Thank you for the trust you have placed in me by using these IFR notes.

The notes include only summarised knowledge for the IFR Ground Component, and are not intended as an IREX study guide. Previous knowledge is required for these notes to be useful, and they are meant to be a compressed revision guide for your flight test or proficiency check. They would also be useful as IFR revision for a job interview.

I have also included a few paragraphs on PBN, RNP, GNSS, and ADS-B for those nervous about new technology questions on their next IPC.

Hopefully this guide will help you connect the dots, but if instead it uncovers knowledge gaps, reference the AIP and your IREX book, and it will all come back.

This guide has been compiled by a Flight Examiner with years of experience teaching IFR, but if you have any feedback please email me any concerns or suggestions. This document will undeniably improve with time.

Disclaimer: This document is an academic reference tool only and is not to be used operationally. Always refer to CAR, CASR, CAO, CAAP, AIP, DAP, ERSA, and Company Operations Manuals. The author does not guarantee the accuracy or currency of any information provided. Please check back regularly for updated versions.

"A good pilot is one who uses superior judgement to avoid those situations where they might have to use their superior skills"

David Roses
david@flighttest.net

DOCUMENTS FOR INITIAL INSTRUMENT RATING	DOCUMENTS FOR IPC
61-2i Notification of Issue of Operational Rating (signed) 61-1503 Instrument Rating Flight Test Report Training file, Logbook, Licence, Medical, ASIC/Photo ID, IREX KDR *Flight plan, fuel plan, weather & NOTAMs, flight notification, weight & balance, maintenance release.*	61-2P Notification of Proficiency Check 61-1512 Instrument Proficiency Check Report Licence, Medical, Photo ID (ASIC), Logbook *Flight plan, fuel plan, weather & NOTAMs, flight notification, weight & balance, maintenance release.*

1. GROUND COMPONENT – KNOWLEDGE REQUIREMENTS MOS Schedule 5 Appendix M.1 (page 601, p624)

- ☐ Privileges and limitations of the rating
- ☐ Proficiency check requirements
- ☐ IFR and approach recency requirements
- ☐ Night recency requirements *
- ☐ Night VFR operations *
- ☐ Aircraft instrument requirements
- ☐ Interpreting operational and meteorological information
- ☐ Take-off minima
- ☐ Holding and alternate requirements
- ☐ IFR procedures for all airspace requirements
- ☐ Departure and approach instrument procedures
- ☐ Operations below LSALT and MSA for day and night operations
- ☐ GNSS and PBN standards
- ☐ Circling approaches
- ☐ Adverse weather operations
- ☐ ERSA normal and emergency procedures
- ☐ IFR planning

**Only appears as required knowledge for initial issue flight test, but should be considered essential knowledge.*

2. PRIVILEGES AND LIMITATIONS (IR-MEA) CASR 61.M, CASR 61.395

Fly as PIC of a ME or SE aeroplane under the IFR and NVFR,
as long as IPC is current and the relevant recency requirements are met.
Can only conduct a circling approach if last IPC included a circling approach.
IPC expires last day of month +12 months. Can do an IPC up to 3 months before expiry and still conserve original expiry date for following year.
IPC in a single covers you for SEA AFR (24 months). IPC in a twin covers you for MEA/SEA AFR (24 months).
IFR in single engine aeroplanes is limited to PVT, AWK, and Freight CHTR (except some approved turboprops).

IFR Recency
3 instrument approaches in the last 90 days.
1 approach in last 90 days covering required approach type (2D or 3D, CDI or AZI).
Note: The approaches can be in IMC, VMC or in an FSTD.

A pilot who has passed an IFR OPC in the previous 3 months is taken to meet the IAP recency requirements.

Single pilot recency:
A single pilot IFR flight of 1h duration which included 1 instrument approach in last 6 months.

Night IFR recency:
If carrying PAX, 3 TOL at night in 90 days.

Night VFR recency:
N/A, you can do a flight under the NVFR if your IR is current and recent. If PAX, 3 TOL at night in 90 days.
For NVFR rating holders: 1 TOL at night in 6 months. If carrying PAX, 3 TOL at night in 90 days.

3. INSTRUMENTS REQUIRED (11 + lights) CAO 20.18 Appendix III, IV, V, AIP GEN 1.5 p4, AIP GEN 1.5 p5

PRIVATE, AVK, FREIGHT CHTR	PAX CHARTER
1 ASI with pitot heat	
1 Altimeter*	**(2 Altimeters)**
1 VSI	
1 AH	**(2 AH)**
1 DI	
1 TC	
Compass	
1 OAT	
1 time piece (hh:mm:ss)	**(1 Clock fitted to A/C)**
1 Suction indicator^	***Duplicate sources of power for AH, DI, TC***
Assigned Altitude indicator for CTA	***Autopilot or 2 Pilots˜***
1 Landing light	**(2 Landing lights or 1 Landing light with 2 filaments)**

Means of illuminating instruments with standby power and intensity control
Pilot compartment lighting for reading maps and documents, Lighting in all passenger compartments
Nav lights, anti-collision lights (beacon and/or strobes)
Shockproof torch for each crew member

*Altimeter must be accurate to +/-60ft. Can depart if +/-75ft but check at next landing point must be +/-60ft.
^A means of indicating whether the power supply to the gyroscopic instruments is working satisfactorily.
˜Autopilot with roll and pitch, heading and altitude hold capability. *If autopilot becomes U/S flights may be operated single pilot IFR for up to 3 days commencing on the day on which the autopilot became U/S.*
-IFR CHTR/RPT aircraft which are required to be crewed by two pilots must be fitted with a weather radar. Unpressurised turbine aircraft ≤5700Kg and unpressurised piston engine aircraft are exempt.
-IFR CHTR/RPT turbine engine aeroplanes >15000Kg or ≥10 pax must be fitted with GPWS (or TAWS <5700Kg).

4. INSTRUMENT ERRORS & MALFUNCTIONS

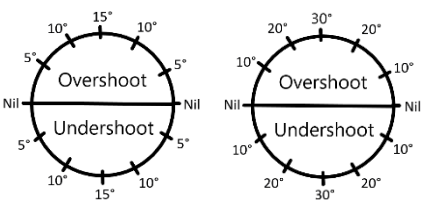
Know the location of the alternate static source "knob" on your aeroplane.
For effects on ASI, use mnemonic "PUD SUC".

	Pitot blocked, climbing	**Pitot blocked, desc**	**Static blocked, climbing**	**Static blocked, desc**
Altimeter	-	-	Reading frozen	Reading frozen
VSI	-	-	Returns to 0 fpm	Returns to 0 fpm
ASI	ASI reflects the behaviour of the altimeter, therefore reading increases ("overreads")	ASI reflects the behaviour of the altimeter, therefore reading decreases ("underreads")	Underreads	Overreads

5. COMPASS ERRORS

Acceleration errors **"SAND"**:
Compass shows apparent turn to the **South** when **Accelerating**, and an apparent turn to the **North** when **Decelerating**. The effect is largest on Easterly and Westerly headings, nil on North and South.

Turning errors **"ONUS"**:
To roll out on correct heading, we must **Overshoot** a turn onto a **Northerly** heading and we must **Undershoot** a turn onto a **Southerly** heading. By how much? On North and South, about 30° at lower latitudes (eg. Sydney) and about 15° at higher latitudes (eg. Cairns). On East and West, roll out on the desired heading without correction.



6. FORECASTS CAR 239, AIP ENR 1.1 p11.7.2, ENR 1.10 p1

Before beginning an IFR flight, the pilot in command shall study all available information appropriate to the intended operation (weather forecasts and reports, NOTAMs incl. FIR NOTAMs, airways facilities, and ATC rules appertaining to the particular flight) for the route flown and any aerodromes to be used.
When a forecast that is required cannot be obtained, the flight can depart provided that the pilot is satisfied that the weather will allow for a safe return to the departure aerodrome within one hour, and the pilot must obtain the required forecasts within 30 minutes after departure.
The weather forecast for the destination and any alternate aerodromes must be valid from 30 minutes before to 60 minutes after the respective ETA.

*INTER, TEMPO, FROM weather phenomena that introduce an operational requirement are taken to begin 30 minutes before the time specified on the TAF (ie bad wx on TAFs always extends 30 minutes into the good wx)
*INTER, TEMPO, FROM weather phenomena that remove an operational requirement are taken to begin 30 minutes after the time specified on the TAF (ie bad wx on TAFs always extends 30 minutes into the good wx)

TAF3 are issued every 3 hours and are valid for 18, 24 or 30 hours. TAF3 also receive proactive amendments.
*Due to increased accuracy, these 30 minute buffers do not apply during the first 3 hours of a TAF3.

7. TAKEOFF MINIMA ENR 1.5 p4.3, ENR 1.5 p4.4

Vis 2000M, Ceiling 300FT.
-With an engine failure at any time after V1, terrain clearance must be assured until reaching LSALT or MSA.
-If a return to land at the departure aerodrome will be necessary in the event of an engine failure, the meteorological conditions must be at or above instrument approach landing minima for the aerodrome or such as to allow a visual approach.
-If a return to the departure aerodrome is not possible, the aeroplane's performance and fuel availability are each adequate to enable the aeroplane to proceed to a suitable aerodrome, having regard to terrain, obstacles and route distance limitations.

Qualifying multi-engine aeroplanes AIP ENR 1.5 p4.3
2 crew, or 1 crew jet, or 1 crew with autofeather
>5700Kg and is able to meet obstacle clearance reqs in CAO 20.7.1B
≤5700Kg -gross OEI climb gradient at least 1.9% with OEI
-OEI climb gradient at least 0.3% greater than obstacle free gradient for runway length reqd
-obstacle gradient surveyed out to 7500m from 150m baseline from end of TODA and 12.5% splays. 150m strips always have this.
Ceiling zero feet
Visibility 800m, or;
Visibility 550m -by day OCTA, day or night in CTR with ATC
-edge lighting ≤60m and centreline markings or lights
-SBY PWR with 1sec switchover time on edge lights, or centreline lights if no edge lights

8. ALTERNATE REQUIREMENTS ENR 1.1 p11.7, ENR 1.5 p4, ENR 1.10 p1.2

ALTERNATES	Nav**A**ids, see paragraph #9
COULD	**C**louds, see paragraph #10
VERY	**V**isibility, see paragraph #10
WELL	**W**ind – crosswind or downwind on runway exceeding the aeroplane's limitations
PROVE	**P**rovisional forecast, or **P**robability (PROB) of any adverse conditions (see "Savers" below)
LIFE	**L**ights, see paragraph #11
SAVERS	**S**torms, thunderstorms, icing, fog, smoke, cyclones, dust storms, or any other forecasted wx phenomena that would impede a safe landing at the destination aerodrome.

Note: An "Operational Requirement" means the need for an alternate incl. corresponding extra fuel.

9. ALTERNATE REQUIREMENTS – NAVAIDS

PVT/AWK:

One instrument approach at the destination that the pilot and aeroplane are capable of using, or plan for a suitable alternate.

CHTR/RPT:

One navaid with an instrument approach and two receivers in the aeroplane; or
Two separate navaids with separate instrument approaches, with two respective receivers.
Note: To satisfy the navaid requirements, a TSO C145/C146 receiver counts as one navaid (as long as there is an RNAV approach available), ie. a charter flight with two TSO C145 GPS receivers (or 1 TSO C145 and 1 ground-based navaid) would not require an alternate due to navaids.
However, a TSO C129 receiver cannot be counted as an instrument approach navaid for the destination and the navaid combo requirement needs to be fulfilled solely with ground-based navaids (NDB, VOR, LOC, ILS).
If destination doesn't have any instrument approaches, by day: No more than SCT cloud below last leg LSALT + 500ft and 8Km visibility.

No instrument approach at night: Alternate required.

Night VFR: Destination served by NDB/VOR, or aircraft is GPS equipped (and pilot qualified to use it).
For NVFR, whether an aerodrome has instrument approaches available or not is irrelevant. We need to be able to navigate to the aerodrome by means of a navaid or GPS, or plan for an alternate within 1 hour's flight time.

10. ALTERNATE REQUIREMENTS - WEATHER ENR 1.1 p11.7.3

Cloud not more than SCT and visibility not below alternate minima as specified on the approach charts.
Vertical Visibility is equivalent to overcast cloud at the specified ceiling (eg. VV010 = OVC010).

No instrument approach by day: No more than SCT cloud below last leg LSALT + 500ft and 8Km visibility.
Aerodrome with instrument approach by day/night but no TAF available: Alternate required!

Note: If an aerodrome has a particular navaid but the pilot or aircraft is not capable of using it, for the purposes of that flight, the aerodrome is taken to not have that navaid (confirmed this with CASA).

Night VFR: No more than SCT below 1,500' and 8Km Vis.

11. ALTERNATE REQUIREMENTS – DESTINATION RUNWAY LIGHTING ENR 1.1 p11.7.4

-If lighting is PAL, a **responsible person** to be on standby to manually turn on the lights should the system fail.
-If lighting is electrically powered there needs to be **standby power** automatically engage in the event of a power outage, or alternatively have a **responsible person with portable lighting**.
-The alternate requirement need not be applied if carrying holding fuel for first flight plus 10 minutes.

PAL	PAL	Electrical (non-PAL)	Electrical (non-PAL)	Portable
SBY PWR	Responsible Person	SBY PWR	Responsible Person	Responsible Person
Responsible Person	Portable Lighting		Portable Lighting	
= No Altn Reqd	***= No Altn Reqd***	***= No Altn Reqd***	***= No Altn Reqd***	***= No Altn Reqd***

PVT/AWK/CHTR/Non-pax RPT, RPT<3500Kg:

-If you require an alternate and the alternate has PAL, you require a responsible person in attendance at the alternate unless you have a) 2xVHF receivers, or b) VHF+HF+30min holding fuel.

-If you require an alternate due to lighting, the ALTERNATE does not require SBY PWR.

Pax RPT >3500kg: The ALTERNATE, if PAL, must have a responsible person (but no SBY PWR reqd).

12. SPECIAL ALTERNATE MINIMA (ILS) ENR 1.5 p6.2

Dual LOC/GP/Marker receivers (duplicated markers can be a marker receiver + DME).
Tower needs to be open and METAR/SPECI service needs to be available.

13. DEPARTURE ENR 1.1 P2.7.3, ENR 1.5 p4.4.3, p4.4.4

Unless instructed by ATC or tracking via a SID, be established on the departure track within 5NM.
When not departing via a SID, terrain clearance is always pilot responsibility. Terrain clearance must be assured until reaching LSALT or departure aerodrome MSA, including in the event of an engine failure (MEA).

14. OBSTACLE CLEARANCE ENR 1.5 p8.1.4, p1.10, p2.2, p2.5.2

SID: must climb at minimum 3.3%.
MAP: must climb at minimum 2.5%, this provides 100ft obstacle clearance.
MSA: provides 1000ft obstacle clearance.

15. CAT/SPEEDS ENR 1.5 p1, ENR 1.5 p1.16, ENR 1.5 p3.3.1

	Vat	Initial	Reversal	Final	Circling	MAP
Cat A	<91	90-150	110	70-100	100	<110
Cat B	91-120	120-180	140	85-130	135	<150
Cat C	121-140	160-240		115-160	180	<240

Holding up to FL140: 230kt, or 170kt where approach is limited to Cat A/B only.
Holding above FL140 up to and including FL200: 240kt. Holding above FL200: 265kt.

16. AIRSPACE ENR 1.4 p4, ENR 1.2 p2, ENR 1.6 p7.1.4

VFR FLIGHTS	XPDR	VHF	CLEARANCE	SEPARATION	VIS	CLOUD SEP
G	No	Above 5000' and at CTAF where carriage of radio is reqd.	No	Info only	5000m^	1000ft vertical 1500m horizontal *≤3000' ≤1000AGL* *clear of cld*
E	Yes	Continuous two way	No	Info only	5000m^	1000ft vertical 1500m horizontal
D	No	Continuous two way	2-way comms	Info only *SVFR from SVFR**	5000m*	1000' above cloud 500' below cloud 600m horizontal
C	Yes	Continuous two way	Yes	Info from VFR Sep. from IFR *SVFR from SVFR**	5000m*	1000ft vertical 1500m horizontal
A	-	-	-	-	-	-

^Visibility always 8000m above 10,000'
**Special VFR clearance: Visibility 1600m, Clear of cloud. Must see ground/water when below 2000' AGL.*

IFR FLIGHTS	XPDR	SERVICE	CLEARANCE	SEPARATION
G	Yes, ADS-B reqd. *IFR flight without discrete transponder code assigned:* *OCTA squawk 2000* *CTA/CTR squawk 3000.*	FIS	No	Info only
E		ATC	Yes	Info on VFR Sep. from IFR
D			Yes	From IFR and from SVFR
C			Yes	From all aircraft
A			Yes	

Speed restriction 250kt below 10,000'.
Class D speed restriction for all aircraft: 200kt at or below 2500' AAL and within 4NM.

17. RVSM AIRSPACE GEN 1.5 p9

RVSM airspace is Class A airspace between FL 290 and FL 410 inclusive where ATC may separate aircraft by minimum of 1,000ft vertically. Only CASA approved operators may operate with RVSM within this airspace.

18. VECTORS ENR 1.6 p3, ENR 1.7 p4

Change of level must be commenced asap but no later than 1 minute of receiving instruction.
Change of heading must be commenced immediately (rate 1 turn or 25° whichever is less).
When being vectored on headings that could infringe terrain clearance of separation standards, the interval between ATC transmissions will not exceed 30 seconds.

19. CAPTURE REGIONS ENR 1.5 p2.4, ENR 1.5 p3.4, ENR 1.5 p3

Sector entry defined by arrival HEADING. S1 Parallel, S2 Offset, S3 Direct. Can choose sector entry if heading within 5° of boundary line.
Reversal approaches: Can go straight in to approach if enroute arrival track is within 30° of outbound track.
Where the 30° direct entry sector does not include the reciprocal of the inbound track, the entry sector is expanded to include it.
For RNAV approach: 70° each side of the track for the centre IAF, or for other IAF, if outside the line parallel to final track.

20. APPROACHES GEN 2.2, ENR 1.5 p1.83, ENR 1.5 p2.7.3

Δ symbol means IAF and ✠ symbol means FAF for 2D approaches and FAP for 3D approaches.
Reversal approaches don't show ✠ on chart, but the FAF is taken to be when established inbound on appr.
Straight-in instrument approaches can be offset by up to 30° of RWY centreline (15° for Cat C & D).

21. LANDING MINIMA ENR 1.5 p5.3

TAF QNH: MDA/DA as printed on chart.
Shaded box: Reduce MDA/DA by 100ft with "Actual QNH" (ATIS, AWIS, ATC, MET observer), QNH valid 15min.
Using Area QNH (Area forecast QNH): Increase MDA/DA by 50ft.
Temperature colder than ISA-15°C, altitude correction as per DAP 2-2 and 2-3 (instructions DAP 1-1 p1.5).
For ILS approach, add 50ft to DA if not using aircraft PEC.
Note: If local QNH is not available and ATS has not communicated an Area QNH, the use of the actual QNH of an aerodrome within 100NM is considered to be more accurate than Area QNH. See ENR 1.7 Figure 1.

22. ILS/LOC ENR 1.5 p1.19, ENR 1.5 p4.7, ENR 1.5 p4.7

ILS if no glide slope, continue with LLZ approach (can switch prior to FAP).

For LLZ approach if HIAL not avlb increase Vis by 900m.

ILS CAT 1 Visibility shall be the higher of the visibility printed on approach chart or:
Vis 550RVR
Vis 0.8Km when instrumented RVR not available
Vis 1.2Km unless: Coupled autopilot (LOC+GP) or FD+manually flown, failure warning system for AH/DI, high intensity RWY edge lighting available
Vis 1.5Km when HIAL is not available

23. RUNWAY LIGHTING FAILURE AT CONTROLLED AERODROME ENR 1.1 p11.7.4.8

At night, if one runway lighting circuit fails, light spacing 60m > 120m. Increase minimum visibility for procedure by x1.5 unless in VMC.

24. AIRPORT LIGHTING REQUIRED FOR PVT/AWK/CHTR ENR 1.1 p11.8.3

Runway edge lighting, threshold lighting, illuminated wind direction indicator, obstacle lighting.
RPT: *above plus taxiway lighting, apron floodlighting.*
If windsock lighting not working, require ATIS/AWIS or approved observer to report wind.
If runway lighting not pilot activated, arrangements for 10 minutes before and 30 minutes after takeoff.
30 minutes before arrival until completion of taxi.

25. EXECUTE MISSED APPROACH (So Not Visual ROFL (*rolling on floor laughing*)) ENR 1.5 p1.10

Straight in landing not possible and circling approach not possible
Not **V**isual at MAPT or DA
RAIM failure or warning after IAF
Outside tolerance past FAF
Failure of navaid, or suspicious navaid
Loss of visual reference during circling

26. FLIGHT BELOW LSALT (Don't Vector In Very Close) GEN 3.3 p4.4

DME/GNSS arrival
Vectors
Instrument approach or holding
VMC by day + **V**isual approach
Climb after takeoff

27. VISUAL APPROACH ENR 1.1 p2.11.3, ENR 1.5 p1.15

By day: Within 30NM, from not below the LSALT/MSA/MDA
Clear of cloud
In sight of ground or water
Vis 5000m
Can maintain VFR flight minimum altitude as per CAR157 to the circling area

Controlled airspace:
Clear of cloud, Vis 5000m, can maintain continuous visual reference to ground or water to aerodrome
Descend not below CTA LL +500' and not below CAR157.
Maintain last cleared track/heading until within 5NM (or circling area at night), then manoeuvre for landing runway circuit. If on a STAR and subsequently cleared for visual approach, follow STAR lateral profile, including any visual or instrument termination route.

By night:
Clear of cloud
In sight of ground or water
Vis 5000m
Not below the LSALT/MSA/MDA until the circling area (or 3NM if AD with no instrument app), or:
Within 5NM (7NM if ILS runway) of aerodrome, established not below T-VASIS or PAPI, aligned with runway
Within 10NM if established not below ILS GS and less than full scale deflection of LOC

28. VISUAL CIRCLING (DESCENT BELOW MDA) ENR 1.5 p1.7, ENR 1.10 p1.4, ENR 1.5 p1.8

Maintain aircraft in circling area
Visibility (as per approach chart) along the intended flight path
Maintain visual contact with landing runway environment (threshold, lights, etc)
Maintain not less than 300' abv obstacles (Cat A/B) along intended flight path until aligned with runway on final
AT NIGHT: Can't descend below MDA until MDA intercepts normal circuit descent profile on downwind, base or final.
CIRCLING AREA: CAT A 1.68nm, CAT B 2.66nm, CAT C 4.20nm.

29. ICING NASA (link)

Two conditions required for ice to form: visible moisture and temperature below 0°C.

Clear ice: Large water droplets or freezing rain strike the leading edge and do not freeze instantly but rather flow aft along the aerofoil before freezing. Visually, it appears as a transparent, often invisible layer of ice on the aerofoil. Apart from changing the shape of the aerofoil, it can add enormous weight to the aeroplane, both of which increase stall speed. Most likely to occur at temperatures 0° to -10°.

Rime ice: Small supercooled water droplets instantly freeze on impact. Rough and opaque white appearance on the aerofoil leading edge. Severely disturbs airflow, degrading performance and increasing stall speed. Most likely to occur at temperatures -15° to -25°.

Mixed ice: A combination of Clear ice and Rime ice. Most likely to form at temperatures -10° to -15°.

To exit icing conditions encountered in stratiform clouds, change altitude by at least 3000' up or down.
To exit icing conditions in cumuliform clouds, divert laterally and vertically to exit clouds.
Plan to cross cold fronts on a perpendicular track to shorten the duration of the potential icing encounter.

30. COMMS FAILURE ERSA EMERG 1.5

a. Squawk 7600
b. Listen out on ATIS and/or voice modulated NAVAIDs.
c. Transmit intentions and make normal position reports (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 (and if the tower is open, look for light signals)

31. PERFORMANCE CAO 20.7.4

Takeoff & Landing: Multiply TOLD by a factor of 1.15 for aeroplanes below 2000kg unless the performance charts already include it (see CAO 20.7.4 Para 6 and 10 as well as individual company Ops Manuals).

Climb gradients:
Takeoff configuration (with gear down at Vtoss): 6%
Landing climb performance (ie go-around config, at 1.3 Vs): 3.2%

Enroute Single engine aeroplane climb at 4.5% up to 5000'
IFR AWK and Charter: With OEI ability to climb at 1% up to 5000'
VFR, PVT IFR: With OEI ability to maintain height at all altitudes up to 5000'

32. CALCULATION OF LSALT AIP GEN 3.3 p4

RNP2: Highest obstacle within 5NM either side of track +1000' or +1360' (see below).
NVFR: Highest obstacle within 10NM either side of track +1000' or +1360' (see below).
A LSALT can never be lower than 1500'.

Man-made obstacle >360'

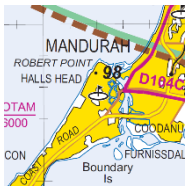
1329
+1000
2329

Man-made obstacle <360'

1307
–329
+1360
2338

Terrain only

2379
+1360
3739



Can never be lower than 1500'

98
+1360
1458
LSALT = 1500

33. MULTI-ENGINE NOTES

Vmca: The minimum airborne IAS at which it's possible to maintain directional control of the aeroplane with OEI. Marked with a red line on the ASI.

Vmca is a speed that depends on the aeroplane configuration (just like Vs does) and it's measured in the following conditions:
- critical engine inoperative
- live engine at take-off power
- landing gear retracted
- maximum of 5 degrees bank towards live engine
- propeller windmilling (for aircraft with autofeather, propeller feathered)

Recovery: close both throttles, pitch down, then smoothly re-apply power whilst pitching up to maintain Vyse.

Critical Engine: The engine whose failure will have the most detrimental effect on control and performance. For clockwise rotating props, the LH engine is critical. For counter-rotating props (BE76, PA44) there is no critical engine.

34. GENERAL FORMULAS

$$PNR = \frac{SE\ x\ GSH}{GSO+GSH} = minutes$$

$$CP/ETP = \frac{DIST\ x\ GSH}{GSO+GSH} = miles$$

$$AOB\ (R1\ turn) = \frac{IAS}{10} + half\ the\ result = degrees$$

35. FLIGHT TEST STANDARDS MOS SCHEDULE 4 Table 2, Table 5

Taxi aeroplane within 1.5m of centreline

Climb airspeed -0 +5kt

Level off from climb or descent, as well as level flight +/-100ft

Nominated heading +/-5°

Straight and level flight IAS +/-10kt and not below minimum approach speed

Powered descent +/-10kt, Glide descent -0 +5kt

Turns AOB +/-5°, turn onto nominated HDG +/-5° (for steep turns +/-10°)

Final approach speed -0 +5kts

Landing within 60m of aiming point, within 2m of centreline

Asymmetric: engine failure maintain heading initially +/-20°, continued flight +/-5°, IAS -0 +5kts

Limited panel: HDG +/-15°

Navigation and instrument approach tolerance 5° (for Azimuth) or half scale deflection (for CDI and GS)

Minimum altitude (LSALT, MSA, MDA) -0 +100ft

For 3D approaches, missed approach initiated not below the DA

36. PBN/RNP ENR 1.10 ITEM 10, ENR 1.1 p4.2.7

PBN: Performance Based Navigation. The concept by which the different navigational capabilities are defined.
RNP: Required Navigation Performance. It defines what level of accuracy the aircraft's navigation system is expected to perform to. For the purposes of GA, the following RNP are defined:

- **RNP 2 (ENR)** full scale CDI deflection is 2NM, and is used in the cruise phase of flight.
- **RNP 1 (TERM)** full scale CDI deflection is 1NM, and is used within 30NM of departure or destination AD.
- **RNP 0.3 (APCH)** is used for RNAV approaches. Transition from TERM to APCH is completed before the FAF.

GNSS Principles:
4 Satellites required for 3D navigation solution
5 Satellites required for FD (Fault Detection)(TSO C129 certified GPS)
6 Satellites required for FDE (Fault Detection and Exclusion)(TSO C145/C146 certified GPS)
RAIM Failure: RAIM not available ie. less than 5 satellites in range *["**INTEG**" message]*
RAIM Position Warning: Unresolved discrepancy *["**WARN**"]*, CDI will be automatically disabled.

RNAV Approach: Past the FAF, RAIM failure messages are inhibited (for up to 5 minutes), ie if there are only 4 satellites the unit will continue to operate as normal even though FD is unavailable.
However if the GPS can't determine the position or there is an unresolved discrepancy, a Position Warning will still be displayed, the CDI disabled, and a missed approach must be initiated.

ADS-B stands for "Automatic Dependant Surveillance Broadcast".
Traditionally transponders waited to be interrogated by a radar station and then replied with very simple data that consisted of a 4 digit transponder code (Mode A), a barometric altitude (Mode C), and more recently the aircraft's callsign (Mode S). The interrogating station then had to figure out 1) which direction the signal came from and 2) how long it took for the signal to do the round trip. With all that information (including the reported altitude) it could then determine the aeroplane's relative position and plot its coordinates.

ADS-B transponders require a GPS input and send the aircraft's real-time coordinates to the interrogating station (as well as a transponder code, altitude, rate of climb/descent, track, groundspeed, callsign, etc.). These GPS coordinates are still received by dedicated ground stations but are orders of magnitude more accurate than traditional radar-transponder systems. The ground stations are also simpler/cheaper to run which is why they have been deployed throughout Australia, covering most of the country.
There are different types of ADS-B transponder. ADS-B OUT transponder broadcasts data every half second. The ADS-B IN function is optional and is used in conjunction with TCAS systems to display the position of other aircraft to the pilots.
Most GA aeroplanes only have 1090MHz ADS-B OUT and will therefore select **E B1** on the flight notification.