circling minima for the aerodrome plus:
  - a ceiling increment of 500 ft
  - a visibility increment of 2 km.

In many cases the application of a 500 ft ceiling increment and 2 km visibility increment to the circling minima will result in the highest alternate minima.

Specified aircraft performance categories (91.320)

When conducting an IAP the operator must not allow an aircraft to be operated in a lower performance category than that derived (from Table 18 below) without holding an approval. In addition, the operator must provide its flight crew with the details of the approval and any conditions imposed by CASA.

The specified aircraft performance category for an aeroplane is the highest of those determined from Table 18.

Note: Performance categories rank from A (lowest) to E (highest).

The specified aircraft performance category for a helicopter is:

- H, or
- A, for an instrument approach procedure that does not specify category H minima.

The specified aircraft performance category for a powered-lift aircraft is that stated in the AFM.

Table 18: Definition of specified aircraft performance category – (MOS 2.02)

Aircraft performance category – V_{AT}
A – up to 90 V_{AT}
B – from 91 to 120 V_{AT}
C – from 121 to 140 V_{AT}
D – from 141 to 165 V_{AT}
E – from 166 to 210 V_{AT}

Note: V_{AT} is the indicated airspeed (IAS) in knots at the threshold which is equal to the stalling speed V_{SO} multiplied by 1.3, or the stalling speed V_{S1G} multiplied by 1.23.

The table allows a pilot to determine the specific performance category for the aircraft.. You should consult 91.287 and MOS 14.09 limitations relating to your performance category air speed limitations when conducting an instrument approach procedure.

Flight notifications (91.240)

You must follow the flight notification requirements prescribed in the MOS as follows.

Flight notification requirements (MOS 09.02)

You must submit a flight plan in accordance with the AAI procedures for:

- an IFR flight
- a VFR flight in C or D airspace.

If your VFR flight is any of the following:

- air transport, or
- over water, beyond a distance from land greater than would allow the aircraft to reach land with one engine inoperative, or
- in a designated remote area, or
- at night proceeding beyond 120 NM from the departure aerodrome, then you must also do one of the following:
  - submit a flight plan, or
  - nominate a search and rescue time (SARTIME) for your arrival, or
  - leave a flight note with a responsible person.

If your flight is a VFR community service flight, you must submit a flight plan or nominate a SARTIME for arrival in accordance with procedures in the AAI.

Note: These are the minimum flight notification requirements; however, nothing prevents you from submitting a flight plan, nominating a SARTIME, or leaving a flight note with a responsible person (see MOS 9.05 below) for any flight.

Image | CASA

Changes to flight plans and SARTIME nominations (MOS 9.03)

If you have submitted a flight plan you must notify ATS of any change to:

- the aircraft callsign or registration
- the flight rules under which the flight will be operating
- the serviceability of the equipment that, as stated in the flight plan, is carried onboard
- the planned departure time (but only if changed by more than 30 minutes)
- the route, landing points and destination alternate aerodromes
- your cruising level
- your cruising speed
- the number of persons onboard (POB) (except if you are conducting Australian air transport operations).

When you have nominated a SARTIME you must notify ATS of any of the following changes:

- the aircraft callsign or registration
- the planned departure time (but only if changed by more than 30 minutes)
- the route, landing points and destination alternate aerodromes
- the SARTIME.

Cancelling SARTIME (MOS 9.04)

You must cancel your SARTIME no later than the time nominated.

Responsible persons for receipt of a flight note (MOS 9.05)

A responsible person for the receipt of a flight note must:

- be over the age of 18 years
- have access to at least two operative and appropriate means of communicating with a search and rescue service

Note For example 2 telephones or 1 telephone and 1 radio transmitter.

- be able to satisfy you they:
  - know how to contact the Joint Rescue Coordination Centre (JRCC) Australia
  - will immediately do so if your flight is overdue.

When cancelling a SARTIME you must include the aircraft call sign and place of arrival. ATS will acknowledge your 'CANCEL SARTIME' report with a readback of the place of arrival, if appropriate, and the words 'SARTIME CANCELLED'.

Matters to be checked before take-off (91.245)

Before take-off, you must complete the following checks prescribed in the MOS.

Matters to be checked before take-off (MOS 10.02)

Before commencing a flight, you must complete the following checks to confirm:

- each aerodrome, air route and airway facility that you plan to use will be available, adequate and safe for use
- all Head Office and FIR NOTAMs applicable to the en route phase of the flight
- all location-specific NOTAMs for relevant aerodromes
- the availability of GNSS integrity if required by MOS 11.03 or MOS 14.06
- all equipment required to be fitted to, or carried on the aircraft is available and functioning properly
- emergency and survival equipment carried on the aircraft is readily accessible
- that each crew member is fit to perform his or her duties
- the aircraft's hatches, access ports, panels and fuel tank caps are secured
- the control locks, covers and ground safety devices and restraints have been removed
- if the aircraft is an Australian aircraft, that there is either:
  - a certificate of release to service for the most recent maintenance carried out on the aircraft, or
  - a maintenance release for the aircraft
- that the aircraft's flight controls have been tested and are functioning correctly
- for each system fitted to the aircraft for measuring and displaying pressure altitude, the system's accuracy in accordance with the procedures described in MOS 10.03 and MOS 10.04
- if an amount of supplemental oxygen or protective breathing equipment is required, to be carried for a flight crew member, the following checks (as the case requires) have been made:
  - the required amount of supplemental oxygen is available
  - the protective breathing equipment is operative
  - the oxygen mask is connected to the supply terminal
  - each communication system associated with the oxygen mask is connected to the aircraft's communication system
  - if an oxygen mask is adjustable, the mask fits the flight crew member correctly.

Pilots and operators should identify the requirements that must be addressed that are applicable to their aircraft operations. Checks of aircraft equipment should be completed in accordance with any criteria or limitation expressed in the AFM, or where the AFM has no instruction for other equipment, the manufacturer's requirements or guidance for that equipment.

Although not mandatory under Part 91, CASA recommends operators develop the following checklists as a minimum:

- *before take-off*
- *approach*
- *landing.*

See AC 91-22 *Aircraft checklist systems for further information.*

Checking systems for measuring and displaying pressure altitude – general (MOS 10.03)

If the site elevation is known and an accurate QNH is available then before take-off, you must check the accuracy of each altimeter.

Altimeters must be checked as detailed below.

Checking pressure altitude systems – IFR flight (MOS 10.04)

For a flight under the IFR you must consider any altimeter with an error in excess of ± 75 ft as inoperative.

If the category of operation requires 2 altimeters, one must read the site elevation to within 60 ft. If the other altimeter has an error between 60 ft and 75 ft, you may fly to the first point of landing where its accuracy can be rechecked; however, if on rechecking the other system after landing, it shows an error in excess of 60 ft, this altimeter must be considered as inoperative for further IFR flight.

If the category of operation requires 1 altimeter, but 2 are fitted, flight is permitted if at least one of the altimeters reads the site elevation to within 60 ft; however, if the remaining altimeter has an error in excess of 75 ft, you must placard it as inoperative for IFR flight.

If the category of operation requires only 1 altimeter and only 1 is fitted and it has an error between 60 ft and 75 ft, you may fly to the first point of landing where the accuracy of the altimeter can be rechecked; however, if on rechecking the altimeter it shows an error in excess of 60 ft, you must consider it as inoperative for further IFR flight.

Certain aircraft manufacturers may specify altimeter check criteria in the AFM which are more stringent than those stated here. You must comply with the AFM.

Checking pressure altitude systems – VFR flight (MOS 10.05)

For a flight under the VFR, an altimeter used with an accurate QNH is only operative if it reads site elevation to within:

› 100 ft, or

› 110 ft at test sites above 3,300 ft.

An aircraft fitted with 2 altimeters that continues to fly under the IFR with 1 altimeter reading erroneously by more than 100 ft (or 110 ft as the case may be), then you must consider the erroneous altimeter as inoperative for further use.

If you plan to fly VFR above FL200, you must check the altimeter accuracy against the IFR accuracy requirements.

Accurate QNH and site elevation (MOS 10.06)

QNH is to be considered accurate only if it is provided by one of the following:

› automatic aerodrome information service (AAIS)

› air traffic control (ATC)

› aerodrome automatic terminal information service (ATIS)

› automatic weather information service (AWIS)

› certified air/ground radio service (CA/GRS)

› weather and terminal information reciter (WATIR).

QNH from an authorised weather forecast must not be used for checking the accuracy of a pressure altimeter.

Site elevation must be derived from aerodrome survey data that is authorised in writing by CASA or an NAA or supplied in writing by the relevant aerodrome operator.

11. Ground operations

Use of aerodromes (91.410)

You may only take off or land if you can do so safely considering all the circumstances, including the prevailing weather conditions, at one of the following places:

› a certified aerodrome

› a military aerodrome

› a place suitable to take off or land from.

When considering 'all circumstances' expressed in the regulation you should include, aircraft performance, the take-off or landing distance available, obstacles in the take-off or landing flight path, temperature, wind direction and speed. Also consider the type of runway surface and the runway surface condition.

See also other MOS take-off and landing performance requirements in this section below.

› *See* AC 91-02 - Guidelines for aeroplanes with MTOW not exceeding 5 700 kg - suitable places to take off and land

› AC 91-29 Guidelines for helicopters – suitable places to take-off and land

Information pertinent to air transport operations in rotorcraft is contained in AC 133-01 (AC 133-02 may also be of use to Part 91 rotorcraft operators).

For information on aerodrome lighting and pavement strength refer to AMC/GM Part 91 and to the AIP-ERSA.

Military aerodromes used by Australian and foreign aircraft (EX81/21)

Before operating to, from or at a military aerodrome the operator must obtain permission from the relevant military authority.

The operator and pilot must comply with any conditions of the permission that are not contrary to the civil aviation legislation.

When operating at a joint military/civilian aerodrome, the operator and pilot, must each comply with the AAI, unless those requirements are contrary to the civil aviation legislation.

Note 1 Information on military aerodromes including the relevant military authority are listed in the AIP-ERSA under the symbol 'MIL'.

Note 2 Permission may be in whatever form the the relevant military authority chooses.

Note 3 Information on, joint military/civilian aerodromes are listed in the AIP-ERSA under the symbol 'JOINT'.

Parked aircraft not to create hazard (91.420)

A person must not park an aircraft in a place where it is a hazard to the movement of other aircraft.

Safety when aeroplane operating on ground (91.425) (MOS 18.01)

Only a pilot, a person qualified to taxi under Part 64, or a person operating the aeroplane for maintenance or maintenance training, may start the engine of an aeroplane on the ground. When a person starts the engine the aeroplane must be secured from moving.

When hand starting the engine using the propeller, and assistance is not readily available, a person must secure the aeroplane from moving and no other person may be onboard. However, a person may have another person in a pilot seat to assist with starting, to apply the brakes and control the engine including shutting down the engine, provided they have been instructed how and their competence has been assessed by a qualified person.

Safety when rotorcraft operating on ground (91.430)

For other than maintenance or maintenance training, only a qualified pilot may operate a rotorcraft on the ground.

> **Exception:** *For foreign registered aircraft a pilot authorised by either the state of registry or the state of the operator may operate a rotorcraft on the ground for other than maintenance or maintenance training (EX81/21).*

The MOS may prescribe another person who may also operate a rotorcraft on the ground for other than maintenance or maintenance training provided they secure the rotorcraft from moving.

Taxiing aircraft (91.415)

An aircraft may only be taxied by a person who is qualified.

Taxiing or towing on movement area of aerodrome (91.365)

Unless an aircraft or tow vehicle is being operated in accordance with an ATC clearance or instruction, a person taxiing or towing the aircraft on the movement area of an aerodrome, must:

- give way to a landing aircraft, or one on its final approach to land
- give way to an aircraft taking off, or preparing to take off
- keep well clear of another aircraft when overtaking that aircraft
- give way to the aircraft on the right if both aircraft are on a converging course
- stop, or alter course to the right to remain clear of an aircraft approaching head-on or approximately head-on
- when giving way to an aircraft preparing to take off, taking off, landing, or on final approach to land, hold at the marked runway hold position, or where no hold position is marked, not encroach on a graded runway strip.

> **Exception:** *You may take whatever action is necessary to avoid a collision.*

A movement area is any part of an aerodrome used for the take-off, landing and taxiing of aircraft including manoeuvring areas and aprons.

12. Aircraft performance and weight and balance

Loading of aircraft (91.805)

At all times you must ensure that the aircraft is loaded and operated within its weight and balance limits.

> **Exception:** *For CASR Part 137 Aerial application operators see CASA instrument EX92/22 for directions and exemption that apply.*

The probability of overloading in small aircraft with less than 7 seats is high if standard passenger weights are used. Therefore, it is recommended to use actual passenger weights.

Take-off performance (91.795)

You and the operator when determining take-off performance of an aircraft must meet the requirements in Chapter 24 of the MOS that relate to:

- the aircraft's configuration
- the operation of any equipment for the flight
- characteristics of the aerodrome at which the aircraft takes off
- characteristics of the route flown
- characteristics of the aerodrome at which the aircraft lands.

For small aeroplanes,the AFM take off performance charts are normaly unfactored and often do not contain performance information for the effects of runway slope, various surface conditions or wind effect. In some cases they do not provideinformation on the effects of pressure and temperature variation. It is your responsibility to be satisfied the runway is long enough so you can take off safely (91.410).

To account for various levels of pilot competency or aircraft degradation of performance due to age, it is recommended for aeroplanes with landing performance charts which are unfactored, that the following factors are applied to the take-off distance required:

- *MTOW 2,000 kg or less – 1.15*
- *MTOW above 2,000 kg but below 3,500 kg – linear interpolation between 1.15 and 1.25*
- *MTOW 3,500 kg or more – 1.25.*

It is further recommended that you apply additional safety margins or factors to the above, where the AFM is silent on other matters of performance degradation. See AC 91 02 Guidelines for aeroplanes with MTOW not exceeding 5,700kgs – Suitable places to take off and land.

Any of the following IFR aircraft taking off in other than day VMC conditions, must clear obstacles by a safe margin until reaching the LSALT (set out in 91.305):

- *multi engine aeroplane under 5,700 kg*
- *a multi engine rotorcraft*
- *a single engine aeroplane or rotorcraft.*

Refer to the AMC/GM Part 91 for guidance on how a safe margin is to be determined.

Take-off performance for aeroplanes (MOS 24.02)

You must ensure, during and after take-off, until reaching the minimum height, that the aeroplane has the performance to clear all obstacles by a safe margin after considering:

- 91.265 Minimum height rules – populous areas and public gatherings
- 91.267 Minimum heights rules – other areas
- 91.277 Minimum heights – VFR flights by night
- 91.305 Minimum heights – IFR flights.

You must determine the aeroplane performance from 1 of the following:

- the AFM
- the manufacturer's data manual (if any)
- other data approved under CASR Part 21 for the purpose.

In addition, you must also consider:

- the take-off distance available
- the pressure altitude and temperature
- the type of runway surface and the runway surface condition
- the gradient of the runway in the direction of the take-off
- the wind direction, speed and characteristics
- the take-off and en route weather forecast
- the obstacles in the vicinity of the take-off flight path.

Take-off performance for rotorcraft – general (MOS 24.03)

You must ensure, during and after take-off, until reaching the minimum height, that the rotorcraft has the performance to clear all obstacles by a safe margin after considering:

- 91.265 Minimum height rules – populous areas and public gatherings
- 91.267 Minimum heights rules – other areas
- 91.277 Minimum heights – VFR flights by night
- 91.305 Minimum heights – IFR flights.

You must determine the rotorcraft performance from 1 of the following:

- the AFM
- the manufacturer's data manual (if any)
- other data approved under CASR Part 21 for the purpose.

In addition, you must also consider:

- the take-off distance available
- the adequacy of the size of the departure and planned destination aerodrome and any alternate aerodromes
- the pressure altitude and temperature
- the gradient of the take-off and initial climb stage of the flight
- the climb flight path
- the wind direction, speed and characteristics – if known, or zero wind if unknown
- the take-off and en route weather forecast
- the obstacles in the vicinity of the take-off path.

Take-off performance for rotorcraft – Category A rotorcraft within populous areas (MOS 24.04)

You may only take-off in a Category A rotorcraft, from a place that is a non-certified aerodrome or an aerodrome that is not used for the regular take-off or landing of aircraft within a populous area if:

› the performance of the rotorcraft is sufficient to comply with the category A procedure for take-off and initial climb at the place, and

› you can ensure that the rotorcraft, with 1 engine inoperative, will maintain an obstacle clear climb gradient until 1,000ft above the take-off surface.

> **Exception:** *This does not apply if the rotorcraft is being operated as a Category B rotorcraft in accordance with its Category B supplement in the AFM, and MOS 24.05 is complied with for the take off.*

Note: In the event of an engine failure, the Category A procedure allows for a rejected take-off within take-off distance available. If an engine failure occurs after the take-off decision point, the Category A procedure allows for flight clear of persons and property.

Take-off performance for rotorcraft – Category B rotorcraft within populous areas (MOS 24.05)

> *A Category A performance rotorcraft will allow for obstacle avoidance in the take-off path following an engine failure by being able to fly away. However, a Category B performance rotorcraft will not always be able to continue safe flight following an engine failure. A forced landing may result in such circumstances.*

You may only take-off in a Category B rotorcraft from a place in a populous area, that is a non-certified aerodrome or an aerodrome that is not used for the regular take-off or landing of aircraft if:

› the rotorcraft's performance is sufficient to:

  » avoid obstacles during the take-off and initial climb stage of the flight

  » auto rotate or fly clear of persons or property if there is an engine failure

  » where the area is a confined area – hover-out-of-ground-effect, and

› as far as practicable, provide for a planned take-off profile that minimises time within the avoid area of the HV curve.

Note: Avoid area of the HV curve, for a rotorcraft, means the area depicted in the AFM heightvelocity diagram, which identifies the combinations of height above ground and airspeed in knots which a rotorcraft should avoid.

Landing performance (91.800)

You and the operator when determining landing performance of an aircraft must satisfy the requirements in Chapter 25 of the MOS that relate to the:

› aircraft's configuration

› operation of any equipment for the flight

› characteristics of the aerodrome at which the aircraft lands

› safety factor percentages to be applied.

> *For small aeroplanes, the AFM landing performance charts are normaly unfactored and often do not contain performance information for the effects of runway slope, various surface conditions or wind effect. In some cases they do not provide information on the effects of pressue and temerature varition. It is your responsibility to be satisfied that the runway is long enough so you can land safely (91.410).*
>
> *To account for various levels of pilot compentcy or aircraft degradation of performance due to age, it is recommended for aeroplanes with landing performance charts which are unfactored, that the following factors are applied to the landing distance required:*
>
> › *MTOW 2,000 kg or less – 1.15*
>
> › *MTOW above 2,000 kg but below 4,500 kg – linear interpolation between 1.15 and 1.43*
>
> › *MTOW 4,500 kg or more – 1.43.*
>
> *It is further recommended that you apply additional safety margins or factors to the above, where the AFM is silent on other matters of performance degradation. See AC 91 02 Guidelines for aeroplanes with MTOW not exceeding 5,700kgs – Suitable places to take off and land.*
>
> *The FAA Safety Alerts For Operators (SAFO) provide useful information on actual landing distance (SAFO 19001) and landing in very wet conditions (SAFO 19003).*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Landing performance aeroplane (MOS 25.02)

You must ensure during approach and landing, the aeroplane has the performance, from the time it descends below the minimum height, to clear all obstacles by a safe margin after considering:

- 91.265 Minimum height rules – populous areas and public gatherings
- 91.267 Minimum heights rules – other areas
- 91.277 Minimum heights – VFR flights by night
- 91.305 Minimum heights – IFR flights.

You must determine the aeroplane performance from 1 of the following:

- the AFM
- the manufacturer's data manual (if any)
- other data approved under CASR Part 21 for the purpose.

In addition, you must also consider:

- the landing distance available
- the pressure altitude and temperature
- the type of runway surface and the runway surface condition
- the gradient of the runway in the direction of the landing
- the wind direction, speed and characteristics
- the landing weather forecast
- the obstacles in the approach flight path and missed approach flight path.

Landing performance rotorcraft – general (MOS 25.03)

You must ensure during approach and landing, the rotorcraft has the performance from the time it descends below the minimum height, to clear all obstacles by a safe margin after considering:

- 91.265 Minimum height rules – populous areas and public gatherings
- 91.267 Minimum heights rules – other areas
- 91.277 Minimum heights – VFR flights by night
- 91.305 Minimum heights – IFR flights.

You must determine the rotorcraft performance from 1 of the following:

- the AFM
- the manufacturer's data manual (if any)
- other data approved under CASR Part 21 for the purpose.

In addition, you must also consider:

- the final approach and take-off area (FATO) distance available
- the adequacy of the size of the planned destination and any alternate aerodromes
- the pressure altitude and temperature
- the gradient of the approach and any missed approach
- the wind direction, speed and characteristics – if known, or zero wind if unknown
- the en route and destination weather forecast
- the obstacles in the vicinity of the approach flight path and the missed approach flight path.

Landing performance for a rotorcraft – Category A rotorcraft within a populous area (MOS 25.04)

You may only land in a Category A rotorcraft, from a place that is a non-certified aerodrome or an aerodrome that is not used for the regular take-off or landing of aircraft within a populous area if:

› the performance of the rotorcraft is sufficient to comply with the Category A performance procedure for landing and missed approach, and

› if an engine becomes inoperative, you can ensure that the rotorcraft will maintain an obstacle clear approach gradient including any missed approach.

> **Exception:** *this does not apply if:*
>
> › *the rotorcraft is being operated as a Category B rotorcraft in accordance with its Category B supplement in the AFM, and*
>
> › *section 25.05 is complied with for the landing.*

Note: The Category A procedures allows you in the event of an engine failure at, or after, the landing decision point to, continue an approach clear of persons and property and land within the landing distance available at the HLS.

Landing performance for rotorcraft – Category B rotorcraft within a populous area (MOS 25.05)

You may only land a Category B rotorcraft at a place in a populous area that is a non-certified aerodrome, or an aerodrome that is not used for the regular take-off or landing of aircraft if:

› the performance of the rotorcraft is sufficient to:

  » avoid obstacles during the landing and missed approach stage of the flight

  » autorotate or fly clear of persons or property if there is an engine failure

  » where the area is a confined area – hover-out-of-ground-effect, and

› as far as practical, provide for a planned landing profile that minimises time within the avoid area of the HV curve.

Note: Avoid area of the HV curve, for a rotorcraft, means the area depicted in the AFM heightvelocity diagram, which identifies the combinations of height above ground and airspeed in knots which a rotorcraft should avoid.

13. IFR – Take-off and landing

Taking off and landing in low-visibility (91.315)

A low-visibility operation at an aerodrome may only be carried out by an operator, that is required to have an operation's manual, if they hold an approval, or if the operator is not required to hold an approval then the pilot must hold an approval.

Take-off minima for low-visibility operations (MOS 15.04)

The take-off minima for a low-visibility operation at an aerodrome are the take-off minima stated in the approval.

See AC 91-11 – Approval to conduct low-visibility operations, for guidance on applying for approval to conduct low-visibility operations.

IFR take-off and landing minima (91.307)

You and the operator must not operate an aircraft below the IFR take-off or landing minima requirements for the aerodrome as prescribed in the MOS.

GNSS arrivals, GNSS/DME arrivals and Standard Terminal Arrival Routes (STAR) are instrument approach procedures. Minimum height and missed approach requirements for GNSS arrivals or GNSS/DME arrivals are therefore applicable.

Definition (MOS 15.02)

In this section:

A *qualifying multi engine aeroplane* means an IFR multi engine aeroplane that is:

› flown by at least 2 pilots, or

› if powered by piston or turbine engines, fitted with auto feather and flown by 1 pilot, or

› if powered by turbo jet engines, flown by 1 pilot, and

› in the event of an engine failure, capable of maintaining terrain clearance until reaching the minimum height for IFR flight.

A *qualifying multi-engine rotorcraft* means an IFR rotorcraft that:

- has a Category A performance supplement
- is operated to the Category A weights, limitations and procedures contained in the supplement
- is capable of maintaining terrain clearance until reaching the minimum height for IFR flight in the event of an engine failure.

Take-off minima requirements (MOS 15.03)

You must not commence a take-off if, at the time, the weather conditions:

- are less than the take-off minima for the aircraft, or
- following an engine failure, would not allow you to return to land under an instrument, or visual approach procedure, if it were necessary.

Take-off minima for qualifying multi-engine aeroplanes (MOS 15.05)

In a qualifying multi-engine aeroplane, the take-off minima are:

- visibility of:
  - 800 m, or
  - 550 m but only if:
    - the runway has illuminated edge lighting at spacing intervals not more than 60 m, and centreline lighting or centreline markings, all of which are supported by a secondary power supply with a switchover capability of one second or less
    - where the aerodrome is non-controlled, or is controlled but without ATC in operation, the take-off is by day and the aerodrome is one where you must carry a radio.

Take-off minima for other aeroplanes (MOS 15.06)

For an aeroplane that is not a qualifying multi-engine aeroplane, the take-off minima are:

- a cloud ceiling of 300 ft
- a visibility of 2,000 m.

Take-off minima for qualifying multi-engine rotorcraft (MOS 15.07)

For a rotorcraft that is a qualifying multi-engine rotorcraft, the take-off minima are:

- a cloud ceiling not lower than the height at which the greater of V_{yse} or V_{min} IMC can be achieved
- visibility of:
  - 800 m, or
  - 550 m, but only if:
    - the relevant runway or final approach and take-off area (FATO) has both illuminated edge lighting at spacing intervals not exceeding 60 m, and centreline lighting, that are both supported by a secondary power supply with a switchover capability of one second or less, and
    - where the aerodrome is non-controlled, or is controlled but ATC is not in operation, where radio carriage is mandatory, the take-off must be conducted by day.

Take-off minima for other rotorcraft (MOS 15.08)

For a take-off in a qualifying multi-engine rotorcraft, the minima are:

- a cloud ceiling of 500 ft
- visibility of 800 m.

Landing minima requirements (MOS 15.09)

Low visibility operation

For a landing at an aerodrome that is a low visibility operation you must not land below the landing minima specified on the approval under 91.315.

Other than low visibility operation

You must not land below the landing minima detailed in MOS 15.10 below. You must determine the landing minima from the instrument approach chart in accordance with the:

- specified aircraft performance category
- aircraft lateral navigation (LNAV) and vertical navigation (VNAV) capabilities.

You must comply with the missed approach requirements set out in MOS 15.11.

Landing minima (MOS 15.10)

If you are flying an RNP approach (APCH)-LNAV/VNAV, an RNP APCH-LPV, or a precision approach procedure, the minimum altitude must not be lower than the higher of the:

- decision altitude (DA) or decision height (DH) on the instrument approach chart for the IAP
- relevant minima in the AFM
- relevant minima in the operations manual.

LPV refers to localiser performance with vertical navigation

If you are flying an RNP APCH-LNAV/VNAV, an RNP APCH-LPV or a precision approach procedure, the minimum visibility must not be lower than the higher of:

- the runway visual range (RVR) or visibility on the instrument approach chart for the IAP
- the relevant minima in the AFM
- the relevant minima in the operations manual
- 800 m, if:
  - the touchdown zone (TDZ) RVR report is not available, or
  - the approach lighting system normally available beyond 420 m from the runway threshold is inoperative
- 1,200 m, if:
  - the approach cannot be flown to at least the landing minima using a flight director, a head-up display (HUD), or an autopilot, or
  - the aircraft is not equipped with a failure warning system for the primary attitude and heading reference systems, or
  - high intensity runway edge lighting is not in operation, or
  - the approach lighting system normally available beyond 210 m from the runway threshold is inoperative
- 1,500 m, when the approach lighting system normally available for the runway is inoperative
- 1.5 times the RVR or visibility for the IAP if a lighting failure has occurred on a runway at a controlled aerodrome that results in doubled spacing of runway edge lights.

Note: At controlled aerodromes, in the event of failure of 1 electrical circuit on a runway equipped with interleaved circuitry lighting, pilots will be notified of a doubled spacing of runway edge lights that is from 60 m spacing to 120 m spacing.

If you are flying an RNP APCH-LNAV, an RNP APCH-LP or another non-precision approach (NPA), the minimum altitude or minimum visibility must not be lower than the higher of:

- the minimum descent altitude (MDA) or minimum descent height (MDH) or the visibility minima on the instrument approach chart for IAP
- the relevant minima in the AFM
- the relevant minima in the operations manual
- in the event the approach lighting system normally available for the runway is inoperative, the visibility specified on the instrument approach chart, plus a value equivalent to the length of the approach lighting system (as published).

If you are flying a circling manoeuvre, the minimum descent altitude or minimum visibility must not be lower than the higher of:

- the circling minima on the instrument approach chart for the IAP
- the relevant minima in the AFM
- the relevant minima in the operations manual.

For an aerodrome without an authorised instrument approach procedure, the minimum altitude must not be below whichever is the highest of:

- the LSALT
- the relevant minima specified in the AFM
- the relevant minima specified in the operator's exposition or operations manual.

For an aerodrome without an authorised instrument approach procedure, the minimum visibility must not be below whichever is the highest of:

- the flight visibility specified for the type of aircraft, the class of airspace and the height in Figure 3 - VMC criteria
- the relevant minima specified in the AFM
- the relevant minima specified in the operator's exposition or operations manual.

Note: VMC criteria is referred to in Figure 3. The effect of this is that flight visibility must not be below the highest flight visibility relevant to the aircraft, if it were required to maintain VMC, during the flight to the aerodrome.

Missed approach (MOS 15.11)

When flying an instrument approach, you must immediately execute the missed approach procedure if:

- during the final segment of the instrument approach, the aircraft is flown outside the tolerances for the navigation aid being used, or
- when using GNSS as a substitute or alternative to a ground-based navigation aid, there is a sustained deviation from the centreline of the instrument approach, other than during a transient manoeuvre, or
- when below the MSA, the navigational aid in use for the instrument approach becomes unreliable or inoperative.

Note 1: Examples of when a navigational aid for an approach becomes unreliable or inoperative include a Receiver Autonomous Integrity Monitoring (RAIM) warning for a GNSS approach, a red flag for a VOR approach, or a loss of the ident for an NDB approach.

Note 2: If a RAIM warning ceases, or there is no longer loss of data integrity, after the pilot has commenced the missed approach procedure, the pilot may execute the missed approach using GNSS-derived information.

In addition, when flying an instrument approach, you must immediately execute the missed approach procedure if:

- for an RNP APCH-LNAV/VNAV, an RNP APCH-LPV, or a precision approach, the aircraft has arrived at the minimum altitude, or has passed the minimum altitude but has not touched down, or
- for an RNP APCH-LNAV, an RNP APCH-LP or other NPA, the aircraft has arrived at the missed approach point, or is being operated below minimum altitude, and any of the following apply:
  - the aircraft is not continuously in a position from which a descent to a landing on the intended runway or, for a rotorcraft, flight to a landing or hover on or over the intended FATO, may be made:
    - at a normal rate of descent
    - using normal manoeuvres
    - that allows touchdown to occur within the TDZ of the runway or the touchdown and lift off area (TLOF) for the intended landing, and
  - for other than low-visibility operations
    - flight visibility is less than the landing minima, or none of the following visual references for the intended runway or FATO are distinctly visible and identifiable to the pilot:
      - elements of the approach lighting system
      - the threshold
      - the threshold markings
      - the threshold lights
      - the runway identification lights
      - the FATO itself
      - the visual approach slope indicator
      - the touchdown zone or touchdown zone markings
      - the touchdown zone lights
      - the FATO or runway lights

Note: There are certain NPAs that have a minimum flight visibility of 5 km and where the geographical point of attaining the minimum altitude is more than 5 km from the visual references mentioned above. In these instances, noting that the minimum flight visibility is 5 km, if the requirements to conduct a visual approach procedure are met, effectively, the flight transitions from one conducting an IAP to one conducting a visual approach at the minima.

  - for low-visibility operations, the following visual references for the intended runway are not continuously visible and identifiable to the pilot:
    - for a CAT III approach using a fail operational (FO) landing system where use of a DH is prescribed – at least 1 centreline light
    - for a CAT III approach using a fail-passive (FP) landing system – at least 3 consecutive longitudinally-aligned lights
    - for a CAT III approach using an FO hybrid landing system – at least 3 consecutive longitudinally-aligned lights

  - for any other low-visibility operation:
    - at least 3 *consecutive longitudinally-aligned lights*
    - unless the approach is conducted using a HUD – a lateral element of lighting in the form of an approach lighting crossbar, a landing threshold light, or a barrette of TDZ lights

› for an aircraft conducting a circling manoeuvre, if:

  » the flight visibility reduces below the minimum visibility, or

  » an identifiable part of the aerodrome is not distinctly visible to the pilot (apart from loss of visibility due to normal aircraft manoeuvring during the approach).

Consecutive longitudinally-aligned lights means any of the following:

› centreline lights of the approach lighting system

› the TDZ lights

› runway centreline lighting

› runway edge lighting

› any combination of these lights.

Approach ban for IFR flights (91.310)

When making an approach to land at an aerodrome in an IFR aircraft, the approach ban procedure set out in the MOS below must be followed by the pilot and the operator.

Approach ban – other than low-visibility operations (MOS16.02)

For an IAP in other than low visibility, where ATC services and RVR reports are available and the TDZ RVR is reported to be continually less than the specified minima for the landing, you must not descend below 1,000 ft above the aerodrome elevation. However, if you receive the report after passing 1,000 ft you may continue the approach.

Approach ban – low-visibility operations (MOS 16.03)

For an IAP in low visibility, where ATC services and RVR reports are available and the controlling zone RVR is reported to be continually less than the RVR zone requirements you must not descend below 1,000 ft above the aerodrome elevation. However, if you receive the report after passing 1,000 ft you may continue the approach.

Note: Controlling zone RVR is the reported value of 1 or more RVR locations (touchdown, mid-point and stop-end) used to determine whether operating minima are met (MOS 1.07).

The RVR zone requirements are as follows:

› a TDZ RVR zone report is always required unless:

  » the instrument approach is a CAT III approach conducted with the use of an FO landing system, and an FO or FP rollout system, as well as the MID and END RVR zones are providing valid reports

› for other than a special authorisation (SA) CAT I instrument approach, a MID RVR report is required if the END RVR zone is not providing valid reports

› for other than a SA CAT I instrument approach an END RVR report is required if the MID RVR is not providing valid reports

› for other than a SA CAT I instrument approach and END RVR report is required for:

  » a CAT III instrument approach conducted without a rollout system

  » for any other low-visibility instrument approach, if the MID RVR is not providing valid reports

Note: MID or END RVR reports are not required for SA CAT I instrument approach operations.

› for a TDZ RVR report, the RVR value shown on the instrument approach chart

› for a MID RVR zone report:

  » 175 m for a CAT III instrument approach operation conducted without the use of a rollout system

  » 75 m for a CAT III instrument approach operation conducted with the use of an FO rollout system

  » 125 m for other instrument approach operations

› 75 m for the END RVR report.

14. Cruising levels and minimum heights

Definitions (for specified cruising levels) (MOS 2.08)

specified VFR cruising level for a track, means a cruising level prescribed by the MOS for a VFR flight on the track.

specified IFR cruising level for a track, means a cruising level prescribed by the MOS for an IFR flight on the track.

Specified VFR cruising levels (91.275)

When flying under the VFR you must fly at a specified VFR cruising level for the aircraft track (see Figure 14).

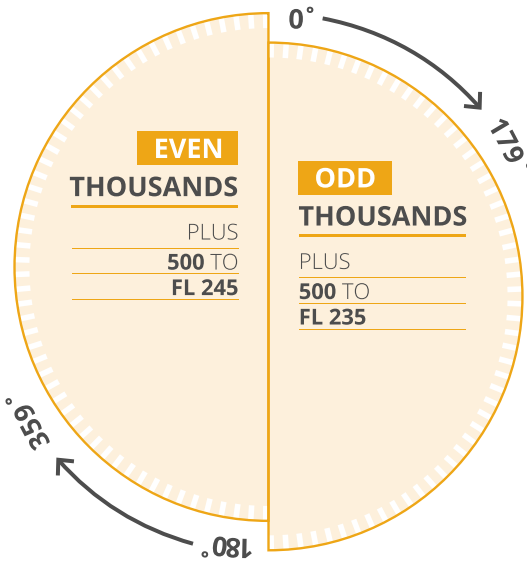
Exception: *You may fly at a non-specified VFR cruising level:*

- *when in uncontrolled airspace, and*
- *the aircraft is below 3,000 ft AMSL, or*
- *the aircraft is at, or above, 3,000 ft AMSL, but below 1,500 ft AGL or*
- *it is not practicable to do so, or*
- *the aircraft is a glider in soaring flight, or*
- *when in controlled airspace, and ATC has given you a clearance or instruction.*

Specified cruising level at or north of 80 degrees south (MOS 2.09)

The specified VFR cruising level for the aircraft track for VFR flights is shown in Figure 14.
A cruising level flown north of latitude 60 degrees south must be selected with reference to the aircraft's magnetic track, and south of latitude 60 degrees south, the aircraft grid track.

Figure 14: Specified VFR cruising levels – at or north of 80 degrees south



VFR flights in Class A airspace must be approved (see 91.285).


Image | Zorgist | Pixabay

Specified IFR cruising levels (91.290)

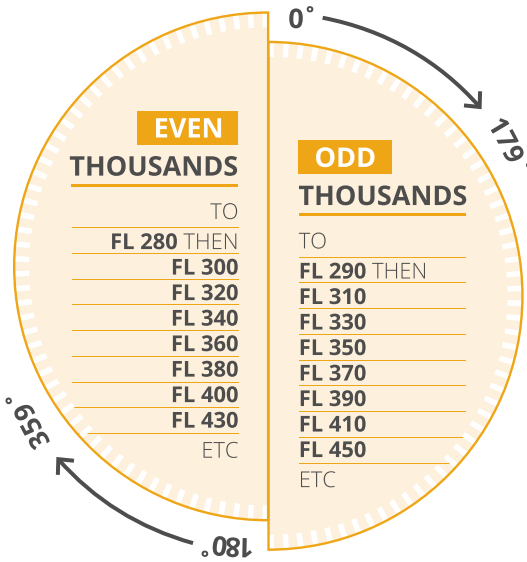
When flying under the IFR you must fly at a specified IFR cruising level for the aircraft track.

> **Exception:** *You may fly at a non-specified IFR cruising level when:*
>
> › *in uncontrolled airspace and it is not practicable to do so, or*
>
> › *ATC has given you a clearance or instruction.*

Specified cruising level at or north of 80 degrees south (MOS 2.09)

The specified IFR cruising level for the aircraft's track is shown in Figure 15. A cruising level flown north of latitude 60 degrees south must be selected with reference to the aircraft's magnetic track, and south of latitude 60 degrees south, the aircraft grid track.

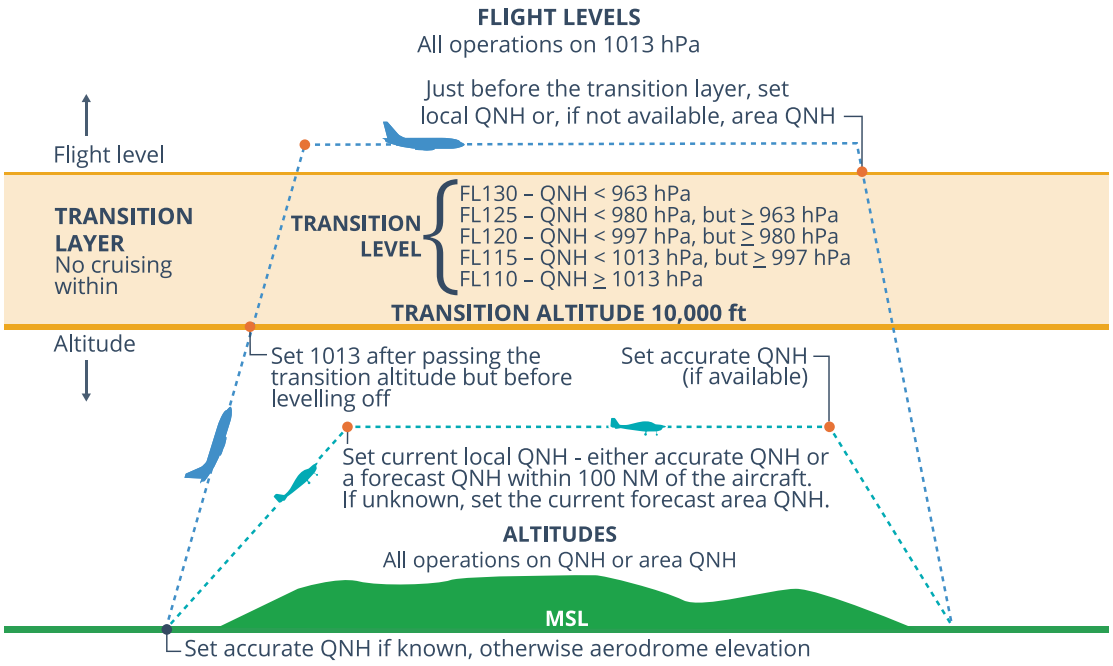
Figure 15: Specified IFR cruising level – at or north of 80 degrees south



Transition altitude, transition layer and transition level (MOS 11.02)

When you are flying within the Australian FIR, the transition altitude is 10,000 ft. The transition level is FL110 when the area QNH is 1013.2 hPa or higher; however, it will vary when an area QNH is below 1013.2 hPa (see Figure 16).

Figure 16: Positions to change between QNH and 1013.2 hPa



Note: The intention is to retain a minimum buffer of 1,000 ft between the lowest available flight level (FL) and the transition altitude therefore cruise within the transition layer is not permitted.

You must not cruise within the transition layer.

If you are flying below the transition altitude, you must use the following altimeter setting:

- the current local QNH (either an accurate QNH from a CA/GRS, ATIS, AAIS, ATC tower, AWIS or WATIR), or a forecast QNH of a station along the route within 100 NM of the aircraft, or
- if the current local QNH is not known, the current forecast area QNH.

If you are flying at, or above, the transition altitude, you must use an altimeter setting of 1013.2 hPa.

On climb, you must change the QNH to 1013.2 hPa after passing 10,000 ft but before leveling off. On descent, you must change from 1013.2 hPa to the QNH before entering the transition layer.

Minimum heights – VFR flights at night (91.277) (MOS 12.03)

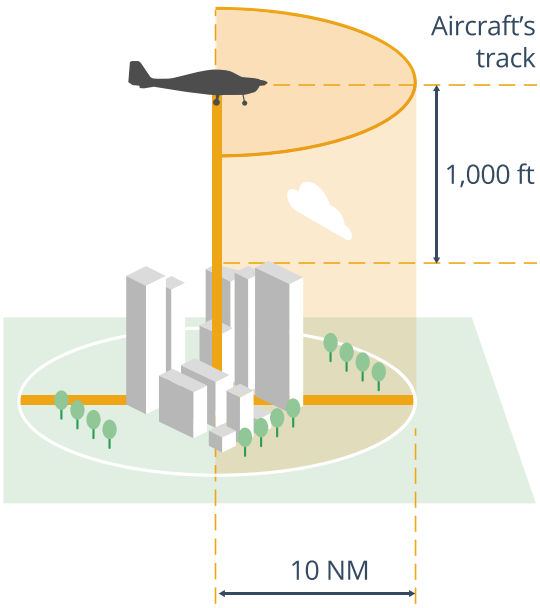
You must not fly under the VFR at night along a route or route segment below one of the following:

- any published LSALT for the route or route segment
- any minimum sector altitude published in the AAI
- any calculated LSALT for the route or the route segment prescribed in the MOS (**Note:** MOS 12.03 is RESERVED)
- 1,000 ft above the highest obstacle on the ground or water within 10 NM ahead of, and to either side of, the aircraft at that point on the route or route segment (see Figure 17).

Exception: *You are permitted to fly below the minimum height when:*

- *taking off or landing*
- *within 3 NM of the aerodrome when taking off or landing*
- *flying in accordance with an air traffic control clearance.*

Figure 17: Minimum heights – VFR flights at night



Minimum heights – IFR flights (91.305)

You must not fly under the IFR below:

- any published LSALT for the route or route segment
- any minimum sector altitude published in the AAI
- any calculated lowest safe altitude for the route or route segment.

Exceptions: *This requirement does not apply when you are taking off or landing in day VMC or you are flying in accordance with:*

- *a visual approach or departure procedure published in the AAI, or*
- *an instrument departure or approach procedure, or*
- *an air traffic control clearance.*

This requirement also does not apply when you are are taking off and climbing to join along a route or route segment provided you ensure the aircraft clears all obstacles by a safe margin between the take-off and the time the aircraft reaches any LSALT (EX81/21).

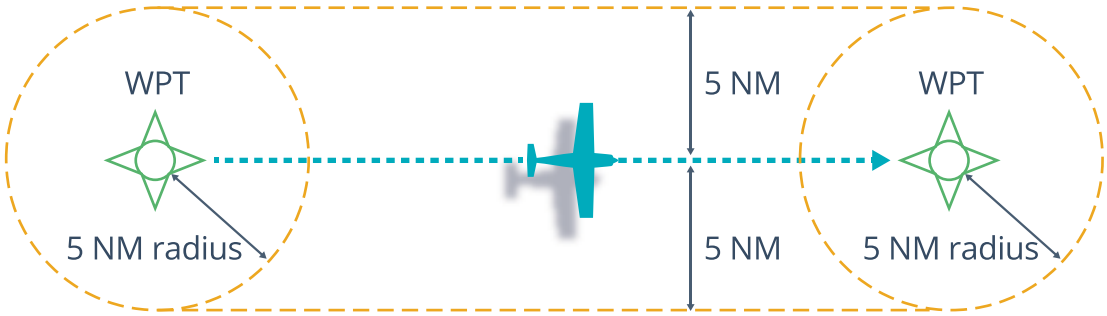
The LSALT published on an Australian en route chart (ERC) low requires an aircraft to be certified to RNP 2 standard.

To determine the lowest safe altitude for the route or route segment where it is not published you should refer to the AAI.

For operations other than RNP 2 you are responsible for determining what allowance you should apply for navigation error considering the method of navigation and the limitations of the navigation aids being used. You must apply this navigation error to the determined navigation area (for the proposed track) and use the highest grid LSALT for the area.

For RNP 2 operations the LSALT must be determined by considering the area within 5 NM surrounding and including the departure point, the destination and each side of the nominal track (see Figure 18).

Figure 18: For RNP2 routes not published – determination of minimum heights



| *WPT means waypoint*

IFR flights at non-specified cruising levels – notifying air traffic services (91.295)

You must notify ATS before you fly at a non-specified IFR cruising level for the aircraft track.

IFR flights at non-specified cruising levels – avoiding collisions with VFR aircraft (91.300)

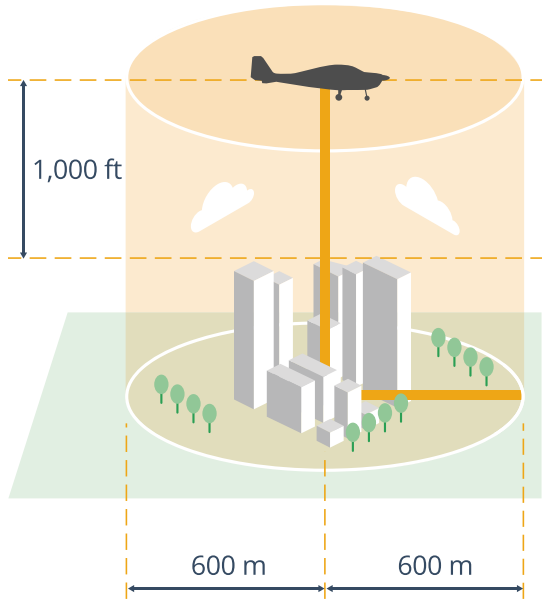
If you are flying an aircraft under the IFR that is not cruising at a specified IFR cruising level for the track, you must give way to an aircraft flying under the VFR cruising at a specified VFR cruising level where there is a collision risk.

Minimum height rules – populous areas and public gatherings (91.265) (MOS 12.01)

Aeroplane

You must not fly an aeroplane over a populous area or public gathering below 1,000 ft above the highest feature or obstacle within a horizontal radius of 600 m of the point on the ground or water immediately below the aeroplane (see Figure 19).

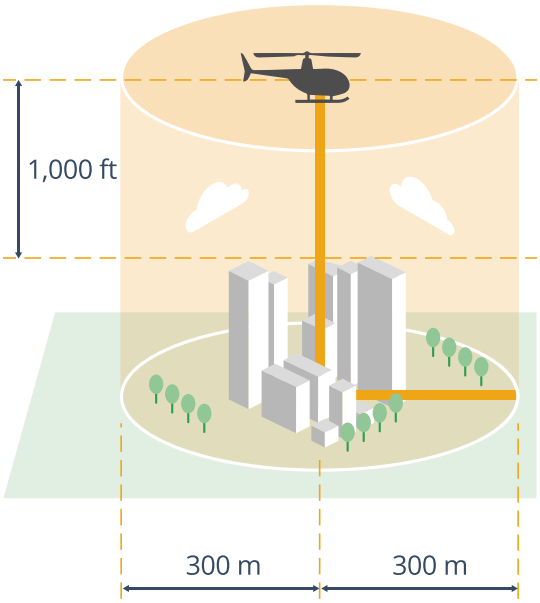
Figure 19: Minimum height populous areas and public gatherings for aeroplane



Rotorcraft

You must not fly a rotorcraft over a populous area or public gathering below 1,000 ft above the highest feature or obstacle within a horizontal radius of 300 m of the point on the ground or water immediately below the rotorcraft (see Figure 20).

Figure 20: Minimum height populous areas and public gatherings for rotorcraft



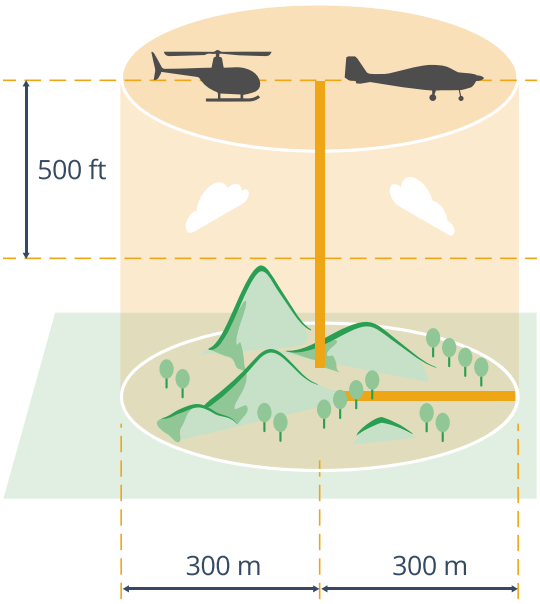
Exception: *This rule does not apply in the following circumstances:*

- *taking off or landing (as prescribed below) (MOS 12.01):*
  - *for take-off – when the point of lift off and climb to the planned cruising level is in accordance with the normal procedures for the aircraft type*
  - *for landing – when the landing is conducted in a continuous descent from the cruising level or circuit height to the landing threshold using rates of descent and flight manoeuvres which are normal for the aircraft type*
- *engaging in a missed approach*
- *practising emergency procedures at an aerodrome without passengers onboard*
- *circuit training at an aerodrome*
- *carrying out air display activities for which you hold an approval*
- *for a rotorcraft – hovering, air transiting, air taxiing or ground taxiing at an aerodrome*
- *for a rotorcraft, seaplane or amphibian – flying within an access lane used by aircraft taking off from, or landing at, a particular place, and details of which are published in the AAI*
- *for a single-engine seaplane or a single-engine amphibian operating over water and within safe gliding distance of open water suitable for a forced landing, and not flown below 1,000 ft above the highest feature or obstacle within a horizontal radius of 300 m of the point on the water immediately below the aeroplane*
- *engaging in a procedure to determine the suitability of an aerodrome for a landing*
- *an aircraft engaged in the validation of a terminal instrument flight procedure that is conducted in accordance with a terminal instrument flight procedure under regulation 173.095 of CASR and the Part 173 MOS. (EX81/21).*

Minimum height rules – other areas
(91.267) (MOS 12.02)

When flying over an area that is not a populous area or public gathering (91.265), you must not fly an aircraft below 500 ft above the highest feature or obstacle within a horizontal radius of 300 m of the point on the ground or water immediately below the aircraft (see Figure 21).

Figure 21: Minimum height for other areas



Exception: *This rule does not apply in the following circumstances:*

- *taking off or landing:*
  - *for take-off – when the point of lift off and climb to the planned cruising level is in accordance with the normal procedures for the aircraft type*
  - *for landing – when you are conducting a circling manoeuvre as part of an IAP using rates of descent and flight manoeuvres which are normal for the aircraft type*
  - *for landing – when the landing is conducted in a continuous descent from the cruising level or circuit height to the landing threshold using rates of descent and flight manoeuvres which are normal for the aircraft type*
- *engaging in a missed approach*
- *not carrying passengers and practising emergency procedures at an aerodrome*
- *not carrying passengers and practising a forced landing procedure with the consent of the person or authority having control over the land or water above which the procedure is carried out*
- *low-flying training by a Part 141 operator, or a low-flying activity by a Part 142 operator, and the aircraft:*
  - *is not carrying passengers, and*
  - *is being flown over an area that, with the consent of the person or authority with control of the area, has been determined by the operator to be suitable as a flight training area and the pilot has surveyed it for obstacles before the flight*
- *performing training circuits at an aerodrome*
- *to determine the suitability of an aerodrome for a landing*
- *carrying out air display activities for which you hold an approval*
- *all of the following apply:*
  - *you hold a low-flying authorisation under Part 61, or hold an approval, provided the point on the ground or water vertically below the aircraft is not within a 150 m of a person, vessel, vehicle, structure or livestock, and you conduct a risk assessment of the area to be flown over*
- *for a rotorcraft – when the rotorcraft is hovering, air transiting, air taxiing or ground taxiing at an aerodrome*
- *for a rotorcraft, seaplane or amphibian – when flying within an access lane used by aircraft taking off from, or landing at, a place, and the details are published in the AAI*
- *an aircraft engaged in the validation of a terminal instrument flight procedure that is conducted in accordance with a terminal instrument flight procedure under regulation 173.095 of CASR and the Part 173 MOS (EX81/21).*

15. Navigation

VFR flights (91.273)

You must fly under the VFR in accordance with the requirements detailed below.

VFR flight navigation requirements (MOS 13.02)

When navigating by visual reference to the ground or water, you must positively fix the aircraft's position by visual reference to features marked on topographical charts at intervals not exceeding 30 minutes.

When navigating by visual reference over the sea, visual reference features may include rocks, reefs and fixed human-made objects marked on topographical charts and readily identifiable from the air.

When you are not navigating by visual reference to the ground or water, you must comply with the requirements of flight under the IFR under regulation 91.287 and the associated MOS as if a flight under the IFR.

You must also be competent (under Part 61 - Flight crew licensing) to use of any IFR navigation techniques and any IFR navigation equipment such as a global navigation satellite system (GNSS).

You may fly in airspace, on a route, or fly a terminal instrument procedure – where a minimum navigation performance value is specified – provided the aircraft is approved for flight under that navigation specification by:

- the AFM, or
- a document approved under CASR Part 21 based on an airworthiness assessment, or
- for a foreign-registered aircraft, a document approved in writing by the NAA of the state of registration or state of the operator of the aircraft.

In addition, any GNSS equipment is required to be approved, including where a GNSS is used as a substitute or alternative for any ground-based navigation aid within the meaning of MOS 14.05.

IFR flights (91.287)

You must fly under the IFR in accordance with the requirements detailed below.

Purpose and definition (MOS 14.01)

For an aircraft to fly under the IFR under a particular navigation specification it must be approved by:

- the AFM, or
- a document issued under CASR Part 21 as part of, or based on, an airworthiness assessment, or
- for a foreign-registered aircraft – a document issued in writing by the NAA of the state of registration or state of the operator of the aircraft.

IFR flight navigation requirements (MOS 14.02)

When flying under the IFR you must navigate using:

- an area navigation system that meets the performance requirements of the intended airspace or route, or
- a ground-based navigation aid, but only if:
  - after making allowance for possible tracking errors of ±9° from the last positive fix, the aircraft will come within the rated coverage of a ground-based navigation aid which can be used to fix the position of the aircraft, and
  - the maximum time interval between positive fixes does not exceed 2 hours, or
- by visual reference to the ground or water but only in the following circumstances:
  - you are unable to operate using a ground-based navigation aid (as above)
  - in daytime only
  - if weather conditions permit flight in VMC
  - the VFR position-fixing requirements are met (MOS 13.02).

You must only operate in airspace, on a route, or conduct a terminal instrument flight procedure, if the aircraft is approved to do so and meets the required navigation performance specification.

You must use an approved GNSS when you are operating in airspace or on a route that requires the use of GNSS or conducting a terminal instrument flight procedure that requires the use of GNSS.

Over the years, a range of terms used to describe the navigation capability of an aircraft has evolved. In many cases there is an equivalence in the navigation capability despite a different term being used. For example, a GPS - BARO - VNAV *capability equates to an* RNP - APCH *capability.*

Navigation capability can also be inferred if the navigation systems comply with specific FAA/JAA advisory circulars and other Standards documents. For example, meeting the JAA AMJ 20X2 standard equates to an RNAV 5 capability. Refer to CASA's Part 91, AMC/GM.

If the navigation system becomes inaccurate, unreliable or inoperative, you must:

› monitor the aircraft's track by reference to the other navigation aids with which the aircraft is equipped

› carry out appropriate procedures designed to maintain aviation safety in the event of loss of navigation equipment

› notify ATS.

You must ensure that data entered into an area navigation system has:

› for a multi-crew operation – been cross-checked for accuracy by at least 2 flight crew members, or

› for a single-pilot operation – been checked for accuracy.

You must ensure that position and tracking information are checked:

› at, or before, each waypoint specified as a reporting point published in the AAI or designated by ATS

› as far as practicable, at or before, each en route waypoint in the AAI

› at regular intervals (as far as practicable) during navigation via waypoints not in the AAI.

You must ensure that, for a terminal instrument flight procedure in which GNSS will be used as the sole means of navigation:

› the intended procedure is loaded from the navigation database by name

› waypoints are not added to, or deleted from, the procedure as so loaded

› the navigation system will fly the procedure as published in the AAI.

Note: During the conduct of an instrument approach procedure that is based on a ground-based navigation aid, but where GNSS will be used for navigation, pilots should be aware that not all aircraft are capable of conducting reversal or holding procedures, or of navigating DME arcs. You should confirm the aircraft navigation system can conduct such operations.

Instrument approach operational requirements (MOS 14.09)

When conducting an IAP in IMC you must ensure that the aircraft is operated within a range of, or not more than the maximum speeds in the Table18A below that is associated with the aircraft performance category.

> **Exception:** *You may fly the aircraft in a higher performance category.*
>
> *To fly the aircraft in a lower performance category the operator must hold an approval and the operator must give the details to the flight crew of the approval and the conditions (if any) imposed by CASA. (91.320):*

Note: For example, an aircraft whose specified aircraft performance category is B, may conform to the requirements of aircraft performance Category C. But an aircraft whose specified aircraft performance category is C must not attempt to conform to the requirements of aircraft performance Category B without CASA approval and operator compliance with 91.320.

Table 18A: IAP segment speeds (MOS 14.09)

	IAP segment indicated airspeed (knots)			
Aircraft performance category - VAT	Range of speeds for initial and intermediate approach (knots)	Range of speeds for final approach	Max. speed for visual manoeuvring (circling)	Max. speed for missed approach
H	70 – 120	60 – 90	None specified	90
A – up to 90 VAT	90 – 150	70 – 100	100	110
B – from 91 to 120 VAT	120 – 180	85 – 130	135	150
C – from 121 to 140 VAT	160 – 240	115 – 160	180	240
D – from 141 to 165 VAT	185 – 250	130 – 185	205	265
E – from 166 to 210 VAT	185 – 250	155 – 230	240	275

Note: VAT is the indicated airspeed (IAS) in knots at the threshold which is equal to the stalling speed VSO multiplied by 1.3, or the stalling speed V_{S1G} multiplied by 1.23.

Instrument approaches – QNH sources (MOS 14.03)

When flying an instrument approach, before you pass the initial approach fix (IAF), you must set:

- the actual aerodrome QNH from one of the following approved sources:
  - AAIS
  - ATC
  - ATIS
  - AWIS
  - CA/GRS
  - WATIR
- the forecast aerodrome QNH
- the forecast area QNH.

You must not use an actual aerodrome QNH for an instrument approach for more than 15 minutes after receiving it.

If you use the forecast area QNH, you must increase the minima for the instrument approach by 50 ft.

GNSS arrivals, and DME or GNSS arrivals (MOS 14.04)

During a GNSS arrival, or a DME or GNSS arrival you must:

- use the destination VOR or NDB as the primary track guidance
- discontinue the arrival procedure if there is a significant disparity between the track guidance of the VOR or NDB and the GNSS track indication.

A significant disparity is:

- for an NDB – a divergence of more than 6.9 degrees
- for a VOR – a divergence of more than 5.2 degrees.

Note: GNSS cannot be used to substitute the VOR or NDB: see MOS 14.05.

Use of GNSS as substitute or alternative to ground-based navigation aids (MOS 14.05)

A ground-based navigation aid is one of the following:

- VOR
- DME
- NDB
- Outer Marker
- Middle Marker.

This MOS section does not apply to the use of a VOR or NDB for a GNSS arrival or DME or GNSS arrival.

GNSS may be used as a substitute or alternative to ground-based navigation aids provided the aircraft is approved as meeting the following required navigation performance (RNP) specifications for the following phases of flight:

- en route – RNP 2
- SID or STAR – RNP 1
- initial, intermediate or missed approach of an IAP – RNP 1
- final approach segment of an IAP – RNP APCH.

Before using GNSS as a substitute for or alternative to a ground-based navigation aid during an en route phase of flight, you must ensure that:

- a waypoint which is a ground-based navigation aid is entered from the navigation database by name
- latitude and longitude coordinates for the ground-based navigation aid are not manually entered.

GNSS must not be used as a substitute or alternative to a ground-based navigation aid that has been decommissioned.

Note: MOS 14.04 sets out the requirements for the conduct of GNSS arrival, and DME or GNSS arrival. The relevant VOR or NDB must be used for azimuth guidance.

GNSS performance may be measured in a number of ways. While accuracy is the most obvious quality of a navigation system, other measures, such as system availability, data integrity and continuity of service, are also important.

Availability of GNSS integrity for instrument approaches (MOS 14.06)

Where you plan to conduct an instrument approach using GNSS at the destination or alternate aerodrome you must obtain a prediction for GNSS integrity availability before departure.

If a continuous loss of GNSS integrity is predicted for more than 5 minutes for any part of an instrument approach, you must revise the flight plan to avoid the use of GNSS during the instrument approach at that time, at that location.

Note: Some examples of flight plan revisions include, delaying the departure time, planning a different route or providing for an alternate aerodrome.

If you are navigating with a satellite-based augmentation system (SBAS)-capable GNSS receiver you must regularly check for the prediction of GNSS integrity in areas where the SBAS is not available.

For an aircraft with an approved GNSS that can achieve a lateral navigation accuracy of less than 0.3 NM using requisite GNSS satellites, you may disregard obtaining prediction for GNSS integrity availability as required above.

Note: Requisite GNSS satellites means at least the number of serviceable GNSS satellites a GNSS manufacturer specifies in writing as being required for its approved GNSS to provide a particular RNP specification.

Many non-aviation and non-TSO global positioning system (GPS) receivers do not monitor integrity and will continue to display a navigation solution based on erroneous data.

Integrity is the ability of a system to provide timely warnings to the user when the equipment is unreliable for navigation purposes. RAIM is the most common form of integrity monitoring. Aircraft with inertial navigation systems can provide an integrity check (AAIM- aircraft autonomous integrity monitoring) when RAIM is unavailable but GNSS position information continues to be valid.

A GNSS receiver with a RAIM capability with 5 satellites in view can detect faulty satellite data (integrity) and will stop providing a navigation solution.

A GNSS receiver with fault detection and exclusion (FDE) capability and with 6 or more satellites in view can detect and exclude faulty satellite data and continue to supply a valid navigation solution (TSO 145, 146 and 196 receivers only).

Navigation database requirements (MOS 14.07)

The navigation database must be:

- current – up to date in accordance with the Aeronautical Information Regulation and Control cycle (AIRAC)
- valid – from an approved data service provider
- in a form that cannot be changed by the operator or a flight crew member.

Updating of the navigation database must be carried out in accordance with the manufacturer's instructions.

The aircraft operator must ensure that any person updating the navigation database is appropriately qualified and competent to properly perform that task.

The operator of an aircraft must regularly check the navigation database for integrity, and if any discrepancy in the data is discovered:

- report the discrepancy as soon as practicable to the approved provider
- deal with the discrepancy before further operational use by:
  - resolving it through the reissue of the database, or
  - prohibiting use of the route, or
  - ensuring that each flight crew member has instructions on how to preserve the safety of the operation despite the discrepancy.

Note: The Transport Safety Investigation Regulations require any discrepancy in a navigation database to be reported if it is likely to cause a hazard due to a loss of separation between aircraft or a reduction in an aircraft's terrain or obstacle clearance.

If a navigation database:

- is not current at the start of a flight, or
- ceases to be current during a flight it may continue to be used for navigation, unless to do so would jeopardise the safety of the flight, provided:
  - the data is verified before use, by reference to current authorised aeronautical information, and
  - the database is not used for updating of a navigation system.

An aircraft operated without a minimum equipment list (MEL) must not operate under PBN for more than 72 hours after the navigation database has ceased to be current.

PRM instrument approach operations (MOS 14.08)

You must not carry out a precision runway monitor (PRM) approach unless all pilots required by the AFM, have received training to conduct the approach from an appropriate source that ensures familiarisation with the following:

- the guidance on PRM approaches in the AAI (AIP)
- the PRM user instructions for the aerodrome
- the relevant instrument approach charts for the aerodrome
- relevant training material available on the websites of Airservices Australia and CASA.

Training for PRM operations for pilots other than those conducting air transport operations should be conducted by a Part 141 or Part 142 training provider.

Use and supply of distance information (MOS 11.05)

When you are flying within the Australian FIR, and you are providing distance information requested by ATS, you must ensure that ATS is aware of the source and the point of reference of the distance measurement, and any GNSS information must be derived from an approved GNSS with a valid database.

Note: The following are examples of source and the point of reference: 115 GNSS ML VOR, 80 GNSS CTM NDB, 267 GNSS BEEZA 86 DME BN.

Oceanic airspace (MOS 11.03)

If you have declared in a flight plan that you can navigate to RNP 2, RNP 4 or RNP 10 you must, immediately before entering oceanic airspace, ensure that a check has been completed and that there are at least 2 independent LRNSs capable of navigating the aircraft to the required navigation specification.

If, because of the check there is less than 2 LRNSs capable of navigating the aircraft you must ensure that ATS is notified of the situation as soon as practicable.

Note: See the definition of INS, IRS, LRNS and Oceanic airspace.

Note: The requirements of this subsection do not override the minimum navigation system equipment requirements required by the Part 91, Part 121, Part 133 or Part 135 Manual of Standards.

Before the departure of a flight planned to operate in oceanic airspace using GNSS, you must obtain a prediction for the availability of GNSS FDE along the intended route

You must plan so that the maximum continuous predicted loss of FDE is not more than:

› for an RNP-4 operation – 25 minutes, or

› for an RNP-10 operation – 34 minutes.

For an aircraft with an approved GNSS that can achieve lateral navigation accuracy of less than 0.3 NM using requisite GNSS satellites, you may disregard obtaining a prediction as required above.

Note: Requisite GNSS satellites means at least the number of serviceable GNSS satellites a GNSS manufacturer specifies in writing as being required for its approved GNSS to provide a particular RNP specification.

FDE – or fault detection and exclusion – is the capability of the GNSS receiver to ensure continued GNSS integrity by excluding satellites that would degrade the integrity of the GNSS-calculated position.

Loss of GNSS integrity (MOS 11.04)

For a flight in any class of airspace within the Australian FIR where you are required to maintain regular contact with ATS or when you are being provided a separation service by ATS, you must advise ATS if any of the following occurs:

› during an en route phase of flight, there is a loss of GNSS integrity for more than 5 minutes

› during a terminal phase of flight, there is a loss of GNSS integrity

› GNSS integrity is not available when ATS requests the provision of GNSS-derived information

› GNSS integrity is not available when ATS grants a clearance or imposes a requirement based on GNSS-derived information

› the GNSS receiver is in dead-reckoning mode, or experiences loss of its navigation function, for more than 1 minute.

If you have notified ATS of a loss of GNSS integrity you must notify ATS when GNSS integrity is restored.

Note: Regulation 91.630 requires certain flights to make regular reports or broadcasts to an ATS. Regulation 91.635 requires certain flights to continuously monitor the primary communications medium used by air traffic control in controlled airspace.

RVSM airspace (91.655)

An aircraft may only be flown in RVSM airspace if:

› the operator holds an approval, or

› the pilot has been given an air traffic control clearance or instruction for the aircraft to be flown in RVSM airspace.

When flying in RVSM airspace and you are unable to operate to the required vertical separation minimum, you must inform ATC as soon as practicable.

For aircraft where an operator does not hold RVSM approval, ATC is unlikely to clear you to operate in RVSM airspace if there is conflicting traffic.

To operate in RVSM airspace an aircraft must have:

› *2 independent primary altimetry systems*

› *a Mode C secondary surveillance radar (SSR) transponder*

› *an altitude alert system*

› *an autopilot with height lock.*

If this equipment is not serviceable an aircraft may be operated in RVSM airspace provided ATC is informed that the aircraft is being operated 'negative RVSM'.

Performance-based navigation (91.660) (MOS 22.01)

You and the operator must hold an approval to conduct operations in accordance with the approved prescribed navigation specifications as follows:

› RNP AR APCH

› RNP AR DP.

RNP AR APCH means RNP authorisation required approach. RNP AR DP means RNP authorisation required departure.

Image | CASA

16. Non-controlled aerodromes

Take-off or landing at non-controlled aerodromes – all aircraft (91.370)

Rules for taking off

You must not commence a take-off until a preceding departing aircraft using the same runway:

- has crossed the upwind end of the runway, or
- has commenced a turn, or
- the runway must be longer than 1,800 m and the other aircraft must have become airborne and be at least 1,800 m beyond your proposed lift off point, or
- the other aircraft and your aircraft must each have MTOW below 2,000 kg and the other aircraft must be airborne at least 600 m beyond your proposed lift off point.

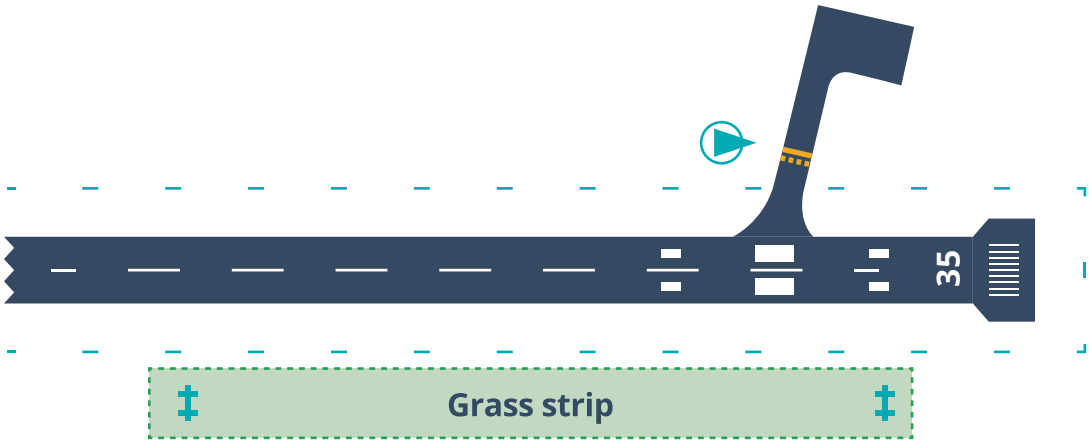
You must not commence a take-off until a landing aircraft that is using the same runway has vacated the runway or if using a crossing runway, has crossed or stopped short of the runway intersection.

Rules for landing

You must not continue an approach to land beyond the threshold of the runway until:

- an aircraft that is taking off from the same runway has become airborne and commenced a turn, or
- an aircraft that is taking off from the same runway is beyond the point of the runway at which your aircraft could be expected to complete its landing roll, and there is enough distance to manoeuvre in the event of a missed approach, or
- an aircraft landing on the same runway has vacated the runway, or is taxing away from the runway, or
- if a landing aircraft ahead is using a crossing runway, the aircraft ahead has crossed or stopped short of the runway intersection.

Figure 22: Runway with parallel strip



Application of rules where gliders or glider tugs operate

At an aerodrome where gliders or glider tugs are operating to a common circuit pattern from either a runway or parallel strip, you cannot take off or land when another aircraft on the parallel strip or runway is taking off or landing. However, you may take-off or land if there is another aircraft taxiing or stationary on either the runway or parallel strip, provided it does not affect your ability to take off or land safely (see Figure 22).

> **Exception:** *The above requirements do not apply where gliders and glider tugs are permitted to operate in contra-rotating circuits on both a runway and a parallel strip outside the runway strip, and simultaneous operations on the runway and parallel strip are permitted.*

Meaning of in the vicinity of a non-controlled aerodrome (91.360)

An aircraft is *in the vicinity of* a non-controlled aerodrome if it is:

- in uncontrolled airspace
- within 10 NM of the aerodrome
- at a height above the aerodrome that could result in conflict with operations at the aerodrome.

For an aerodrome that has a reference point published in the AAI, the distance must be measured from that point.

> *The definition of* in the vicinity of a non-controlled aerodrome *applies in 91.375, 91.380, 91.385 and 91.390.*

Operating on manoeuvring area, or in the vicinity, of a non-controlled aerodrome – general requirements (91.375)

When operating on the manoeuvring area, or in the vicinity of a non-controlled aerodrome you must:

- keep a lookout for other aircraft to avoid a collision
- ensure that your aircraft does not endanger other aircraft
- either join or avoid the circuit pattern of the aerodrome
- for an aeroplane only, take off or land within the aerodrome landing area.

Operating on manoeuvring area, or in the vicinity, of a non-controlled aerodrome – landing and taking off into the wind (91.380)

To the extent practicable, you must land and take-off into wind unless:

- the aircraft's flight manual allows you to land or take-off downwind or crosswind
- you are satisfied that traffic conditions at the aerodrome will allow you to land or take off safely.

It is well documented that taking off and landing into wind is the safest option. However, runway options do not always allow for an into-wind take-off without some crosswind component. Pilots should be familiar with the crosswind limitation in the AFM.

Although the regulation does not preclude a downwind take-off or landing, they should not be attempted in other than very light winds. You should be aware that the take-off and landing distance will increase, and you should apply a considerable safety margin to the normal take-off and landing calculations. You should also consider that the climb and descent angle will be lower/flatter than when operating into wind, and obstacle clearance may become a critical issue after take-off or on your approach to land. You must not exceed any limitation in the AFM.

Operating on manoeuvring area, or in the vicinity, of non-controlled aerodrome – requirements that apply after joining the circuit pattern (91.385)

For other than a rotorcraft, when flying in the circuit of a non-controlled aerodrome you must make all turns to the left unless the AAI contains alternative instructions.

Exception: *The above circuit pattern requirements do not apply:*

- *to a seaplane or amphibian, where it necessary:*
  - *to avoid an obstacle, or*
  - *without compromising the aircraft's safety, to avoid undue noise over a populated area, or*
  - *for a single-engine seaplane or amphibian, to enable the aircraft to land on water if its engine fails*
- *to a glider (other than a glider without an engine operating) if the pilot believes it is necessary to land safely.*

Operating on manoeuvring area, or in the vicinity, of non-controlled aerodrome – requirements related to maintaining the same track after take-off (91.390)

For other than a rotorcraft, you must, after take-off, maintain the take-off track until the aircraft is above 500 ft AGL unless a track change is necessary to avoid terrain.

Exception: *The above circuit pattern requirements do not apply to a seaplane or amphibian, where it is necessary:*

- *to avoid an obstacle, or*
- *without compromising the aircraft's safety, to avoid undue noise over a populated area, or*
- *for a single-engine seaplane or amphibian, to enable the aircraft to land on water if its engine fails.*

Straight-in approaches at non-controlled aerodromes (91.395)

Before commencing a straight-in approach, you must determine the wind direction and the runways in use at the aerodrome.

Unless you are carrying out an instrument approach in IMC or an approach in a specific Part 103 aircraft, you must complete your manoeuvring and be established on final approach by at least 3 NM from the runway threshold you intend to use for the landing.

The aircraft making the straight-in approach must give way to any other aircraft flying in the circuit pattern for the aerodrome.

Exception: *for Part 103 the following aircraft need not comply with the requirement to be established on final approach by 3 NM:*

- *sailplanes (except for powered sailplanes including touring motor gliders, and power-assisted sailplanes – when the engine is operating)*
- *hang gliders and paragliders (whether or not power-driven).*

The exception is necessary since compliance with the 3 NM straight-in rule would expose slower Part 103 aircraft to a collision risk from faster overtaking aircraft. Part 103 aircraft are therefore permitted to establish on a short final approach within 3 NM of the runway threshold.

See AC 91-10 – Operations in the vicinity of non-controlled aerodromes.

Aircraft in aerodrome traffic at controlled aerodromes (91.405)

When operating at a controlled aerodrome you must:

- have an ATS clearance to taxi, land or take-off
- maintain a continuous listening watch on the ATS frequency for the aerodrome, or
  - where you cannot maintain a continuous listening watch, maintain a watch for any visual signals given by ATS (EX81/21).

Unless you are complying with an ATS clearance or instruction, or flying in accordance with an instrument departure or approach procedure, you must (other than a Part 131 aircraft):

- maintain runway track from the take-off until you reach 500 ft AGL unless a change to the track is necessary to avoid terrain
- make all turns in the direction of the circuit pattern when joining the circuit for a landing or when taking off for the purpose of conducting a circuit.

You would only need to watch for visual signals if your radio failed, or if ATS had approved your aircraft operation without a radio. Standard visual signals would be used (see regulation 91.670 Standard visual signals).

In an aerodrome environment – where there is no ATS or you are not following a authorised instrument departure - it is not an offence of strict liability if you do not:

- *maintain runway track from the take-off until you reach 500 ft AGL unless a change to the track is necessary to avoid terrain*
- *make all turns in the direction of the circuit pattern when joining the circuit for a landing or when taking off for the purpose of conducting a circuit.*


Image | Alex Dodd | Flickr.com

17. Icing

Flight in icing conditions – adherence of frost, ice or snow (91.705)

Before you begin a flight there must be no frost, ice or snow adhering to the aircraft's wings, flaps, control surfaces, rotors, propellers, and horizontal or vertical stabilisers.

In addition, there must also be no frost, ice or snow adhering to the top of the fuselage when the aircraft has rear mounted engines, or for any other aircraft where it could be hazardous to the safe operation of the aircraft.

> **Exception:** *These requirements do not apply if the take-off is conducted in accordance with the AFM that relates to take-off in the above conditions.*

Flight in icing conditions – requirements for flight (91.710)

You must not commence a flight in known or suspected icing conditions unless your aircraft is certified as complying with the airworthiness standards to fly in icing conditions.

If your aircraft is not certified as complying with the airworthiness standards to fly in icing conditions, and you inadvertently fly into icing conditions, you must change your flight path to try and avoid the icing conditions as soon as practicable.

18. Special flight operations

Air displays in Australian territory (91.180)

A person who conducts an air display must hold an approval. You and the operator of an air display flight must ensure the person conducting the air display holds an approval.

An air display may only be conducted with the approval of CASA. The air display event organiser (the person conducting/ managing the air display) is the person required to obtain and hold the approval.

The manual contains advice for air display organisers including instruments that may be applicable from time to time.

Instrument EX81/21 provides for exemptions of certain rules when conducting an air display, including practice flights by the pilot before approval is issued for the air display. See appendix C.

For guidance on air displays see AC 91-21

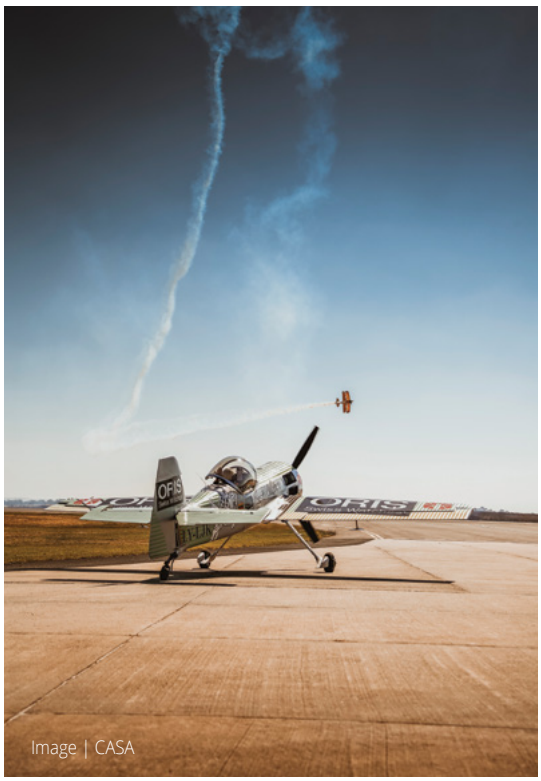


Image | CASA

Conducting aerobatic manoeuvres (91.185)

You may only fly aerobatic manoeuvres over a populous area, at an air display, or at night, if you hold an approval.

You must not fly aerobatic manoeuvres in IMC.

For aerodrome activities in the vicinity of non-controlled aerodromes- exemptions and directions, see appendix C EX81/21.

Pilots must hold an aerobatic flight activity endorsement, see 61.380 and Flight activity endorsement table (61.1145).

An aerobatic flight manoeuvre is one that has:

- *bank angles greater than 60°, or*
- *pitch angles greater than 45° or are otherwise abnormal to the aircraft type, or*
- *abrupt changes of speed, direction, angle of bank or angle of pitch.*

You must not engage in aerobatic flight below 3,000 ft AGL unless your aerobatic activity endorsement permits lower heights.

Before engaging in an aerobatic manoeuvre, you should ensure:

- *any loose objects are either removed from the aircraft or stowed securely*
- *all hatches and doors are securely fastened*
- *seatbelts or harnesses are securely and firmly fastened*
- *seatbelts or harnesses of any vacant seat are made secure*
- *you have checked for other aircraft in your vicinity.*

Dropping things from aircraft (91.190)

You must not allow anything to be dropped from an aircraft.

Picking up or setting down people or things during flight (91.195)

You must not pick up or set down a person or anything during a flight unless you hold an approval, or it is permitted by another regulation.

Flying in formation (91.205) (MOS 6.01)

You may only fly an aircraft in formation, if you hold an activity endorsement to fly in formation and have prearranged the flight with the other pilots making up the formation.

You may only fly an aircraft in formation at night, or in IMC, if you hold an approval.

Note: Pilots must hold a flight activity endorsement to fly in formation, see 61.380 and *Flight activity endorsement* table (61.1145).

> **Exception:** *If you are soaring in a glider, with one or more gliders in a thermal, although such a flight constitutes a formation flight, you do not need to have prearranged the flight with other pilots (MOS 6.02).*

> *Aircraft are in formation any time 2 or more aircraft are flown in close proximity to each other and they operate as a single aircraft with regard to navigation, position reporting and control.*
>
> *Aircraft are also considered to be in formation when they are manoeuvring to achieve separation from each other to effect individual control (break away) and during join up.*
>
> *For determining what constitutes 'close proximity', you must consider the type of aircraft in the formation and their speed.*

Towing of things by aircraft (91.210)

You may only tow a thing with an aircraft if you hold an approval or are permitted to do so by another provision of the regulations.

> *The other regulations which permit towing are in Part 103 for towing gliders and Part 138 for aerial work operations.*

Night vision imaging system (NVIS) flights (91.085)

You must ensure that when conducting an NVIS flight you comply with the MOS requirements set out in appendix B and the equipment requirements set out in appendix A.

> *Part 91 MOS operational rules for NVIS flights are generally restated by the Part 133 and 138 manuals of standards.*
>
> *If you are operating or training under other Parts (such as 133 or 138), the rules that apply to you may be varied by the Part 133 or 138 MOS requirements for NVIS.*
>
> *To fully comprehend any broader obligations you may have, it is recommended you review section 2.3 of the latest version of the 'Night Vision Imaging Systems' multi-part advisory circular AC 91-13, AC 133-09 and AC 138.06, referred to in this guide simply as AC 91-13).*

Search and rescue services and emergency and survival equipment (Division 91.C.5)

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19. Aircraft equipment

Requirements relating to equipment (91.810)

A person must satisfy the requirements of MOS chapter 26 relating to:

- the fitting or non-fitting of equipment
- the carrying of the equipment
- the equipment that is fitted to or carried on an aircraft.

The variation in approval by the authorities certifying helicopter automatic pilot and automatic stabilisation systems characteristics, means it is not possible for CASA to prescribe specifications for this equipment. Accordingly, each application for approval to conduct helicopter IFR operations will be individually assessed.

Carbon Monoxide (CO) detectors- it is strongly recommended that pilots of piston engine aircraft should wear personal CO detectors. Refer Part 91.

MOS Chapter 26

The following requirements of MOS Chapter 26 can be found in appendix A.

Purpose MOS (26.01)

Approval of aircraft equipment (MOS 26.02)

Visibility and accessibility of pilot-operated equipment (MOS 26.03)

Flight with inoperative equipment (MOS 26.04)

Aeroplane – VFR flight by day (MOS 26.06)

Aeroplane – VFR flight by night (MOS 26.07)

Aeroplane – IFR flight (MOS 26.08)

Rotorcraft – VFR flight by day (MOS 26.10)

Rotorcraft – VFR flight by night (MOS 26.11)

Rotorcraft – IFR flight (MOS 26.12)

Application – VFR flight requirements do not apply to certain light sport aircraft (LSA) (MOS 26.13)

Application – VFR and IFR flight requirements do not apply to certain experimental aeroplanes (MOS 26.14)

Application – VFR and IFR flight requirements do not apply to certain experimental rotorcraft (MOS 26.15)

Application – VFR and IFR flight requirements do not apply to certain Australian-registered aircraft (MOS 26.16)

Electronic flight information systems (MOS 26.17)

Radiocommunication system (MOS 26.18)

When an aircraft may begin a flight with inoperative radio (MOS 26.19)

Equipment to measure and record cosmic radiation (MOS 26.20)

Cockpit and cabin lighting requirements (MOS 26.21)

Anti-collision lights (MOS 26.22)

Landing lights (MOS 26.23)

Navigation lights (MOS 26.24)

Altitude alerting system and assigned altitude indicator – IFR flights (MOS 26.25)

Aircraft flown with inoperative altitude alerting – IFR flights (MOS 26.26)

Reserved – aeroplane airborne collision avoidance system: ACAS II (MOS 26.27)

Reserved – ACAS II requirements for use (MOS 26.28)

Reserved – Flight with inoperative ACAS (MOS 26.29)

Definitions – flight recorders (MOS 26.30)

Aeroplane flight data recorder (MOS 26.31)

Aeroplane cockpit voice recorder (MOS 26.32)

Rotorcraft flight data recorder (MOS 26.33)

Rotorcraft cockpit voice recorder (MOS 26.34)

Combination recorders – for aeroplane or rotorcraft (MOS 26.35)

FDR, CVR and combination recorder technical requirements (MOS 26.36)

Use of FDR, CVR and combination recorders (MOS 26.37)

Flight with inoperative FDR, CVR or combination flight recording equipment (MOS 26.38)

Reserved – Datalink recorder (MOS 26.39)

Flight crew intercommunications system – VFR flights (MOS 26.40)

Flight crew intercommunications system – IFR flights (MOS 26.41)

Public address system (MOS 26.42)

Supplemental oxygen (MOS 26.43)

Oxygen masks – usage requirement pressurised aircraft above FL250 (MOS 26.44)

Protective breathing equipment flight crew members (MOS 26.45)

Portable protective breathing equipment (MOS 26.46)

First aid oxygen equipment – pressurised aircraft (MOS 26.47)

Carriage of ELT (MOS 26.48)

ELT – basic technical requirements (MOS 26.49)

Automatic ELT (MOS 26.50)

Survival ELT (MOS 26.51)

Aircraft flown with inoperative ELT (MOS 26.52)

Hand-held fire extinguishers – aeroplanes (MOS 26.53)

Hand-held fire extinguishers – rotorcraft (MOS 26.54)

Sea anchors and sound signals – seaplanes and amphibians (MOS 26.55)

Lifejackets carriage requirements (MOS 26.56)

Stowage of life jackets (MOS 26.57)

Wearing life jackets – aircraft generally (MOS 26.58)

Wearing life jackets – rotorcraft – special provision (MOS 26.59)

Life rafts carriage requirements (MOS 26.60)

Stowage of life rafts (MOS 26.61)

Over-water survival equipment (MOS 26.62)

Remote area – definitions (MOS 26.63)

Remote area survival equipment (MOS 26.64)

Meaning of remote area (MOS 26.65)

Surveillance equipment exceptions to (E) TSO or NAA requirements (MOS 26.66)

Surveillance equipment – Definitions (MOS 26.67)

Carriage of transponders and surveillance equipment (MOS 26.68)

Operation of transponders – general requirements (MOS 26.69)

Mode S transponders – specific requirements (MOS 26.70)

Alternate GNSS position source for ADS-B OUT – requirements (MOS 26.71)

Alternate ADS-B OUT equipment configuration – requirements (MOS 26.72)

Aircraft flown with inoperative transponder (MOS 26.73)

Equipment for NVIS flights (MOS 26.74)

Application (MOS 26.74A)

Definitions (MOS 26.75)

Aircraft general and lighting standards for NVIS flights (MOS 26.76)

Table 29 – Modifications of RTCA/DO 275

Maintenance of the NVIS and its components (MOS 26.78)

Minimum aircraft equipment for NVIS flight (MOS 26.79)