IFR Cheat Sheet

Version 7.1 – 30 March 2024

Note for December 2 2021 Changes

On December 2 2021, there were significant changes to the regulatory structure.

The changes included incorporation of many previous CARs, CAOs and some elements of the AIP into new CASR Part 91. Many rules remain unchanged, but can now be found in the newer CASRs as well as the Part 91 Manual of Standards

Some new rules were also introduced (such as approach bans).

Many rules are largely the same, but with more complicated wording.

CASR Part 91 covers General Operating and Flight Rules. CASA have published a Plain English Guide to Part 91 which is available here: casa.gov.au/sites/default/files/2021-08/plain-english-guide-part-91-new-flight-operations-regulations-interactive-version.pdf

The terms *charter* and *regular public transport* no longer exist within the regulatory framework and have been replaced by *air transport*.

CASR Part 121 covers larger aeroplane air transport (MTOW more than 8,618 kg or more than 9 passenger seats).

CASR Part 135 covers smaller aeroplane air transport (MTOW 8,618kg or less and up to 9 passenger seats).

CASR Part 138 covers aerial work.

For brevity, some of the changes applicable to Part 121 and Part 135 operations (such as aircraft equipment and alternate requirements) have been removed from this update of the Cheat Sheet. They should, however, be included again soon.

As the changes are substantial, please treat this document as a work in progress. Be aware that some sections may be incorrect, incomplete or contain inaccurate references. As always, do not use this document for operational purposes.

Introduction

Thanks for downloading the We Fly Planes IFR Cheat Sheet!

This is a free resource and we encourage you to share it with others. If you find it useful and wish to contribute, you can donate at

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The project began in 2014 for the author's first Instrument Rating renewal. Since then it has grown and been made available to pilots all across Australia.

This resource mostly deals with IFR information in the Australian region. However, other notes have been included where deemed useful.

Some sections included in the document have been pasted directly from the original reference with no changes. In cases where the original reference was difficult to interpret or contained superfluous information, attempts have been made to simplify and paraphrase the content. Because of this, the reader should always refer back to the original reference for complete information.

This IFR Cheat Sheet has been formatted for printing on A5 paper or for easy reading on a mobile device.

We'd love to hear from you with suggestions, improvements, amendments and additions. Use the contact form at weflyplanes.com.au

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Remember, this document is a reference tool only and must NOT be used for operational use. Always refer to CASR, MOS, CAR, CAO, AIP, DAP, ERSA, Company Manuals, NOTAMs and your other current documents. We accept no responsibility for your use or misuse of this document, nor do we guarantee the accuracy or currency of any information provided herein.

Thanks again, and happy flying!

Summary of Changes

Date	Version	Page	Changes
27/03/24	7.1	Multiple	Multiple editorial changes and corrections including to CASRs, MOS, AIP (21 March 2024 version) and Jeppesen (21 March 2024 version) references
		12	Inclusion of power supply indications to gyroscopic instruments
		18	Error from Part 91 Plain English Guide had been incorporated in previous version, wording *landing performance charts* replaced with *take-off performance charts*
		34	Correction to align qualifying aircraft with Part 91 MoS, 5700kg removed
		44	"T V I V C" mnemonic replaced with "V I V A T" to better align with CASR wording
		54	Correction where previous version cited minimum visibility instead of minimum altitude
		56	Addition of RAIM if below MSA
		56	*Navigational tolerances* definition added

Administrational

Part 61 Definitions

CASR 61.015 – Definition of category of aircraft for Part 61

Each of the following is a ***category*** of aircraft:

(a) aeroplane;
(b) helicopter;
(c) powered-lift aircraft;
(d) gyroplane;
(e) airship.

CASR 61.020 – Definition of class *of aircraft for Part 61*

(1) Each of the following is a ***class*** of aircraft:

(a) single-engine aeroplane;
(b) multi-engine aeroplane;
(c) single-engine helicopter;
(ca) powered-lift aircraft;
(d) single-engine gyroplane;
(e) airship

(2) For this Part, the single-engine aeroplane class includes:

(a) multi-engine centre-line thrust aeroplanes; and
(b) multi-engine aeroplanes that are prescribed by a legislative instrument under regulation 61.050 (Prescription of multi-engine aeroplanes included in single-engine class).

Part 61 Manual of Standards

CASR 61.035 – Issue of Manual of Standards for Part 61

(1) For paragraph 98(5A)(a) of the Act, CASA may issue a Manual of Standards for this Part that sets out matters relating to flight crew licences.

(2) In particular, the manual of standards may set out standards for the following:
- (a) approvals under regulation 61.040;
- (b) aeronautical and other knowledge required by this Part for the grant of a licence, rating or endorsement;
- (c) flight training;
- (d) other training and development requirements;
- (e) flight tests;
- (f) aviation and general English language proficiency;
- (g) general operating competencies for:
  - (i) aircraft of a particular class or type; and
  - (ii) activities authorised by operational ratings and endorsements;
- (h) competency in the use of an airborne collision avoidance system;
- (i) flight reviews;
- (k) instrument proficiency checks;
- (l) night vision imaging system proficiency checks;
- (m) aerial application proficiency checks;
- (n) instructor proficiency checks;
- (o) competencies for glider pilot licences.

Validity of an Instrument Proficiency Check

CASR 61.880 – Limitations on exercise of privileges of instrument ratings – instrument proficiency check Paragraph 3

An instrument proficiency check is valid:

- From the period the holder passes the flight test to the end of the 12th month after the month in which the holder passes the flight test.

or

- For the period during which the holder is successfully participating in an operator's training and checking system for an IFR operation in the relevant aircraft.

If the holder successfully completes an instrument proficiency check for the relevant aircraft within 3 months before the validity of the existing check expires, then the instrument proficiency check is valid to the end of the 12th month after the validity of the existing check.

Privileges and Limitations of an Instrument Rating

CASR 61.855 – Privileges of instrument ratings

Subject to Subpart 61.E and regulations 61.860 to 61.880, the holder of an instrument rating is authorised to pilot an aircraft:

(a) under the IFR; or
(b) at night under the VFR.

CASR 61.860 – Limitations on exercise of privileges of instrument ratings – general

The holder of an instrument rating is authorised to:

- conduct an instrument approach only if the aircraft is equipped for that kind of operation;
- pilot an aircraft in a single-pilot operation under the IFR only if, at some time in the past, the holder has passed an instrument rating flight test in a single-pilot aircraft or has completed an instrument proficiency check in a single-pilot aircraft;
- conduct a circling approach under the IFR only if:
    - the holder passed the instrument rating flight test within the previous 12 months and that flight test included a circling approach; or
    - the holder's most recent instrument proficiency check (or operator's proficiency check that covers IFR operations and is conducted by a flight examiner who holds an instrument rating flight test endorsement) included a circling approach; or
    - the holder is successfully participating in an operator's training and checking system for an operation that includes circling approaches;
- conduct an instrument approach only if the holder has completed training in the conduct of that instrument approach and has demonstrated competence to CASA or an examiner.

Recent Experience Requirements

CASR 61.870 – Limitations on exercise of privileges of instrument ratings – recent experience: general

	Requirement (in an aircraft or approved flight simulation training device)
To fly under the IFR	Must have conducted at least three instrument approach operations within the previous 90 days
To pilot an aircraft of a particular category	Must have conducted at least one instrument approach operation in an aircraft of the same category (refer to *Definitions*) within the previous 90 days
2D approach	Must have conducted at least one 2D instrument approach within the previous 90 days
3D approach	Must have conducted at least one 3D instrument approach within the previous 90 days
Azimuth guidance	Must have conducted at least one 2D instrument approach using azimuth guidance within the previous 90 days
Course deviation indicator	Must have conducted at least one instrument approach using a CDI within the previous 90 days

All of the above recent experience requirements are considered to be met if the holder:

- the holder has successfully completed an operator proficiency check that covers IFR operations within the previous 3 months; or
- the holder is successfully participating in an operator's training and checking system for an IFR operation.

CASR 61.875 – Limitations on exercise of privileges of instrument ratings – recent experience: single pilot

(1) The holder of an instrument rating is authorised to pilot an aircraft under the IFR in a single-pilot operation only if the holder has conducted a flight or simulated flight under the IFR in a single-pilot operation within the previous 6 months.

(2) For subregulation (1), the flight or simulated flight must:
    (a) have a duration of at least one hour; and
    (b) include at least one instrument approach or simulated instrument approach.

Aircraft Equipment

Part 91 MOS Chapter 26.08 – Equipment – Aeroplane IFR flight

Requirements
Approved GNSS
AI[1 7]
ASI[2 3]
ALT[3]
VSI[3]
T+S[4 5 7]
DG[6 7]
Compass
OAT
Clock[8]

1 Primary and alternate power supply unless independent of T+S or a second AI required
2 Pitot heat required on at least one ASI
3 With alternate static source or a balanced pair of flush static ports
4 Slip only if a second AI is available
5 Primary and alternate power supply unless independent of other gyroscopic instruments or a second AI required
6 Primary and alternate power supply unless independent of T+S or a second AI required
7 Must include equipment to show adequate power supply to gyroscopic instruments (if any)
8 Can be worn

Part 91 MOS 26.25 – Altiude alerting system and assigned altitude indicator – IFR flights

1) For an IFR flight, the following aircraft must be fitted with altitude alerting equipment in accordance with subsection (2):
    a) a piston-engine aircraft operating in controlled airspace above FL 150;
    b) an unpressurised turbine-engine aircraft operating in controlled airspace above FL 150;
    c) a pressurised turbine-engine aircraft operating in any controlled airspace.
2) For subsection (1), the altitude alerting equipment must:
    a) include an assigned altitude indicator; and
    b) alert the flight crew members if the aircraft approaches a preselected altitude; and
    c) alert the flight crew members, including by an aural warning, if the aircraft deviates from a preselected altitude.
3) If an aircraft, other than an aircraft to which subsection (1) applies, is operating under the IFR in controlled airspace, the aircraft must be fitted with altitude alerting equipment that at least includes an assigned altitude indicator.

Part 91 MOS 26.04 – Flight with inoperative equipment

Any equipment required by this Chapter to be fitted to, or carried on, an aircraft for a flight must be operative unless:

a) Another section of this Chapter provides otherwise (refer *Part 91 MOS 28*); or
b) The equipment:
    (i) Is inoperative because of a defect that has been approved as a permissible unserviceability for the aircraft for the flight; and
    (ii) Is fitted or carried in accordance with the permissible unserviceability.

Part 91 MOS 26.21 – Cockpit and cabin lighting requirement

Equipment illumination inc. checklists and documents
Compatible with each item of equipment
In a normal position, can read all placards and instrument markings, eyes shielded from direct and reflected light
Variable intensity
Cabin lighting for seatbelt, oxygen normal and emergency exits
Independent portable light for each FCM

Part 91 MOS 26.22 – Anti-collision lights

1 red beacon, or
2 white strobes, or
A combination of these

Part 91 MOS 26.23 – Landing lights

Operating by night, at least 1 landing light

Part 91 MOS 26.24 – Navigation lights

Operating by night, must be fitted

General Operational Knowledge

Speed Definitions

V_{MCA} Minimum Control Speed, air (red radial)

- critical engine inoperative
- live engine at take-off power
- landing gear retracted
- maximum of 5 degrees bank towards live engine
- propeller feathered (only for aircraft with automatic feathering devices)

The minimum speed at which it is possible to maintain directional control of the aircraft with the critical engine inoperative.

V_{MCG} Minimum Control Speed, ground

- critical engine inoperative
- live engine at take-off power

The minimum speed, whilst on the ground, at which it is possible to maintain directional using only aerodynamic controls.

V_{SSE} Single Engine Safety Speed

The speed below which intentional simulated engine failures should not be conducted. V_{SSE} is a manufacturer-stated speed intended to provide a margin above V_{MCA}.

V_{YSE} Single Engine Best Rate of Climb Speed (blue radial)

- critical engine inoperative
- live engine at take-off power
- landing gear retracted

The speed at which the best rate of climb can be achieved with the critical engine inoperative.

Communications Failure

ERSA EMERG 1.5 – Communication Failure
(JEPP EMERG – Emergency Procedures 3)

In the event of communications failure, maintain terrain clearance throughout all procedures.

Indications by an Aircraft:

In Flight

(i) during the hours of daylight - by rocking the aircraft's wings; and
Note: This signal should not be expected on the base and final legs of the approach.

(ii) during the hours of darkness - by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

On the Ground

(i) during the hours of daylight: by waggling the aircraft's ailerons or rudder; and

(ii) during the hours of darkness: by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

If VFR in Class G Airspace

a. Remain in VMC.
b. Broadcast Intentions (prefix “TRANSMITTING BLIND").
c. Remain VFR in Class G airspace and land at the nearest suitable aerodrome.
d. Report arrival to ATS if on SARTIME or reporting schedules (SAR 1800 815 257).

If in Controlled/Restricted Airspace or IFR in any airspace

a. Squawk 7600
b. Listen out on ATIS and/or voice modulated NAVAIDs.
c. Transmit intentions and make normal position reports (assume transmitter is operating and prefix calls with "TRANSMITTING BLIND").

AND

if in VMC and are certain of maintaining VMC

a. Stay in VMC and land at the most suitable aerodrome (note special procedures if proceeding to a Class D).

OR

If in IMC or are uncertain of maintaining VMC

b. If no clearance limit received and acknowledged, proceed in accordance with the latest ATC route clearance acknowledged and climb to planned level.
c. If a clearance limit involving an altitude or route restriction has been received and acknowledged:

i. maintain last assigned level, or MSA if higher, for three minutes and/or
ii. hold at nominated location for three minutes, then
iii. proceed in accordance with the latest ATC route clearance acknowledged and climb to planned level.

d. If receiving an ATS surveillance service:
i. climb to MSA/LSALT, and,
ii. if being vectored, maintain last assigned vector for two minutes, then
iii. proceed in accordance with the latest ATC route clearance acknowledged.

e. If holding:
i. fly one more complete holding pattern, then
ii. proceed in accordance with the latest ATC route clearance acknowledged.

Destination Procedures:

a. Track to the destination in accordance with flight plan (amended by the latest ATC clearance acknowledged, if applicable).
b. Commence descent in accordance with standard operating procedures or flight plan.
c. Descend to the initial approach altitude for the most suitable approach aid in accordance with the published procedures.
d. Carry out the approach to the prescribed minima.

Actions at Minima

a. If visual at the minima at an uncontrolled aerodrome, continue to land provided that a safe landing can be accomplished If visual at the minima at a controlled aerodrome continue to land provided that a clearance to land is received via a voice modulated NAVAID and/or light signal from the Tower.
b. If not visual at the minima, depart for a suitable alternate aerodrome.
c. If insufficient fuel is carried to divert to a suitable alternate, the pilot may hold or carry out additional approaches until visual.
d. Certain Class D aerodromes have specific communications failure procedures which are shown at each aerodrome entry in the FAC section

Aeroplane Weight and Performance Limitations

Take-off performance for aeroplanes
CASR 91.795 – Take-off performance
Part 91 MOS 24.02 – Take-off performance for aeroplanes
Part 91 Plain English Guide – Take-off performance

For small aeroplanes, the AFM take-off performance charts are normally 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 pressure and temperature variation. It is your responsibility to be satisfied that the runway is long enough so you can take off safely (*CASR 91.410*).

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

(a) 1.15 for MTOW of 2,000 kg or less;
(b) 1.25 for MTOW of 3,500 kg or greater; and
(c) Between 2,000 kg and 3,500 kg, use linear interpolation

Landing Distance Required
CASR 91.800 – Landing performance
Part 91 MOS 25.02 – Landing performance for aeroplanes
Part 91 Plain English Guide – Landing performance

For small aeroplanes, the AFM landing performances charts are normally 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 pressure and temperature variation. It is your responsibility to be satisfied that the runway is long enough so you can land safely (*CASR 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 landing distance required:

(a) 1.15 for MTOW of 2,000 kg or less;
(b) 1.43 for MTOW of 4,500 kg or greater;
(c) Between 2,000 kg and 4,500 kg, use linear interpolation

Visual Meteorological Conditions

Part 91 MOS Section 2.07

Class G	Class E
5000M	5000M
8KM (ABV 10,000)	8KM (ABV 10,000)
1500M ⇔	1500M ⇔
1000FT ⇳	1000FT ⇳
When below 3000FT AMSL or 1000 AGL (whichever is higher), can remain clear of cloud and in sight of ground or water if radio carried and used on appropriate frequency	-

Class D	Class C
5000M	5000M
-	8KM (ABV 10,000)
600M ⇔	1500M ⇔
1000FT ⇧	1000FT ⇳
500FT ⇩	-

Transponder codes

AIP ENR 1.6 Para 7.1.4 – Operation of SSR Transponders
(Jepp ATC – ATS Surveillance Services and Procedures 7.1.4)

Operation	Code
VFR in Class E or G or OCTA	1200
IFR OCTA	2000
IFR in Class E or civil flights in CTA	3000

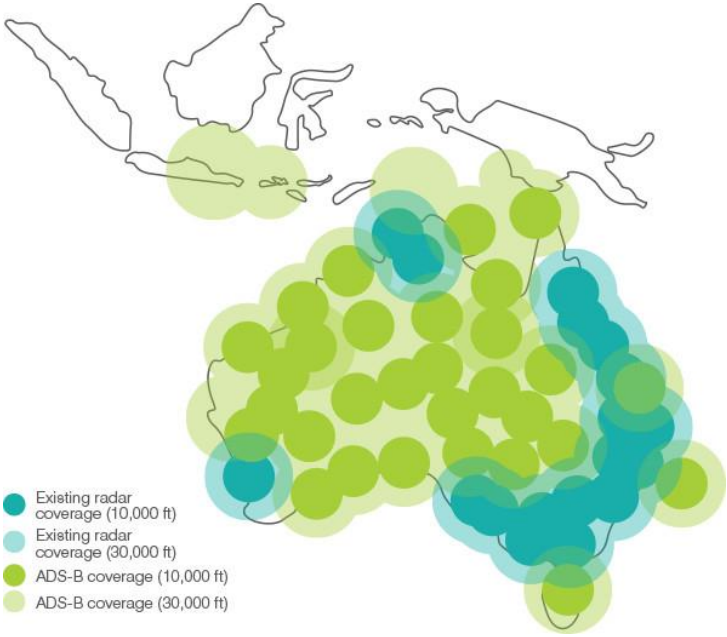
VHF Theoretical Maximum Range

To determine the theoretical maximum range of VHF transmissions, the following formula can be used:

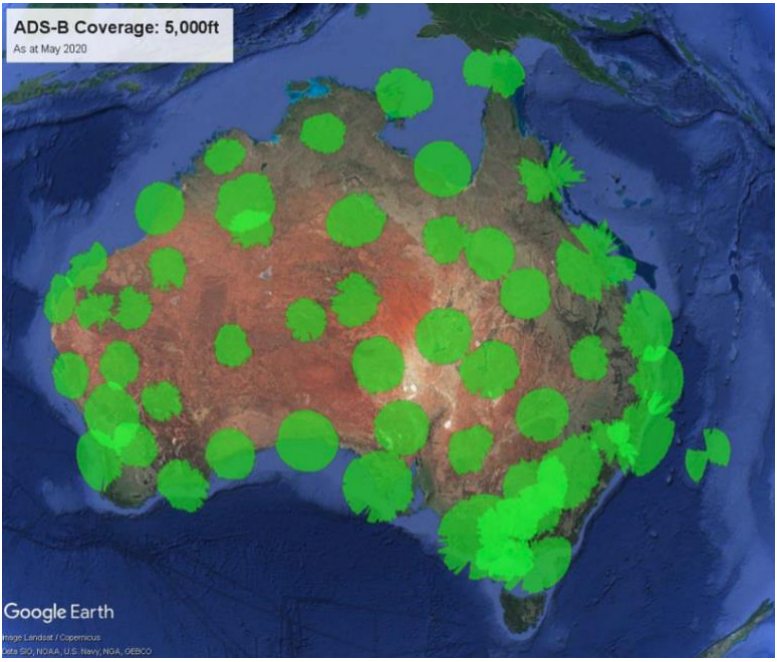
$$d = 1.23 (\sqrt{(Htx)} + \sqrt{(Hrx)})$$

Where:
d = distance in NM
Htx = elevation in feet of transmitter
Hrx = height in feet above ground level of receiver

Radar and ADS-B Coverage



Accessed from https://www.casa.gov.au/book-page/chapter-4-surveillance-and-ads-b on 05/08/2018



Accessed from https://www.airservicesaustralia.com/wp-content/uploads/2020/06/ADS-B-5000ft-Coverage-1024x869.jpg on 26/04/2024

Light Signals to Aircraft

AIP ENR 1.5 Para 12 – Signals for the Control of Aerodrome Traffic (JEPP ATC – Airports and Ground Aids 4)

Light Signal	In Flight	On Airport
Steady green 	Authorised to land if pilot satisfied no collision risk exists	Authorised to take-off if pilot satisfied no collision risk exists
Steady red 	Give way to other aircraft and continue circling	Stop
Green flashes 	Return for landing	Authorised to taxi if pilot satisfied no collision risk exists
Red flashes 	Airport unsafe – do not land	Taxi clear of landing area in use
White flashes 	No significance	Return to starting point on airport

Acknowledgements by aircraft:

In flight:

1. during the hours of daylight: by rocking the aircraft's wings
   Note: this signal should not be expected on the base and final legs of the approach
2. during the hours of darkness: by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights

On the ground:

1. during the hours of daylight: by moving the aircraft's ailerons or rudder
2. during the hours of darkness: by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights

Phraseology

Class G Airports

AIP GEN 3.4 Para 6 – Phraseologies
(Jepp ATC – Communications 7)

Taxi Brisbane Centre ABC Cessna 310 POB 2 (for IFR flights other than air transport operations) IFR Taxiing Roma For Archerfield RWY 18	
Departure Report In ADS-B or SSR Coverage Brisbane Centre ABC 3 miles east of Longreach Passing 2000 Climbing to 9000 Estimating MOVBA at 25	**Departure Report** Outside ADS-B or SSR Coverage Brisbane Centre ABC Departed Blackall 51 Tracking [to intercept] 236 Climbing to 10000 Estimating EXXON at 21
Departure Report Where radio contact was unable to be established on the ground and a SARWATCH needs to begin Brisbane Centre ABC Airborne Blackall 51 Tracking [to intercept] 305 Climbing to 10000 Estimating Longreach at 26	
Inbound If leaving CTA on descent Brisbane Centre And all stations Longreach ABC Cessna 310 35 miles northwest of Moranbah Leaving 10000 Estimating the circuit 55 Centre and all stations Longreach	**Cancel SAR** Brisbane Centre ABC Landed Longreach Cancel SARWATCH

Class D Airports

Airways Clearance Delivery Where a Delivery frequency is specified Tamworth Delivery ABC To Wagga Request clearance	**Airways Clearance Delivery** Where no Delivery frequency is specified Mackay Ground ABC To Townsville Request clearance
Taxi Mackay Ground ABC POB 2 (for IFR flights other than RPT) Information Alpha IFR Request taxi	**Tower transfer** When close to, or at, the holding point and ready for departure Mackay Tower ABC Ready
Departure Report Albury Tower ABC Tracking 166 from the VOR Climbing to 7000	**Departure Report** When Departing via a SID Sunshine Coast Tower ABC Tracking via the MOOLO 1 Climbing to 8000
Inbound Mackay Tower ABC Cessna 310 Information Alpha 25 miles on the 135 radial Descending to 6000 [Visual]	

Class C Airports

Airways Clearance Delivery Where a Delivery frequency is specified Townsville Delivery ABC To Cairns Request clearance	**Airways Clearance Delivery** Where no Delivery frequency is specified Essendon Ground ABC To Albury Request clearance
Taxi Canberra Ground ABC POB 2 (for IFR flights other than RPT) Information Alpha IFR Request taxi	**Tower transfer** When close to, or at, the holding point and ready for departure Canberra Tower ABC Ready
Airborne Report Tracking via a SID where a heading has been assigned to you Canberra Departures ABC Turning left 020 Passing 3000 Climbing to 9000	**Airborne Report** Tracking via a Procedural SID that does not require a heading to be assigned to you Canberra Departures ABC Passing 3000 Climbing to 9000
Airborne Report When instructed to maintain RWY heading Canberra Departures ABC Maintaining runway heading Passing 3000 Climbing to 9000	**Airborne Report** When assigned heading approximates RWY bearing Canberra Departures ABC Heading 120 Passing 3000 Climbing to 9000
First contact with Approach Brisbane Approach ABC Cleared to 6000 Information Echo [Visual]	

Preflight

Fuel Requirements

CASR 91.455
Part 91 MOS 19.02

Aircraft	Flight Rules	Final Reserve Fuel	Contingency Fuel
MTOW ≤ 5700 kg	Day VFR	30 minutes	-
	Night VFR	45 minutes	-
	IFR	45 minutes	-
Turbojet or > 5700 kg turboprop	IFR or VFR	30 minutes	5%
Piston > 5700 kg	IFR or VFR	45 minutes	5%

Alternate Requirements

Suitability of Alternates

Part 91 MOS 8.07 – Destination Alternate Aerodromes – restrictions
AIP ENR 1.1 Para 10.7.1.2 – Alternate Aerodromes – General
(Jepp ATC – Airports and Ground Aids 3.1.2)

The pilot in command of an aircraft may nominate an aerodrome as a destination alternate aerodrome only if the aerodrome is:

a. suitable as a planned destination aerodrome for the flight; and
b. not itself an aerodrome for which the aircraft would require a destination alternate aerodrome; and
c. not a helideck

Alternates Could Very Well Prove Life Savers

Aids

Part 91 MOS 8.05 – Destination Alternate Aerodromes – navigation
AIP ENR 1.1 Para 10.7.3 – Radio Navigation Aids
(Jepp ATC – Airports and Ground Aids 3.3)

Part 91 aircraft: A destination alternate aerodrome must be planned for an IFR flight by night to a planned destination aerodrome that is:

a) not served by an instrument approach procedure; or
b) is served by 1 or more instrument approach procedures, none of which the pilot is able to conduct.

AIP ENR 1.1 Para 10.7.2.10 – Weather Conditions
(Jepp ATC – Airports and Ground Aids 3.3)

For IFR flights, the alternate minima are as follows:

a. For aerodromes with an instrument approach procedure that the pilot is able to conduct, the alternate minima published on the chart (see *ENR 1.5, Section 6*).
b. By day only – for aerodromes without an instrument approach procedure, or that has an instrument approach procedure but the pilot is unable to conduct that procedure, the alternate minima is the lowest safe altitude for the final route segment plus 500FT and a visibility of 8KM.

AIP ENR 1.1 Para 10.7.3.3 – Radio Navigation Aids
(Jepp ATC – Airports and Ground Aids 3.3)

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

Author's Note: This also requires provision for a ground-based IAP if an approach in VMC is not possible). CASA have specifically clarified this with RPT operators to mean that if a TSO-C129 or

129a GNSS is being used, then an alternate must be planned for unless either the weather conditions described above are met or the alternate requirements can be met by the use of ADF or VOR.

Night VFR aircraft must provide for a suitable alternate aerodrome within one hour flight time of the destination unless:

a. the destination is served by a radio navigation aid (NDB/VOR) and the aircraft is fitted with the appropriate radio navigation system capable of using the aid, and the pilot is competent in using the aid, or
b. the aircraft is fitted with an approved GNSS, as defined in the relevant *MOS* for the kind of operation being conducted), and the pilot is competent in using the GNSS.

Clouds, Visibility and Wind

Part 91 MOS 8.04 – Destination Alternate Aerodromes – weather
AIP ENR 1.1 Para 10.7.2 – Weather Conditions
(Jepp ATC – Airports and Ground Aids 3.2.1)

Except when operating an aircraft under the VFR by day within 50NM of the point of departure, the pilot in command must provide for a suitable alternate aerodrome when arrival at the destination will be during the currency of, or up to 30 minutes prior to the forecast commencement of, the following weather conditions:

cloud - more than SCT below the alternate minimum (see *AIP ENR 1.1 Para 10.7.2.10 and Para 10.7.2.11 (Jepp ATC – Airports and Ground Aids 3.2.10 and 3.2.11)*); or
visibility - less than the alternate minimum; or
visibility - greater than the alternate minimum, but the forecast is endorsed with at least a 30% percentage probability of fog, mist, dust or any other phenomenon restricting visibility below the alternate minimum; or
wind - a crosswind or tailwind component more than the maximum for the aircraft.

Note: Wind gusts must be considered.

Provided and PROB

AIP ENR 1.1 Para 10.7.1.3 – General
(Jepp ATC – Airports and Ground Aids 3.1.2)

When an aerodrome forecast is not available, the pilot in command must make provision for a suitable alternate that has an available forecast.

AIP ENR 1.1 Para 10.7.2 – Weather Conditions
(Jepp ATC – Airports and Ground Aids 3.2.1)

If a TAF has been endorsed with a probability of conditions being below the alternate minima, an alternate must be planned for.

Lighting

Part 91 MOS 8.06 – Destination Alternate Aerodromes – aerodrome lighting
AIP ENR 1.1 Para 10.8.1.1 – Suitability of Aerodromes
(Jepp ATC – Airports and Ground Aids 2.1)

When aerodrome lighting is required and PAL is not being used, the pilot in command or operator must ensure that arrangements have been made for the lighting to be operating during the following periods:

a. departure: 10 minutes before departure to at least 30 minutes after take-off;
b. arrival: from at least 30 minutes before ETA to the time landing and taxiing has been completed.

AIP ENR 1.1 Para 10.7.4 – Runway Lighting
(Jepp ATC – Airports and Ground Aids 3.4)

Portable Lighting
When a flight is planned to land at night at an aerodrome where the runway lighting is portable, provision must be made for flight to an alternate aerodrome unless arrangements are made for a responsible person to be in attendance during the period specified in *AIP ENR 1.1 Para 10.8.1.1 (Jepp ATC – Airports and Ground Aids 2.1),* to ensure that the runway lights are available during that period.

If No Standby Power Available
When a flight is planned to land at night at an aerodrome with electric runway lighting, whether pilot activated or otherwise, but without standby power, provision must be made for flight to an alternate aerodrome unless portable runway lights are available and arrangements have been made for a responsible person to be in attendance during the period specified in *AIP ENR 1.1 Para 10.8.1.1 (Jepp ATC – Airports and Ground Aids 2.1)*, to display the portable lights in the event of a failure of the primary lighting.

An alternate aerodrome nominated in accordance with the requirements in *AIP ENR 1.1 paras 10.7.4.2 and 10.7.4.3 (Jepp ATC - Airports and Ground Aids 3.4.2 and 3.4.3)* need not have standby power or standby portable runway lighting.

Pilot Activated Lighting
When a flight is planned to land at night at an aerodrome with PAL and standby power, provision must be made for a flight to an alternate aerodrome equipped with runway lighting unless a responsible person is in attendance to manually switch on the aerodrome lighting.

An alternate aerodrome nominated in accordance with the requirements in *AIP ENR 1.1 paras 10.7.4.2 and 10.7.4.3 (Jepp ATC – Airports and Ground Aids 3.4.2 and 3.4.3)* need not have standby power or standby portable runway lighting.

Lighting Systems for Alternate Aerodrome

An aerodrome served by PAL may be nominated as an alternate aerodrome. There is no requirement for a responsible person to be in attendance, but the aircraft must be equipped with:

a. dual VHF; or
b. single VHF and HF and carries 30 minutes holding fuel to allow for the alerting of ground staff in the event of a failure of the aircraft's VHF communication.

Storms

AIP ENR 1.1 Para 10.7.2.1 – Weather Conditions
(Jepp ATC – Airports and Ground Aids 3.2.1)

The pilot in command must provide for a suitable alternate aerodrome when arrival at the destination will be during the currency of, or up to 30 minutes prior to the forecast commencement of, the following weather conditions:

d. a thunderstorm or associated severe turbulence, or a forecast of at least a 30% probability of such an event;

AIP ENR 1.1 Para 10.7.2.5 – Weather Conditions
(Jepp ATC – Airports and Ground Aids 3.2.5)

When thunderstorms or their associated severe turbulence or their probability is forecast at the destination, sufficient additional fuel must be carried to permit the aircraft to proceed to a suitable alternate or to hold for:

a. 30 minutes when the forecast is endorsed INTER; or
b. 60 minutes when the forecast is endorsed TEMPO.

Special Alternate Weather Minima

Part 91 MOS 8.08 – Alternate Minima – Australian aerodromes
AIP ENR 1.5 Para 6.2 – Special Alternate Weather Minima
(Jepp TERMINAL – Instrument Approach/Take-off Procedures 8.2)

Special alternate weather minima are available for specified approaches at some airports for use by aircraft with dual ILS/VOR approach capability. Dual ILS/VOR approach capability must include:

a. duplicated LOC; and
b. duplicated GP; and
c. duplicated VOR; and
d. either:
    (i) duplicated DME; or
    (ii) duplicated GNSS; or
    (iii) single DME and single GNSS.

Special alternate weather minima are identified on applicable instrument approach charts by a double asterisk adjacent to the ALTERNATE title and a note

detailing the special minima. These special alternate minima will not be available (minima will revert to the standard alternate minima) during periods when:

a. local METAR/SPECI or forecasting services are not available; or
b. an airport control service is not provided

Departure

Altimeter Checks

AIP ENR 1.7 Para 1.1 – Pre-flight Altimeter Check
(Jepp ATC – General Flight Procedures 1.1)

Whenever an accurate QNH is available and the aircraft is at a known elevation, pilots must conduct an accuracy check of the aircraft altimeter(s) at some point prior to take-off.

Note: Where the first check indicates that an altimeter is unserviceable, the pilot is permitted to conduct a further check at another location on the same airfield; for example, the first on the tarmac and the second at the runway threshold (to determine altimeter serviceability).

AIP ENR 1.7 Para 1.2 – IFR Altimeters
(Jepp ATC – General Flight Procedures 1.1.2)

With an accurate QNH set, the altimeter(s) should read the nominated elevation to within **60FT**. If an altimeter has an error in excess of **± 75FT**, the altimeter must be considered unserviceable.

When two altimeters are required for the category of operation, one of the altimeters must read the nominated elevation to within 60 ft. When the remaining altimeter has an error between 60 ft and 75 ft, flight under the IFR to the first point of landing, where the accuracy of the altimeter can be re-checked, is approved. In the event that the altimeter shows an error in excess of 60 ft on the second check, the altimeter must be considered unserviceable for flight under the IFR.

An aircraft fitted with two altimeters but requiring only one for the category of operation may continue to operate under the IFR provided one altimeter reads the nominated elevation to within 60 ft. Should the remaining altimeter have an error in excess of 75 ft that altimeter must be placarded unserviceable and the maintenance release appropriately endorsed.

When an aircraft is fitted with only one altimeter and that altimeter has an error between 60 ft and 75 ft, flight under the IFR to the first point of landing, where the accuracy of the altimeter can be re-checked, is approved. In the event that the altimeter shows an error in excess of 60 ft on the second check the altimeter is to be considered unserviceable for flight under the IFR.

AIP ENR 1.7 Para 1.3 – VFR Altimeters
(Jepp ATC – General Flight Procedures 1.1.3)

With an accurate QNH set, a VFR altimeter(s) should read site elevation to within 100FT (110FT at test sites above 3,300FT) to be accepted as serviceable by the pilot. If an aircraft fitted with two VFR altimeters continues to fly with one altimeter reading 100FT (110FT) or more in error, the faulty altimeter must be placarded unserviceable and the error noted in the maintenance release.

AIP ENR 1.7 Para 1.4 – Accurate QNH and Site Elevation
(Jepp ATC – General Flight Procedures 1.1.4)

A QNH can be considered accurate only if it is provided by AAIS, ATC, ATIS, AWIS, CA/GRS, or WATIR.

Note: QNH contained in an authorised weather forecast must not be used for checking the accuracy of a pressure altitude system.

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

Take-off Minima

Part 91 MOS Chapter 15.06 – Take-off minima for other aeroplanes

The take-off minima in this section apply to a take-off that:

a) is not a low-visibility take-off; and
b) is not conducted using a qualifying multi-engine aeroplane.

The take-off minima are:

a) a cloud ceiling of 300 ft; and
b) visibility of 2 000 m

Part 91 MOS Chapter 15.03 – Take-off minima requirements

A pilot in command must not commence a take-off if, at the time of take-off:

a) the meteorological conditions are less than the take-off minima for the aircraft; or
b) the meteorological conditions that would exist if it were necessary to return to land at the departure aerodrome because of engine failure, are not:
    (i) at or above the landing minima for any IAP that the pilot in command is able to conduct at the aerodrome; or
    (ii) such as to allow a visual approach for the return to land.

Part 91 MOS Chapter 15.05 – Take-off minima for qualifying multi-engine aeroplanes

The take-off minima in this section apply to a take-off that:

a) is not a low-visibility take-off; and
b) is conducted using a qualifying multi-engine aeroplane.

The take-off minima are:

a) visibility of 800 m

Author's Note: This minima can be reduced to a visibility of 550M under certain conditions. Refer Part 91 MOS Chapter 15.05 – Take-off minima for qualifying multi-engine aeroplanes

Part 91 MOS Chapter 15.02 – Definitions for this Chapter

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

a) operated by:
    (i) at least 2 pilots; or
    (ii) if powered by piston engines or turboprop engines, and fitted with operative autofeather – 1 pilot; or
    (iii) if powered by turbojet engines – 1 pilot; and
b) in the event of an engine failure – capable of maintaining terrain clearance until reaching the minimum height for IFR flight.

Sample Departure Briefing

Chart

"Today we are using the *[aerodrome] [departure title] [index number]* effective _____.

"The *[aid]* is tuned identified and tested to *[frequency]*.

[or]

"The *[approach title]* SID has been loaded. The tracks, distances and heights have been verified and RAIM is available."

Flying the Departure

[Read initial climb instructions from chart.]

[Discuss assigned altitude.]

Terrain

[Discuss MSAs]

Weather

[Discuss weather conditions from AWIS, ATIS, or TAF. Consider effect of wind on tracks. Discuss QNH and confirm reasonableness.]

[Discuss weather conditions at destination and confirm they remain suitable.]

Considerations and Questions

[Discuss relevant chart notes for aerodrome and departure. Discuss relevant NOTAMs for aerodrome and departure.]

[Discuss plan to achieve MSA in the event of engine failure and options available to return or divert.]

[Discuss meteorological conditions from AWIS, ATIS, or TAF. Discuss QNH and confirm reasonableness.]

[Discuss special considerations and conditions such as:
- *recent changes to chart*
- *traffic]*

[Ask the other crewmember (if applicable) if they have any further items to discuss or have any questions.]

Sample Take-off Safety Briefing

"My speeds are:

V_{MCA} _____

V_R _____

V_{YSE} _____

"When I have *any* abnormality before V_R I will *maintain aircraft control* and reject the take-off.

"At or after V_R and before V_{YSE} for a critical malfunction, I will *maintain aircraft control* and

- land because runway permits; or
- accelerate to V_{YSE}, selecting flap up above 300 feet.
  [Make an informed and concise plan at each particular take-off, taking into consideration strip length, obstacles, wind for increased climb gradient, terrain and direction of turns, aircraft performance limitations and type of malfunction that could occur.]

"Above V_{YSE} I will *maintain aircraft control*, prevent yaw, mixture up, pitch up, power up, gear up, flaps up then dead leg – dead engine, confirm and feather.

"Based on the meteorological conditions, terrain and facilities here, I will

- circle to land, turning towards the live engine *[if appropriate]*; or
- continue to _____.

"In the event that performance is not achieved to climb or maintain level flight, I will _____ *[discuss options]*.

[Discuss simulated or actual emergencies and who has control of the aircraft in an actual emergency.]"

En Route

Local QNH, Area QNH and Transition Layers

AIP ENR 1.7 Para 2 – Basic Altimeter Setting Rules
(Jepp ATC – General Flight Procedures 1.2)

For an operation at or below the transition altitude, the altimeter setting must be:

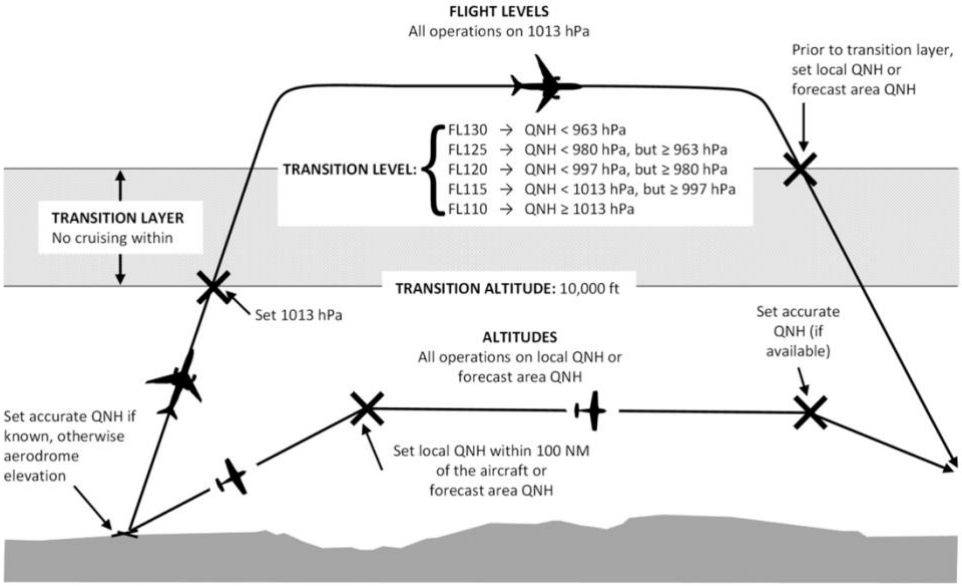
a. the current local QNH (either an accurate QNH or forecast QNH) of a station along the route within 100NM of the aircraft; or
b. the current forecast Area QNH.

Note: QNH Is available from a reporting station (AAIS, ATIS, AWIS, CA/GRS, VOLMET or WATIR), a TAF, the Area QNH forecast, or from ATS (ATC or FIS)

For an operation above the transition altitude, the altimeter setting must be 1013.2 hPa.

On climb, the altimeter setting must be changed from QNH to 1013.2hPa after passing 10,000FT and before levelling off.

On descent, and just before passing the transition layer, the altimeter setting must be changed from 1013.2 hPa to the relevant altimeter setting stated in *AIP ENR 1.7 Para 1.2.4*.



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Navigation Requirements Under the IFR

AIP ENR 1.1 Para 4.1 – Flight Under the IFR
(Jepp ATC – General Flight Procedures 5.1)

An aircraft operating under the IFR must be navigated by:

a. an approved area navigation system that meets performance requirements of the intended airspace or route; or
b. use of a radio navigation system or systems where, after making allowance for tracking errors of ± 9° from the last positive fix, the aircraft will come within the rated coverage of a radio aid which can be used as a fix. The maximum time interval between fixes must not exceed two hours; or
c. visual reference to the ground or water by day, on route segments where suitable enroute radio navigation aids are not available, provided that weather conditions permit flight in VMC and the visual position fixing requirements of *AIP ENR 1.1 Para 4.1.2.1.b (Jepp ATC – General Flight Procedures 5.2.1.b)* are able to be met.

Author's Note:
Distance able to be flown = 6.66 x rated coverage
Maximum time interval of 2 hours between fixes still applies
Fix can be achieved before station passage with GNSS or co-located DME within rated coverage

Deviations in Controlled Airspace

AIP ENR 1.1 Para 4.6.2 – Aircraft Deviations in Controlled Airspace - Advice to ATC
(Jepp ATC – General Flight Procedures 5.6)

The pilot must immediately notify ATC for any of the deviations described below:

Navigation	Tolerance
NDB	± 5°
LOC/VOR	Half-scale deflection
RNP/RNAV	Outside the prescribed RNP/RNAV value
DME	± 2 NM
VISUAL	1 NM

Holding

Sector Entries

AIP ENR 1.5 Para 3.4 – Entry Into the Holding Pattern
(Jepp TERMINAL – Holding Procedures Para 4)

Sector 1 entry (Parallel Entry)

a) On reaching the holding fix, the aircraft is turned onto an outbound heading for the appropriate time (taken from over or abeam the holding fix whichever is later), or until the reaching the limiting DME distance if earlier; then
b) the aircraft is turned onto the holding side to intercept the inbound track or to return to the fix; and then
c) on the second arrival over the holding fix, the aircraft is turned to follow the holding pattern.

Sector 2 entry (Offset or Teardrop Entry)

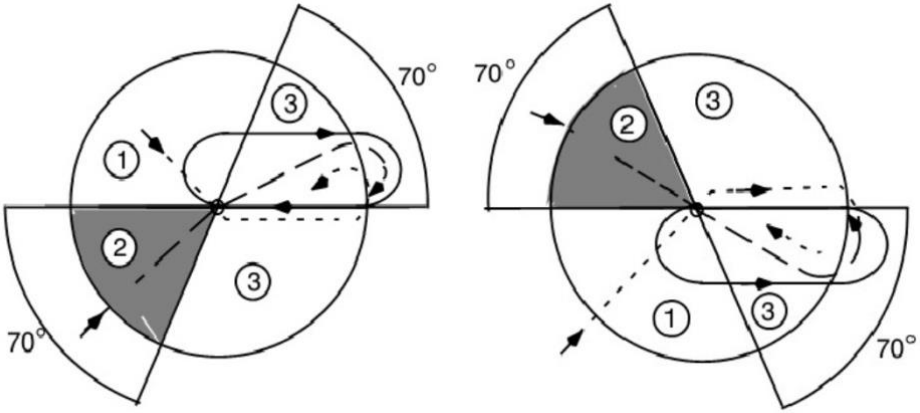
a) On reaching the holding fix, the aircraft is turned onto a heading to make good a track of 30 degrees from the reciprocal of the inbound track on the holding side; then
b) flown outbound:
    1. for the appropriate period of time from the holding fix, where timing is specified, up to a maximum of 1 minute and 30 seconds; or, if earlier
    2. until the appropriate limiting DME distance is attained, where distance is specified; then
c) the aircraft is turned in the direction of the holding pattern to intercept the inbound holding track; then
d) on second arrival over the holding fix, the aircraft is turned to follow the holding pattern.

Sector 3 entry (Direct Entry)

On reaching the holding fix, the aircraft is turned to follow the holding pattern. Outbound timing begins abeam the fix, or when the abeam position cannot be determined, from completion of the outbound turn.

DME Arc Entry

Having reached the fix, the aircraft must enter the holding pattern in accordance with either Sector 1 or Sector 3 entry procedure.



Right Turns (Standard) *Left Turns (Non-Standard)*

Accessed from https://www.airservicesaustralia.com/aip/current/aip/complete_02DEC2021.pdf on 07/12/2021

Holding Limitations

AIP ENR 1.5 Para 3.3 – Limitations
(Jepp TERMINAL – Holding Procedures 3)

(a) ***Speed.*** IAS must not exceed

Altitude	Max KIAS
Up to and inc. FL140	230
	170*
ABV FL140	240
Above FL200	265

**Where the approach is limited to Cat A and B only*

(b) ***Outbound timing*** begins abeam the fix or on attaining the outbound heading, whichever comes later.

(c) ***Time/Distance outbound.*** The outbound leg must be no longer than:
(1) up to and inc. FL140 – 1 minute or the time or distance limit specified on the chart;
(2) above FL140 – 1.5 minutes or the time or the distance limit specified on the chart.

(d) ***Turns.*** All turns in nil wind should be at a bank angle of 25° or rate one, whichever requires the lesser bank.

(e) ***Wind allowance.*** Allowance should be made in heading and in timing to compensate for the effects of wind to ensure the inbound track is regained before passing the holding fix inbound.

(f) **Exiting.** For ATC traffic management, jet aircraft in CTA must leave an en route holding pattern at 250KT IAS, unless otherwise published or advised by ATC. Pilots may request a variation to this requirement.

Approaches

Types of Instrument Approaches

Part 61 Manual of Standards Volume 2, Schedule 2, Section 5, Operational Rating and Endorsement Standards

Instrument Approach 2D	NDB VOR DME or GNSS Arrival Procedure RNP APCH LNAV and RNP APCH LP [prev. RNAV (GNSS)] LLZ
Instrument Approach 3D	ILS MLS GLS RNP-LNAV/VNAV (Baro) RNP-LPV
Azimuth guidance operations	NDB DME or GNSS Arrival Procedure (using an ADF)
Course deviation indicator operations	ILS LLZ RNP APCH LNAV and RNP APCH LP [prev. RNAV (GNSS)] RNP-LNAV/VNAV (Baro) RNP-LPV VOR DME/GNSS Arrival Procedure (using a CDI)

Setting QNH Before IAF

Part 91 Manual of Standards 14.03
AIP ENR 1.5 Para 5.3 – QNH Sources
(Jepp TERMINAL – Instrument Approach/Take-off Procedures 7.3)

Prior to passing the IAF, pilots are required to set either:

(a) the actual aerodrome QNH from an approved source, or
(b) the Forecast Aerodrome (TAF) QNH, or
(c) the forecast area QNH

Where Airservices Australia instrument approach charts are identified by a shaded background to either the minima titles for IAL charts or the published minima for DME or GNSS Arrival Procedures, landing, circling and alternate minima have been calculated assuming the use of Aerodrome Forecast (TAF) QNH. These minima may be reduced by 100FT whenever an actual aerodrome QNH is set. Jeppesen instrument approach charts have minima for both actual aerodrome QNH and forecast aerodrome QNH.

Approved sources of actual QNH are ATC and ATIS except when the aerodrome forecast QNH is provided, AWIS and Bureau of Meteorology accredited meteorological observers. An actual aerodrome QNH obtained from an approved source is valid for a period of 15 minutes from the time of receipt.

Note: METAR QNH does not meet this requirement.

When the actual aerodrome QNH is not available, ATC will report the Aerodrome Forecast (TAF) QNH on the ATIS. The ATIS will include information in the format "ACTUAL QNH NOT AVAILABLE, AERODROME FORECAST QNH..."

Note: Forecast QNH reported by ATC or on the ATIS is not an approved source of actual QNH.

Where the forecast area QNH is used, the minima used must be increased by 50FT.

Aerodrome Operating Minima

AIP ENR 1.5 Para 1.18 – Aerodrome Operating Minima
(Jepp TERMINAL – Instrument Approach/Take-off Procedures 2.6)

Landing minima are published on Australian approach charts as MDA/H or DA/H. Obstacle Clearance Altitude/Height is not published. Landing minima are the basis for determining AOM.

Operators must establish AOM for each aerodrome to be used for operations. After consideration of the factors listed below, operators may determine that their AOM should be higher than the published landing minima:

a) The type, performance and handling characteristics of the aeroplane.
b) The composition, experience and competence of the flight crew.
c) The means used to determine and report meteorological conditions.

Author's Note: the prescriptive 50 feet PEC addition no longer appears in the AIP.

Approach Ban for IFR Flights

CASR 91.310
Part 91 MOS 16 – Approach ban for IFR flights

Author's note: this rule was introduced to ensure that aircraft utilising low-visibility operations were able to make approaches in a timely manner and not be held up by other aircraft who were unlikely to successfully land from an instrument approach when the meteorological conditions are below the minima.

For an aircraft conducting an IAP at an aerodrome:

- that has an air traffic control service in operation; and
- for which RVR reports are available for IAPs to the relevant runway

PIC must not descend below 1,000 feet AAL where the TDZ RVR (for other than low-visibility operations) or controlling zone RVR (for low-visibility operations) is reported by ATC as continually less than the landing minima for the IAP

Despite the above, the PIC may continue the IAP if already below 1,000 feet AAL when this information is received.

Flying Below Lowest Safe Altitude

CASR 91.305 – Minimum heights – IFR flights
AIP GEN 3.3 Para 4 – Calculation of Lowest Safe Altitude
(Jepp ATC – Climb and Cruise 3.6.4)

"V I V A T"
Visual approach or departure
Instrument approach or departure
VMC by day
ATC clearance
Take-off or landing

An aircraft must not be flown under the IFR, lower than the published lowest safe altitude or the lowest safe altitude calculated in accordance with this section, unless permitted by *CASR 91.265*, *91.267* and *91.305* or another civil aviation legislation provision.

Descent Below the Straight-in MDA or DA

AIP ENR 1.5 Para 1.7.2 – Descent Below the Straight-in MDA (Jepp TERMINAL – Instrument Approach/Take-off Procedures 4.17.2)

"VMC"
Visual reference can be maintained
Minima requirements adhered to
Continuously in a position where a landing can be made with normal rates of descent and manoeuvres

Author's note: VMC in the above mnemonic device does not mean visual meteorological conditions.

Descent below the straight-in MDA or continuation of the approach below the DA during APVs, may only occur when:

- visual reference can be maintained;
- all elements of the meteorological minima are equal to or greater than those published for the aircraft performance category (see *AIP ENR 1.5 Para 5.1.1 (Jepp TERMINAL – Instrument Approach/Take-off Procedures 7.1.1)*); and
- the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal flight manoeuvres that will allow touchdown to occur within the touchdown zone of the runway of intended landing.

Circling Approaches and Visual Circling

AIP ENR 1.5 Para 1.6.6 – Circling Approaches and Visual Circling
(Jepp TERMINAL – Instrument Approach/Take-off Procedures 4.16.6)

"VMC, Day Obstacle, Night MDA"
Visibility along flight not less than specified for circling
Maintain visual contact with landing environment
Inside circling area
By day not below obstacle clearance
By night not below MDA until downwind, base or final

Author's note: VMC in the above mnemonic device does not mean visual meteorological conditions.

During visual circling, descent below the circling MDA may only occur when the pilot:

a) Maintains the aircraft within the circling area; and
b) Maintains a visibility, along the intended flight path, not less than the minimum specified on the chart for the procedure; and
c) Maintains visual contact with the landing runway environment (i.e., the runway threshold or approach lighting or other markings identifiable with the runway); and either

- By day:
  While complying with a), b) and c), maintains visual contact with obstacles along the intended flight path and an obstacle clearance not less than the minimum for the aircraft performance category until the aircraft is aligned with the landing runway; or
- By day and night:
  While from a position within the circling area on the downwind, base or final leg, complete a continuous descent from MDA to the threshold using rates of descent and manoeuvres normal to the aircraft type.

Note 1: The concept is as follows:

1) The pilot maintains visual contact with the landing runway while the aircraft is circled at MDA to a position within the traffic pattern that intercepts a normal downwind, base or final approach. If the MDA is above the downwind height, the pilot maintains MDA and downwind spacing until he/she reaches a position from which descent at normal approach rates to join base can be made (see Figure 1).

2) When daylight exists and obstacles can be seen, the pilot has the option of descending from MDA from any position within the circling area while

maintaining an obstacle clearance not less than that required for the aircraft performance category.

3) *Once the pilot initiates descent below circling MDA, the obstacle protection offered by visual circling at the MDA ends and he/she is responsible for ensuring the required clearance from obstacles is maintained visually.*

Note 2: The pilot should maintain the maximum practical obstacle clearance.

Author's Note: altogether, circling approaches should be avoided when safer alternatives exist (such as runway-aligned approaches). Furthermore, descent to minimum obstacle clearance during visual circling should be avoided wherever possible.

AIP ENR 1.5 Para 1.6.2 – Restrictions on Visual Circling (Jepp TERMINAL – Instrument Approach/Take-off Procedures 4.16.2)

Visual circling is prohibited in 'no circling' sectors by day in less than VMC and at night.

After initial visual contact, the basic assumption is that the runway environment (i.e. the runway threshold or approach lighting aids or other markings identifiable with the runway) will be kept in sight while at the MDA for circling (Reference: *ICAO Doc 8168 [Jepp ATC 200 series]*).

The visual circling procedure conducted at or above the circling MDA will provide protection from obstacles within the circling area (see Note 1 (3) and Note 3).

The information provided by spot heights on IAL charts must be treated with caution. Spot heights on IAL charts do not necessarily indicate the highest terrain, or all obstacles in the circling area. In addition, the charts may not cover all of the circling area. Before commencing an instrument approach, pilots should familiarise themselves with the location and altitude of obstacles in the circling area by studying an appropriate topographic map.

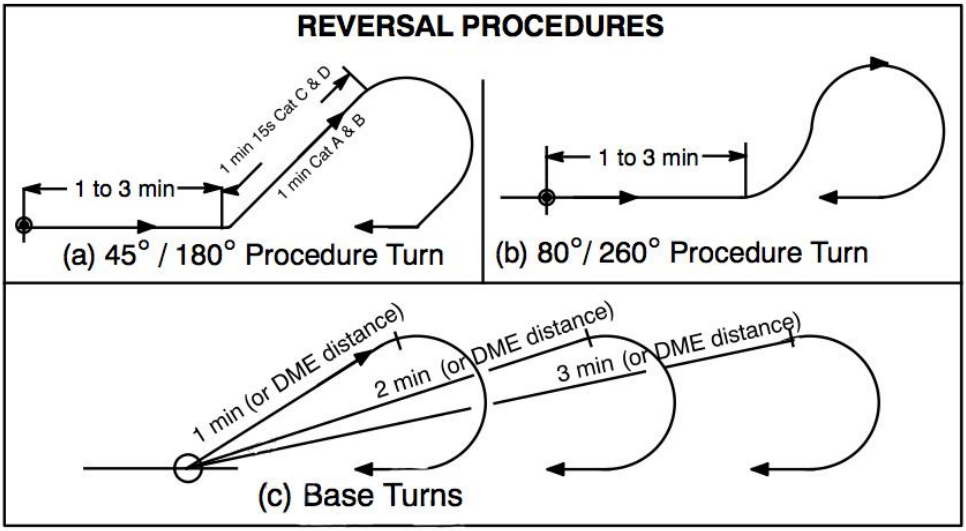
Circling Areas

AIP ENR 1.5 Para 1.6.6 – Circling Approaches and Visual Circling
(Jepp TERMINAL – Instrument Approach/Take-off Procedures 4.16.6)

Aircraft category	Circling area (NM)	Obstacle clearance (ft)
A	1.68	300
B	2.66	300
C	4.20	400
D	5.28	400
E	6.94	500

Procedure Turns

AIP ENR 1.5 Para 2.8 – Reversal Procedures
(Jepp TERMINAL – Instrument Approach/Take-off Procedures Para 4.10)



Accessed from http://www.airservicesaustralia.com/aip/aip.asp?pg=20&vdate=28-May-2015&ver=1 on 06/07/2015

Approach Speeds

AIP ENR 1.5 Para 1.15 – Handling Speeds
(Jepp TERMINAL – Instrument Approach/Take-off Procedures Para 2.3)

ACFT CAT	V_{AT}	Initial and intermediate approach speeds	Final approach speeds	Max speeds for circling	Max speeds for missed approach
A	< 91	90 – 150 (110*)	70 – 100	100	110
B	91 – 120	120 – 180 (140*)	85 – 130	135	150
C	121 – 140	160 – 240	115 – 160	180	240
D	141 – 165	185 – 250	130 – 185	205	265
E	166 – 210	185 – 250	155 – 230	240	275
H	N/A	70 – 120	60 – 90	N/A	90

* Max speed for reversal procedures

Instrument Approach Tolerances – Flight Tests

Part 61 Manual of Standards Volume 4, Schedule 8, Section 1, Table 5 – Instrument Approach Tolerances

Parameter	Tolerance
2D approach Lateral Path Tracking	± 5° of nominated track using azimuth guidance
	± ½ scale deflection of nominated track using lateral course deviation indicator guidance
	Within the RNP value specified for the published minimum altitude
	± 2nm of a DME or GNSS arc
3D Approach Lateral Path Tracking	As above for the lateral path guidance being used
3D Approach Vertical Path	± ½ scale deflection or +/_ 75 ft for RNP BARO VNAV procedure
	For an RNP LPV transients associated with aircraft configuration changes above +1/2 scale are acceptable Transients associated with aircraft configuration changes above +75 ft are acceptable
Minimum Altitude	+100 ft, -0 ft at published minima descent altitude Missed approach initiated not below decision altitude

Instrument Approach Tolerances – ILS

AIP ENR 1.5 Para 7.3 – Altimeter Checks and Flight Tolerances
(Jepp TERMINAL – Instrument Approach/Take-off Procedures Para 2.7.3.1)

The final approach segment contains a fix at which the glide path/altimeter relationship should be verified. If the check indicates an unexplained discrepancy, the ILS/GLS approach should be discontinued. Pilots must conform to the following flight tolerances:

a. To ensure obstacle clearance, both LOC/GLS final approach course and glideslope should be maintained within half scale deflection (or equivalent on expanded scale).
b. If, at any time during the approach after the FAP, the LOC/GLS final approach course or glideslope indicates full scale deflection a missed approach should be commenced.

DME or GNSS Arrivals - General

AIP ENR 1.5 Para 11 – DME or GNSS Arrival Procedures
(Jepp TERMINAL – DME/GNSS Arrival Procedures)

The DME or GNSS Arrival Procedure is an instrument approach procedure that provides descent guidance along a specified track or sector, to the visual circling area of an aerodrome. Azimuth guidance is required from the specified radio navigation aid. The requirements of *subsections 1.6, 1.9 and 1.13* apply.

Descent is not permitted until the aircraft is established within the appropriate sector or on the specified inbound track.

If manoeuvring within a sector is required, the pilot must ensure that the aircraft is contained within the sector, at or above the appropriate segment minimum safe altitude. Manoeuvring within a sector after passing the final approach fix is prohibited.

DME or GNSS Arrivals – Operations in Controlled Airspace

AIP ENR 1.5 Para 11 – DME or GNSS Arrival Procedures
(Jepp TERMINAL – DME/GNSS Arrival Procedures)

The clearance “CLEARED DME (or GNSS) ARRIVAL” constitutes a clearance for final approach and authorises an aircraft to descend to the minimum altitude specified in the appropriate DME or GNSS Arrival procedure. ATC is not permitted to impose any altitude restriction on such a clearance.

When cleared for a DME or GNSS Arrival in controlled airspace an aircraft must not orbit, enter a holding pattern, or use holding pattern entry procedures. ATC will not issue a clearance for a DME or GNSS arrival that involves the use of a holding pattern entry procedure.

When ATC cannot issue a clearance for an unrestricted DME or GNSS arrival, the phrase “DESCEND TO (level) NOT BELOW DME (or GNSS) STEPS” may be used. Such an instruction authorises descent in accordance with the DME or GNSS steps only to the specified altitude.

ATC may clear an aircraft to intercept the final approach segment of another instrument approach procedure. When clearing an aircraft for such a procedure, ATC will use the phrase “DESCEND TO (level) NOT BELOW DME (or GNSS) STEPS” and will issue further instructions prior to the aircraft’s reaching the cleared level.

Nothing in these procedures absolves the pilot in command from their responsibilities to maintain the aircraft on the authorised track or within the defined sector.

Note 1: Where the track being flown is not aligned with the landing runway, a clearance for a DME or GNSS Arrival includes a clearance to manoeuvre within the circling area to position the aircraft on final for landing.

Note 2: Where possible, DME and GNSS arrival procedures are designed to contain the aircraft within controlled airspace and provide 500FT separation from the CTA lower limit. However, there are locations where the procedure commences in Class G airspace, or which can take aircraft into Class G airspace on descent. Pilots should check procedures to ensure that aircraft are contained in CTA where required.

Visual Approaches – rules related to ATC

AIP ENR 1.1 Para 2.11.3.1 – ATC Authorisation
(Jepp ATC – Departure, Approach and Landing Procedures 1.9.3.1)

Visual Approaches – issued by ATC	
Day	**Night**
may be issued when...	
Within 30NM	Within 30NM
Continuous visual reference to ground or water	Continuous visual reference to ground or water
VIS 5000M	VIS 5000M
-	If being vectored, assigned MVA and given heading or tracking instructions to intercept final or to position within circling area

Visual Approach Requirements for IFR Flights

AIP ENR 1.5 Para 1.14 – Visual Approach Requirements for IFR Flights (Jepp TERMINAL – Instrument Approach/Take-off Procedures 4.19)

Visual Approaches – by pilot	
Day	**Night**
Pilot need not commence or may discontinue IAP when...	
Within 30NM	-
Clear of cloud	
In sight of ground or water	
VIS 5000M or AD in sight	VIS 5000M
Maintain at an altitude not less than	
If in CTA – 500FT above the lower limit of the CTA unless clearance received to depart and re-enter CTA	
CASR 91.265 or 91.267	LSALT/MSA, DGA step, or last assigned altitude if being vectored
Maintain track/heading on the route authorised until	
Within 5NM	Within the circling area; or
	Within 3NM and AD in sight if no IAP or not authorised to use IAP or if VFR
Until	
-	5NM on PAPI; or
-	7NM on PAPI (ILS RWY); or
-	10NM on glideslope; or
-	14NM YSSY runways 16L and 34L established not below GS and less than full scale azimuth deflection

Landing Minima

Part 91 Manual of Standards Chapter 15.10

1) For an RNP APCH-LNAV/VNAV, an RNP APCH-LPV, or a precision approach procedure — the minimum altitude must not be below whichever of the following is the highest:
    a) the DA or DH specified on the instrument approach chart for the IAP being conducted;
    b) relevant minima specified in the AFM;
    c) relevant minima specified in the operator's exposition or operations manual.
2) For an RNP APCH-LNAV/VNAV, an RNP APCH-LPV, or a precision approach procedure — the minimum visibility must not be below whichever of the following is the highest:
    a) the RVR or visibility specified on the instrument approach chart for the IAP being conducted;
    b) relevant minima specified in the AFM;
    c) relevant minima specified in the operator's exposition or operations manual;
    d) 800 m, but only if:
        (i) the TDZ RVR report is not available; or
        (ii) the approach lighting system normally available beyond 420 m from the runway threshold is inoperative;
    e) 1 200 m, but only if:
        (i) the approach cannot be flown to at least the landing minima using a flight director, a HUD or an autopilot; or
        (ii) the aircraft is not equipped with an operative failure warning system for the primary attitude and heading reference systems; or
        (iii) high intensity runway edge lighting is not in operation; or
        (iv) the approach lighting system normally available beyond 210 m from the runway threshold is inoperative;
    f) 1 500 m — but only if the approach lighting system normally available for the runway is inoperative;
    g) 1.5 times either the RVR or the visibility specified on the instrument approach chart for the IAP being conducted — but only if:
        (i) a lighting failure has occurred on a runway at a controlled aerodrome; and
        (ii) doubled spacing of runway edge lights results.

        Note: At a controlled aerodrome, 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.

3) Subject to subsection (5), for an RNP APCH-LNAV, an RNP APCH-LP or another NPA — the minimum altitude must not be below whichever of the following is the highest:
    a) the MDA or MDH specified on the instrument approach chart for IAP being conducted;
    b) the relevant minima specified in the AFM;
    c) relevant minima specified in the operator's exposition or operations manual.
4) Subject to subsection (6), for an RNP APCH-LNAV, an RNP APCH-LP or another NPA — the minimum visibility must not be below whichever of the following is the highest:
    a) the visibility specified on the instrument approach chart for IAP being conducted;
    b) relevant minima specified in the AFM;
    c) relevant minima specified in the operator's exposition or operations manual;
    d) if 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 published length of the approach lighting system.
5) Despite subsection (3), if the aircraft is conducting a circling manoeuvre — the minimum altitude must not be below whichever of the following is the highest:
    a) the circling minimum altitude specified on the instrument approach chart for the IAP being conducted;
    b) the relevant minima specified in the AFM;
    c) the relevant minima specified in the operator's exposition or operations manual.
6) Despite subsection (4), if the aircraft is conducting a circling manoeuvre — the minimum visibility must not be below whichever of the following is the highest:
    a) the circling minimum visibility specified on the instrument approach chart for the IAP being conducted;
    b) the relevant minima specified in the AFM;
    c) the relevant minima specified in the operator's exposition or operations manual.

Missed Approaches

Part 91 Manual of Standards Chapter 15.11

AIP ENR 1.5 Para 1.9.1 – Missed Approach - Standard Procedures
(Jepp TERMINAL – Instrument Approach/Takeoff Procedures Para 4.12.1)

AIP ENR 1.5 Para 1.11 – Missed Approach Requirements - GNSS
(Jepp TERMINAL – Instrument Approach/Takeoff Procedures Para 4.14)

"So Not Visual ROFL"	
So	**S**traight-in landing cannot be effected unless a circling approach can be conducted in weather conditions equal to, or better than, those specified for circling
Not Visual	**Not visual** when you reach the DA/RA height or MAPT
R	**R**AIM Warning or Loss of RAIM after the IAF or when below the MSA
O	**O**utside navigational tolerance during the final segment
F	**F**ailure of aid or suspect aid and below MSA
L	**L**ost visual reference during circling

Part 91 Manual of Standards Chapter 1.07

Navigational tolerance means 1 of the following:

(a) for PBN operations – the RNP value for the segment of the IAP being conducted;
(b) for VOR or LOC-based operations – full-scale deflection of the CDI;
(c) for NDB-based operations – +/- 5º from the specified bearing;
(d) for DME-based operations – +/- 2 NM from the required arc;
(e) for operations based on visual navigation – 1 NM from the cleared track

Go Around and Missed Approach Procedure in VMC

AIP ENR 1.1 Para 2.14 – Go Around and Missed Approach Procedure in VMC (Jepp ATC – Departure, Approach and Landing Procedures Para 1.12)

Except as specified in ERSA for specific locations, an aircraft that is required to go around from a visual approach in VMC must initially climb on runway track, remain visual and await instructions from ATC. If the aircraft cannot clear obstacles on runway track, the aircraft may turn.

In the event that an aircraft is unable, or does not wish, to land from an instrument approach in VMC, the aircraft must carry out the published instrument missed approach procedure for the instrument approach being flown, unless ATC directs otherwise.

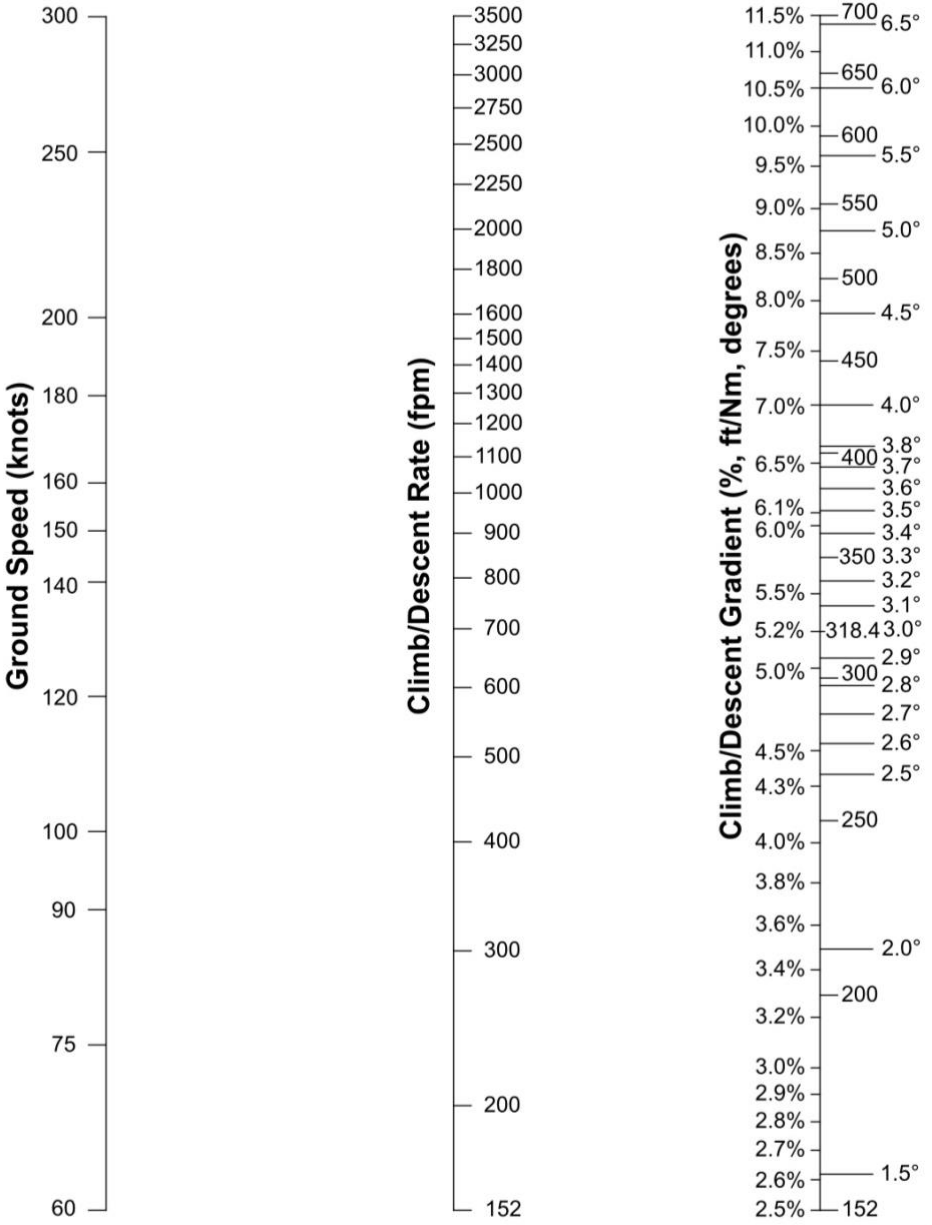
At Class D aerodromes with parallel runways where contra-rotating circuit operations are in progress, if ATC instructs, or a pilot initiates a go around, the pilot must:

a) commence climb to circuit altitude;
b) position the aircraft on the active side and parallel to the nominated duty runway, while maintaining separation from other aircraft; and
c) follow ATC instructions or re-enter the circuit from upwind

Author's Note: if any doubt exists as to which procedure should be used in the event of a go around or missed approach, clarification should be sought from ATC. An example when confusion could occur would be if given the clearance, "cleared visual approach runway 01, track via the ILS".

Gradient Rate Nomograph

The nomograph below gives the Climb/Descent rate for entering arguments of gradient (%, ft/nm, Degrees) and ground speed.



GINTA01-130

Accessed from http://www.airservicesaustralia.com/aip/pending/dap/GINTA01-130_16AUG2018.pdf on 10/08/2018

Sample Approach Briefing

Chart

"Today we are using the *[aerodrome] [approach title] [index number]* effective _____.

"The *[aid]* is tuned identified and tested to *[frequency]*.

[or]

"The *[approach title]* approach has been loaded. The tracks, distances and heights have been verified and RAIM is available."

Briefing Strip™ and Terrain

[Read first two lines of Jeppesen Briefing Strip™ left to right, including MSAs.]

Flying the Approach

[Discuss inbound track and any applicable sector entries or holds.]

[Discuss how the approach is flown with tracks, turns and "not below" descent steps.]

"When we become visual the runway is *[discuss position]* and we will *[manoeuvre to land on/land straight-in on]* runway _____.

"The missed approach point is _____. When we go missed approach, we will *[turn left/right/continue on track]* to track ___° and climb to _____ feet."

[Discuss aircraft reconfiguration for the missed approach if applicable.]

Weather

[Discuss expectations of weather conditions from AWIS, ATIS, or TAF including any difficulties expected in becoming visual. Discuss QNH and confirm reasonableness.]

[Discuss alternate options and fuel available to hold or divert.]

Considerations and Questions

[Discuss special considerations and conditions such as:
- *Relevant NOTAMs for the approach and aerodrome*
- *Relevant chart notes for the approach and aerodrome*
- *recent changes to chart*
- *missed approach gradients versus aircraft performance*
- *no-circling areas*
- *runway condition*
- *actions after landing]*

[Ask the other crewmember (if applicable) if they have any further items to discuss or have any questions.]