IREX

Instrument Rating Examination
Revision Study Guide &
4 complete Practice Exam Papers

INCLUDES AN IFR REFERENCE INDEX

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Introduction

Thank you for purchasing the IREX Revision Guide and Exams Book. The Sample Exams are designed as an aid to your preparation not a replacement. The Exam Instructions contained in the beginning of this book are those that appear in the CASA IREX Exam. Make yourself familiar with the information contained within them.

You are entitled to a **free email helpline**. * Just register on-line and any questions you have regarding the questions contained in the exams in this book will be answered via e-mail within 24 hours. * Conditions apply.

CASA has published 65 ACTUAL IREX questions that are available from the CASA web site.

Below are links to the relevant Web sites

CASA IREX Questions (no answers)
http://www.casa.gov.au/flt_lic/fcl_exam/irex_q.htm

CASA IREX Information
http://www.casa.gov.au/flt_lic/fcl_exam/fceirex.htm

AIC H23/98 Exam administrative arrangements
http://www.casa.gov.au/flt_lic/fcl_exam/aic2398.htm

IREX email Helpline
irexhelp@cosmic.com.au

Avfacts Home Page
www.aviationshop.com.au/avfacts

IREX Help-line Registration

Go to www.cosmic.com.au/irex and follow the links to register for the free e-mail helpline.
Your serial number (needed for email helpline) is 1757.

INTRODUCTION – STUDY GUIDE

These notes are designed to assist you in preparing for the Australian Instrument Rating Examination (IREX). It is not the final word in IFR operations, nor is it for operational use.

The following Civil Aviation Safety Authority Operational Documents are required for the IREX Review Course and Examination.

- ✈ AIP Book / or Jeppesen Equivalent
- ✈ Civil Aviation Regulations - CAR
- ✈ Civil Aviation Orders - CAO
- ✈ Civil Aviation Advisory Publications - CAAP
- ✈ En-Route Supplement Australia - ERSA
- ✈ DAP West / or Jeppesen Equivalent
- ✈ DAP East / or Jeppesen Equivalent
- ✈ AIP MAP Australia Package / or Jeppesen Equivalent
- ✈ PCA chart / or Jeppesen Equivalent

The examination is open book so it is extremely important that your documents are complete and amended.

These notes should be used in conjunction with the :

SYLLABUS OF TRAINING FOR THE INSTRUMENT RATING - AIRCRAFT.
CAO 40.2.1 APPENDIX III.

COURSE CONTENTS

1. Privileges & Limitations of CIR
2. Recency Requirements
3. Minimum Equipment
4. Forecasts - Interpretation
5. Operational Requirements
6. Alternate Requirements
7. Take off Minima
8. Lowest Safe Altitude
9. Rules for Descent below LSALT / MSA
10. IFR Navigation requirements
11. IAL Charts
    - ✈ Old Vs New
    - ✈ Max IAS
    - ✈ Circling Area dimensions / Obstacle Clearance
    - ✈ Precision / Non-Precision
    - ✈ Sector Entries
    - ✈ Holding Patterns
    - ✈ Approach / Descent requirements
    - ✈ Visual Approach requirements
    - ✈ MAPt - Missed approach requirements
    - ✈ Visual circling
    - ✈ Circuit requirements
    - ✈ SID / STAR
    - ✈ DME / GPS Arrival

12. Navaids
    - ✈ Orientation - NDB/VOR
    - ✈ Drift FPT/TMG/Track error
    - ✈ 1:60
    - ✈ Abeam position
    - ✈ Intercepts

13. Meteorology
    - ✈ Icing
    - ✈ Thunderstorms
    - ✈ Turbulence
    - ✈ Microburst

THE INSTRUMENT RATING

CAO 40.2.1

An Instrument Rating is an attachment to either a Private or Commercial Pilot Licence. It is issued for a category of aircraft. (Category indicates Fixed wing or Helicopters, not multi / single engine) The privileges and limitations of the rating depend on the endorsements.

Endorsements CAO 40.2.1 Para 6

Command Multi Engine Instrument Rating

A CIR ME entitles the holder to act as PIC or Co-Pilot of both Single and Multi Engine aircraft under the IFR. (CAO 40.2.1 para 13.1)

Command Single Engine Instrument Rating

A CIR SE entitles the holder to act as PIC of Single Engine aircraft and to act as Co-Pilot of BOTH Multi-and Single engine aircraft under the IFR. - CAO 40.2.1 para 13.2

Co-Pilot Instrument Rating

A Co-Pilot IR entitles the holder to act as Co-Pilot on BOTH Single and Multi engine aircraft. CAO 40.2.1 para 13.3

Navaid Endorsement

To be issued any grade of Instrument Rating you must demonstrate proficiency in the use of at least the NDB, The following Navaids can be entered into the holders logbook.

NDB
VOR
LLZ/ILS
DME/GPS Arrival
GPS/NPA

To conduct any of the above instrument approaches you must have the applicable navaid endorsement in your logbook.

Use of DME

The holder of an IR may use the DME in conjunction with an Azimuth aid during an Instrument approach without having DME endorsed in his/her logbook. The DME logbook endorsement entitles the holder to conduct DME Arrivals.

Night Operations

The holder of an Instrument Rating may utilise the rating at night if he/she satisfies the minimum experience and recency requirements.

CAO 40.2.1 para 8.3(e) details the minimum night experience required.

10 hrs night flight
5 hrs PIC night flight

If these requirements are satisfied and the IR is not endorsed DAY ONLY the holder may conduct NIGHT IFR operations

Separate minimum experience requirements exist for NVFR category

NVFR Charter Requirements CAO 40.2.1 para 14

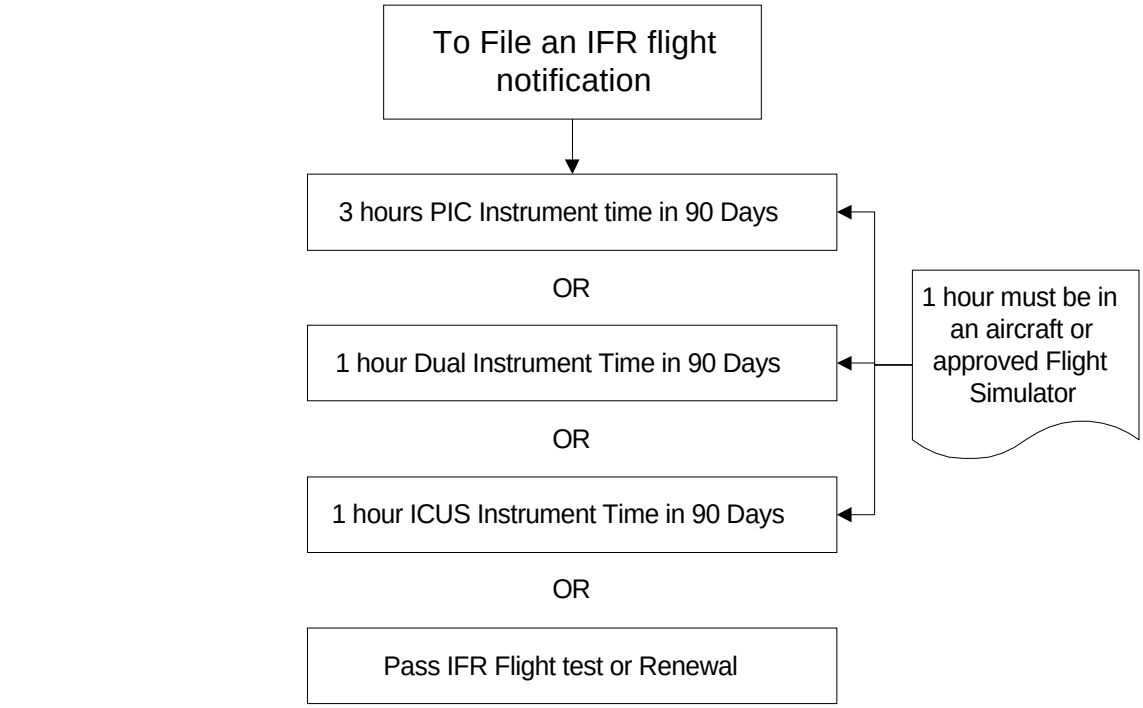
NVFR Charter carrying passengers is permitted however the PIC must hold an Instrument Rating. As a result the minimum experience and recency requirements are applicable only to the CIR holder and are therefore contained the Instrument Rating CAO 40.2.1.

For IFR Charter flights that change to NVFR category the following minimum experience requirements exist:

10 hrs cross country flight time under NVFR procedures and a minimum of 2 navigation exercises (of at least 300nm or 3 hours) as either PIC or ICUS. Each exercise shall exceed a distance of 100nm from the point of departure and include 1 out landing at an aerodrome remote from extensive ground lighting.

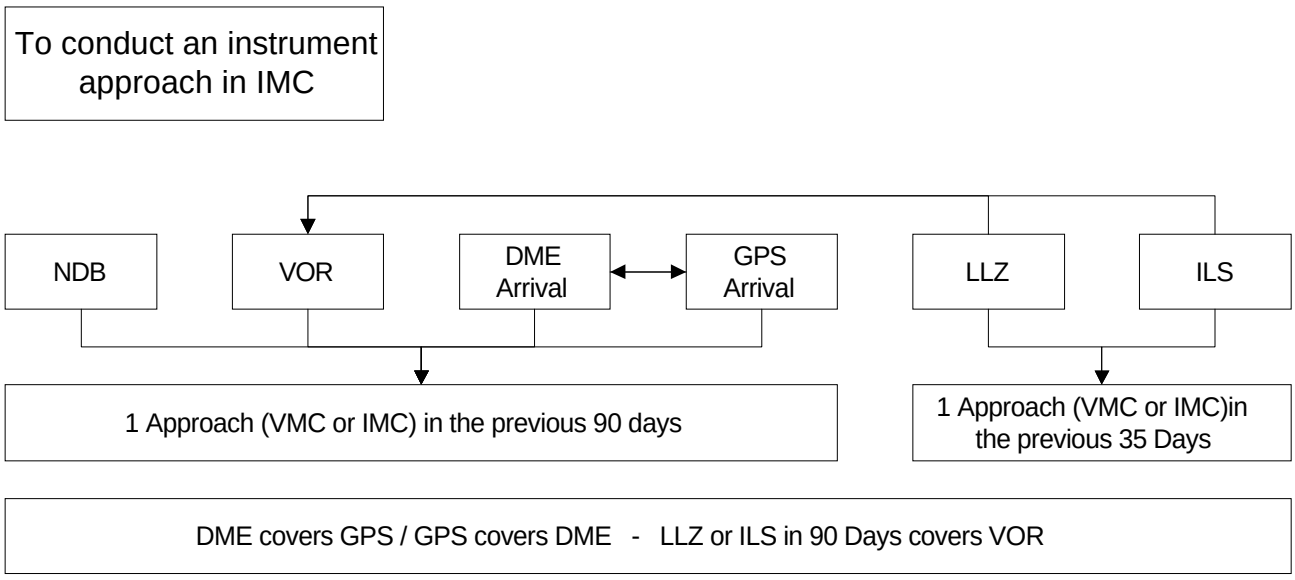
To hold a CIR endorsed with night privileges a pilot does not need to hold a NVFR rating. Consequently the pilot who does not hold a NVFR Rating is not able to downgrade from IFR to NVFR for the last route segment.

IFR Recency Requirements



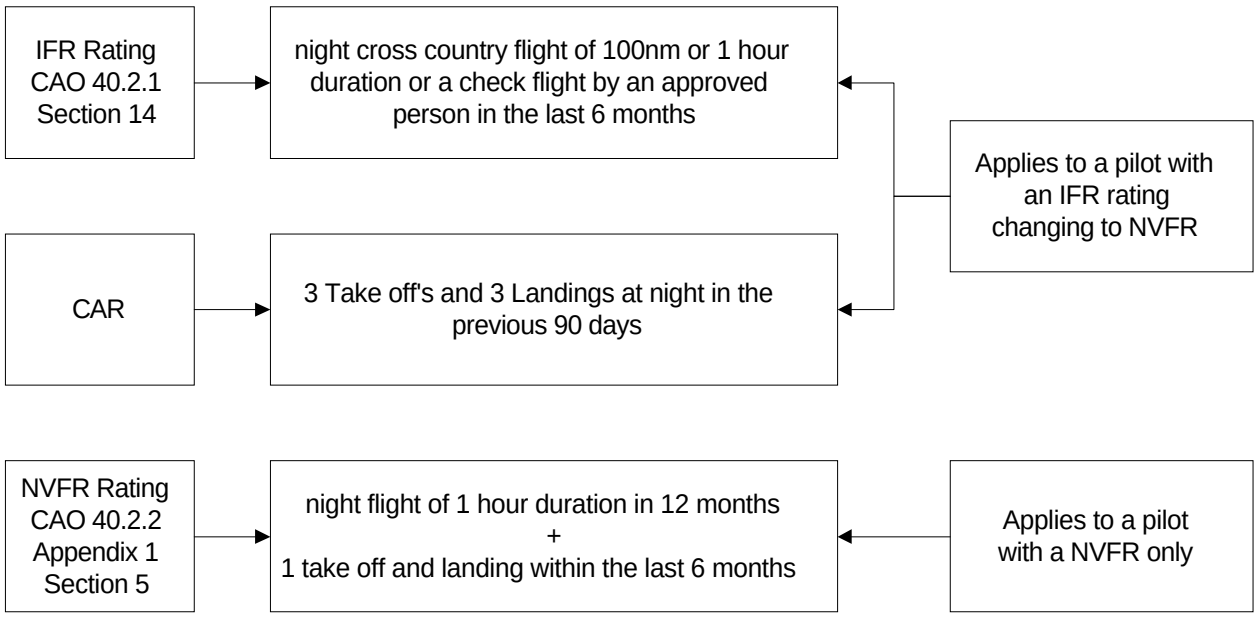
Single Pilot Recency - As Above however 1 hour MUST be as a single pilot operation (NOT DUAL) including an instrument approach conducted as single pilot.

This requirement can be satisfied by using a synthetic trainier



DME covers GPS / GPS covers DME - LLZ or ILS in 90 Days covers VOR

Night VFR Recency for an IFR Flight that Changes to NVFR for the last route segment



EQUIPMENT REQUIREMENTS CAO 20.18 (4)

CAO 20.18 4.1
An aircraft shall not be operated under the Instrument Flight Rules unless it is equipped with:

a. The **flight and navigation instruments** specified in Appendixes II, III, and IV to this section as applicable;

b. Any other instruments or indicators specified in the aeroplane **flight manual**

c. Minimum **lighting equipment** specified in Appendix V to this section

d. Subject to paragraphs 4.1A to 4.1D, an Automatic Pilot approved by CASA, having the following capabilities:
    i) Maintain flight, and manoeuvre the aircraft about the roll and pitch axis
    ii) Automatic heading hold
    iii) Altitude hold

e. in the case of single pilot regular public transport operations, earphones for the pilot with boom or throat microphone and a press to transmit control on the control column. The earphones and microphone shall be compatible with the radio installation in the aeroplane, and shall be used by the pilot during flight.

Auto Pilot Requirements CAO 20.18 (4.1.1)

An autopilot that satisfies the requirements of CAO 20.18 is required for the following operations:

- RPT
- Charter
- Airwork as Air Ambulance or RFDS.

If the autopilot becomes unserviceable during Charter or Airwork operations (RFDS/Air Ambulance) you may continue IFR ops for a period of 3 days commencing on the day the unserviceability occurred provided the pilot considers it safe to do so. Note this allowance does not apply to RPT operations.

The requirement for an autopilot can be satisfied by carrying an co-pilot that satisfies the requirements of CAO 20.18 (4.1b)

An autopilot is NOT required if the flight is conducted as a Private operation.

Assigned Altitude Indicator CAO 20.18 (7)

An aircraft operating under the Instrument Flight Rules in CTA (except NVFR) shall be equipped with an assigned altitude indicator (unless the aircraft is equipped with an altitude alerting system)

Minimum Instrument Requirements CAO 20.18 APPENDIX

The minimum flight Instruments required for IFR depend on the Classification of your operation, i.e. PVT, AWK, CHTR. A list of required instruments appear as appendices to CAO 20.18.

The following page shows a representative table outlining the differences between Charter and Private/Airwork (below 5700kg).

Minimum Instrument Requirements CAO 20.18 APPENDIX

Charter	**Private / Airwork**
ASI (with pitot heat)	ASI (with pitot heat)
2 Altimeters	1 Altimeter
Direct Reading magnetic compass OR Remote indicating compass and a standby remote indicating compass.	Direct Reading magnetic compass OR Remote indicating compass and a standby remote indicating compass.
An accurate timepiece indicating the time in hours, minutes and seconds. Must be fixed to aircraft.	An accurate timepiece indicating the time in hours, minutes and seconds. Pilot Watch OK.
VSI	VSI
OAT	OAT
2 Attitude indicators	Attitude Indicator
Direction Indicator	Direction Indicator
Turn and Slip indicator	Turn and Slip indicator
Gyro Power gauge (suction)	Gyro Power gauge (suction)
2 static sources	2 static sources
2 vacuum pumps	

Electric Lighting CAO 20.18 APPENDIX V

Charter	**Private / Airwork**
Instrument Illumination	Instrument Illumination
Intensity control	Intensity control
2 Landing lights	1 Landing light
Passenger compartment lights	Passenger compartment lights
Pilot’s compartment lights	Pilot’s compartment lights
Position and anti-collision lights	Position and anti-collision lights
Emergency lighting (Shock proof electric torch for every crew member)	Emergency lighting (Shock proof electric torch for every crew member)

FORECASTS

To enable the pilot of an IFR aircraft to safely plan a flight he/she needs to have access to current Meteorology Forecasts. The two main types of Met forecasts that are of most interest to an IFR pilot are:

Area Forecasts - ARFOR

Terminal Forecasts - TAF, TTF

When planning an IFR flight consideration needs to be given to expected en-route weather as well as local weather associated with your destination.

Minimum Forecasts Required

AIP ENR 1.10 (1.2)

The type of Met forecast required for an IFR flight depends on the destination. In all cases an en-route ARFOR is required AIP ENR 1.10 (1.2)

If the destination has an Instrument approach a TAF is also required.

Departing Without a Forecast AIP ENR 1.10 (1.2.1)

You may depart an aerodrome without a forecast if you are satisfied that the weather will permit a safe return within 1 hour and you obtain a forecast within 30 minutes.

Validity Requirements AIP ENR 1.10 (1.3)

In the case of an en-route ARFOR the forecast must be valid for the duration of the flight.

In the case of an Aerodrome forecast the TAF/TTF must be valid for 30 mins before your ETA to 60 mins after your ETA.

FORECAST CHANGES

Inter / Tempo *AIP GEN 3.5 (3.6.4)*

Inter and Tempo are used within a TAF of TTF to indicate variations which are of an intermittent or temporary nature. INTER indicates a change in the prevailing conditions for periods of less than 30 mins. TEMPO indicates a change in the prevailing conditions for periods of less than 60 mins. After the INTER / TEMPO period the weather conditions return to those in the body of the TAF.

Operational Requirements *AIP ENR 1.1 (69.2.2/69.2.3)*

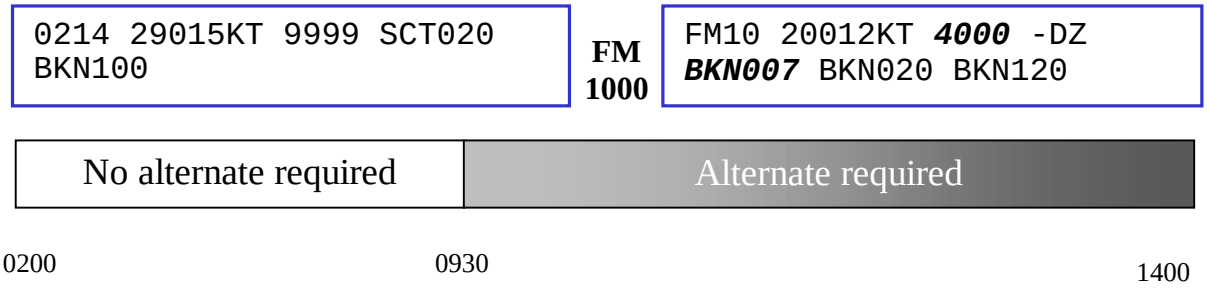
If the conditions within the INTER/TEMPO create an operational requirement provision for an alternate need not be made if holding fuel is carried.
INTER - 30 mins fuel / TEMPO 60 mins fuel.
A 30 min buffer applies to Both INTER and TEMPO (AIP GEN 1.1 (66.2.6)) when contained in a TAF (does not apply to TTF).

"From" Period in Forecast *AIP GEN 3.5 (3.6.5)*

A from period is used to indicate a change in the prevailing conditions within a TAF. The changes relate to both improvements and deteriorations. The conditions after the FM continue until the end of the TAF or until replaced by another FM period.

```
TAF YGLB 070024Z 0214 29015KT 9999 -FEW020 BKN100
         FM10 20012KT 4000 -DZ BKN007 BKN020 BKN120
```

In this situation the weather after the from creates an operational requirement



A buffer period of 30 mins must be applied to this situation. If the ETA is within 30 min BEFORE the onset of the 'from' period (0930) the operational requirements apply, in this case an alternate is required. (AIP GEN 1.1 (69.2.5 a))

Where a FM period removes an operational requirement alternate fuel need not be carried if sufficient fuel is carried to allow the aircraft to hold until the end of the FM period plus 30 mins. (AIP GEN 1.1 (69.2.5 b))

Note: The above buffers apply to a TAF. A TTF that contains a FM has NO buffers due to the accuracy of the forecast and the continuous weather watch provided. AIP ENR 1.1 (69.2.7))

ASSORTED TAF'S

BANKSTOWN YSBK

```
06:36 UTC, 09/09/1998
TAF YSBK 090635Z 0820 05010KT 9999 FEW030
FM10  VRB03KT 9999 FEW030
PROB30 1820 2000 BR
T 17 15 14 13 Q 1030 1031 1032 1031

08:34 UTC, 09/09/1998
METAR YSBK 0830Z 05003KT //// 16/11 Q1031 RMK RF00.0/000.0
CLD:CLR
     BLW 125 VIS:9999
```

BATHURST YBTH

```
06:53 UTC, 09/09/1998
TAF YBTH 090652Z 0820 08006KT 9999  BKN025
T 13 11 09 07 Q 1029 1029 1029 1029

08:01 UTC, 09/09/1998
METAR YBTH 0800Z 03006KT //// 12/09 Q1029 RMK RF00.0/000.0
```

CAMDEN YSCN

```
00:19 UTC, 09/09/1998
TAF YSCN 090017Z 0214 05008KT 9999 SCT035
T 19 20 16 12 Q 1033 1031 1032 1033

08:08 UTC, 09/09/1998
METAR YSCN 0800Z 09004KT //// 15/12 Q1030 RMK RF00.0/000.0
```

*CANBERRA YSCB

```
06:38 UTC, 09/09/1998
TAF YSCB 090638Z 0802 01005KT 9999 FEW040
FM12 06005KT 9999 BKN018
FM23 35005KT 9999 FEW018 SCT040
T 14 12 10 08 Q 1029 1029 1029 1028

08:35 UTC, 09/09/1998
METAR YSCB 0830Z 05002KT 9999 FEW030 SCT130 BKN280 12/05 Q1030
RMK
     RF00.0/000.0
```

COOMA YCOM

```
06:51 UTC, 09/09/1998
TAF AMD YCOM 090650Z 0820 04010KT 9999 FEW040
FM12 06005KT 9999 BKN012
T 13 10 07 04 Q 1029 1029 1029 1028

08:00 UTC, 09/09/1998
METAR YCOM 0800Z 04002KT //// 10/07 Q1029 RMK RF00.0/000.0
```

COOTAMUNDRA YCTM

```
00:22 UTC, 09/09/1998
TAF YCTM 090020Z 0214 06012KT CAVOK
T 16 18 15 11 Q 1031 1030 1030 1032

Not available
METAR not available
```

COWRA YCWR

```
00:22 UTC, 09/09/1998
TAF YCWR 090020Z 0214 06012KT CAVOK
T 18 20 17 13 Q 1031 1030 1030 1032

Not available
METAR not available
```

CUDAL YCUA

00:22 UTC, 09/09/1998
TAF YCUA 090020Z 0214 06012KT CAVOK
T 18 20 17 13 Q 1031 1030 1030 1032

Not available
METAR not available

GOULBURN YGLB

23:59 UTC, 08/09/1998
TAF YGLB 082358Z 0214 04007KT 9999 BKN040
FM11 06007KT 9999 BKN012
T 15 17 13 10 Q 1033 1031 1032 1033

08:06 UTC, 09/09/1998
METAR YGLB 0800Z 10010KT //// 12/09 Q1030 RMK RF00.0/000.0

LORD HOWE ISLAND YLHI

18:19 UTC, 08/09/1998
TAF YLHI 081818Z 2008 12010KT 9999 -SHRA SCT030 BKN050
T 16 17 18 18 Q 1031 1032 1032 1031

08:09 UTC, 09/09/1998
METAR YLHI 0800Z 11009KT 9999 FEW035 16/10 Q1031 RMK
RF00.0/000.0

MALLACOOTA YMCO

18:47 UTC, 08/09/1998
TAF YMCO 081846Z 2008
02008KT 9999 SCT035
T 05 09 13 16 Q 1033 1034 1033 1031

08:04 UTC, 09/09/1998
METAR YMCO 0800Z 02004KT //// 15/11 Q1030 RMK RF00.0/000.0

MERIMBULA YMER

06:58 UTC, 09/09/1998
TAF YMER 090656Z 0820 04011KT 9999 FEW025
FM10 24007KT 9999 SCT020
T 16 14 13 12 Q 1030 1030 1030 1029

08:07 UTC, 09/09/1998
METAR YMER 0800Z 05006KT //// 15/12 Q1030 RMK RF00.0/000.0

MORUYA YMRY

07:00 UTC, 09/09/1998
TAF YMRY 090658Z 0820 04010KT 9999 FEW020
FM10 25007KT 9999 SCT020
T 16 14 13 12 Q 1030 1030 1030 1029

Not available
METAR not available

NORFOLK ISLAND YSNF

06:16 UTC, 09/09/1998
TAF YSNF 090616Z 0820 10010KT 9999 SCT030
T 16 15 15 15 Q 1029 1030 1029 1028

08:15 UTC, 09/09/1998
METAR YSNF 0800Z 13010KT 9999 FEW025 15/09 Q1029 RMK
RF00.0/000.0

ALTERNATE REQUIREMENTS

AIP ENR 1.1 (69)

When considering the suitability of a destination, consideration needs to be given to factors that may prevent the aircraft from landing. If a successful approach and landing is unlikely provision needs to be made for flight to an Alternate Aerodrome.

As per the AIP ENR 1.1 (69) three factors need to be considered

1. Weather Conditions
2. Aerodrome & Aircraft Navaids
3. Aerodrome Lighting

When considering weather the alternate minima are as follows:
AIP ENR 1.1 (69.2.10)

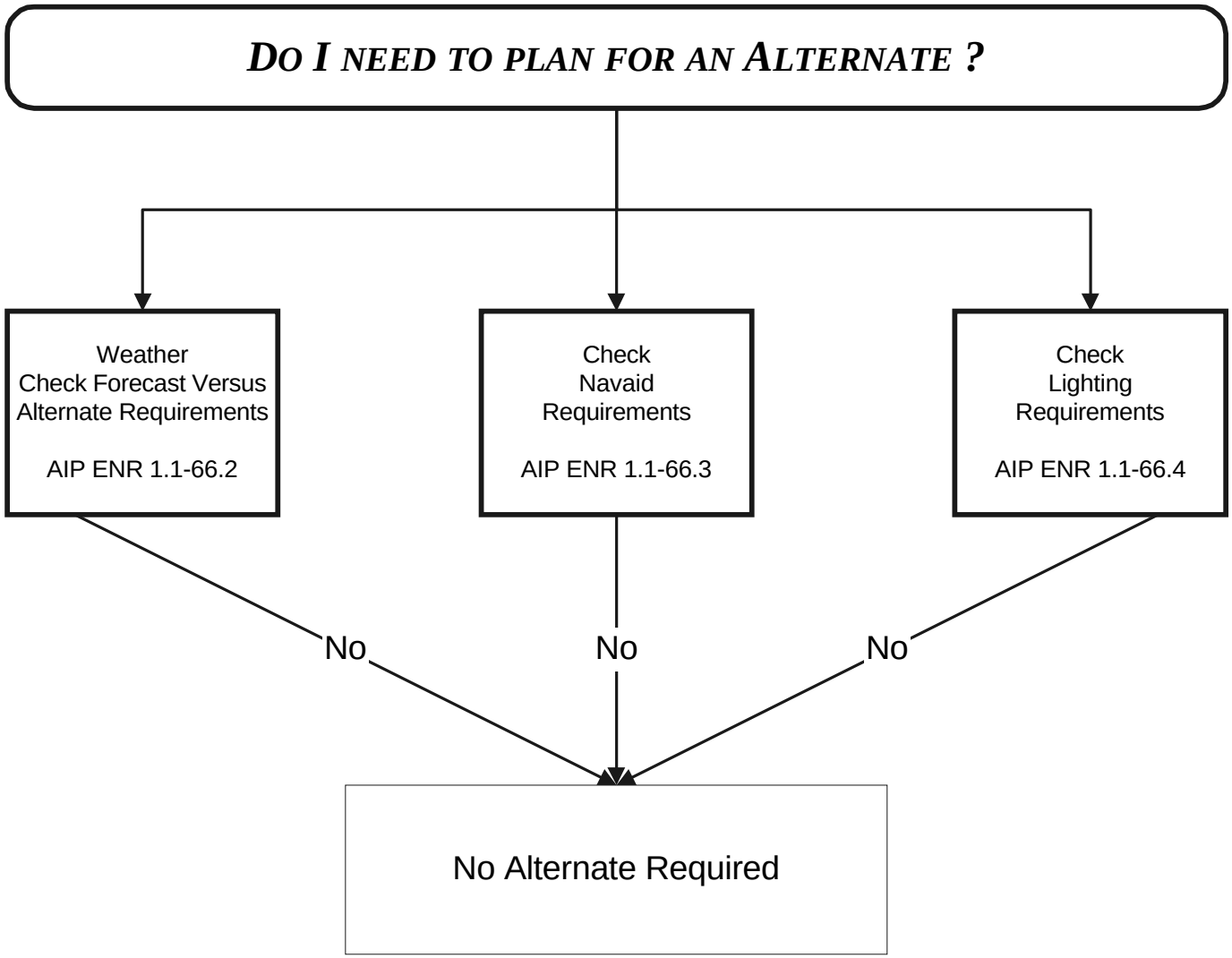
- ✈ If the aerodrome has an instrument approach procedure the alternate minima are published on the chart.
- ✈ If the aerodrome does not have an instrument approach procedure the alternate minima is the LSALT for the last route segment + 500' and a visibility of 8km. (Refer AIP ENR 1.10 (1.7) for more information regarding planning an IFR flight to an aerodrome without an Instrument Approach)

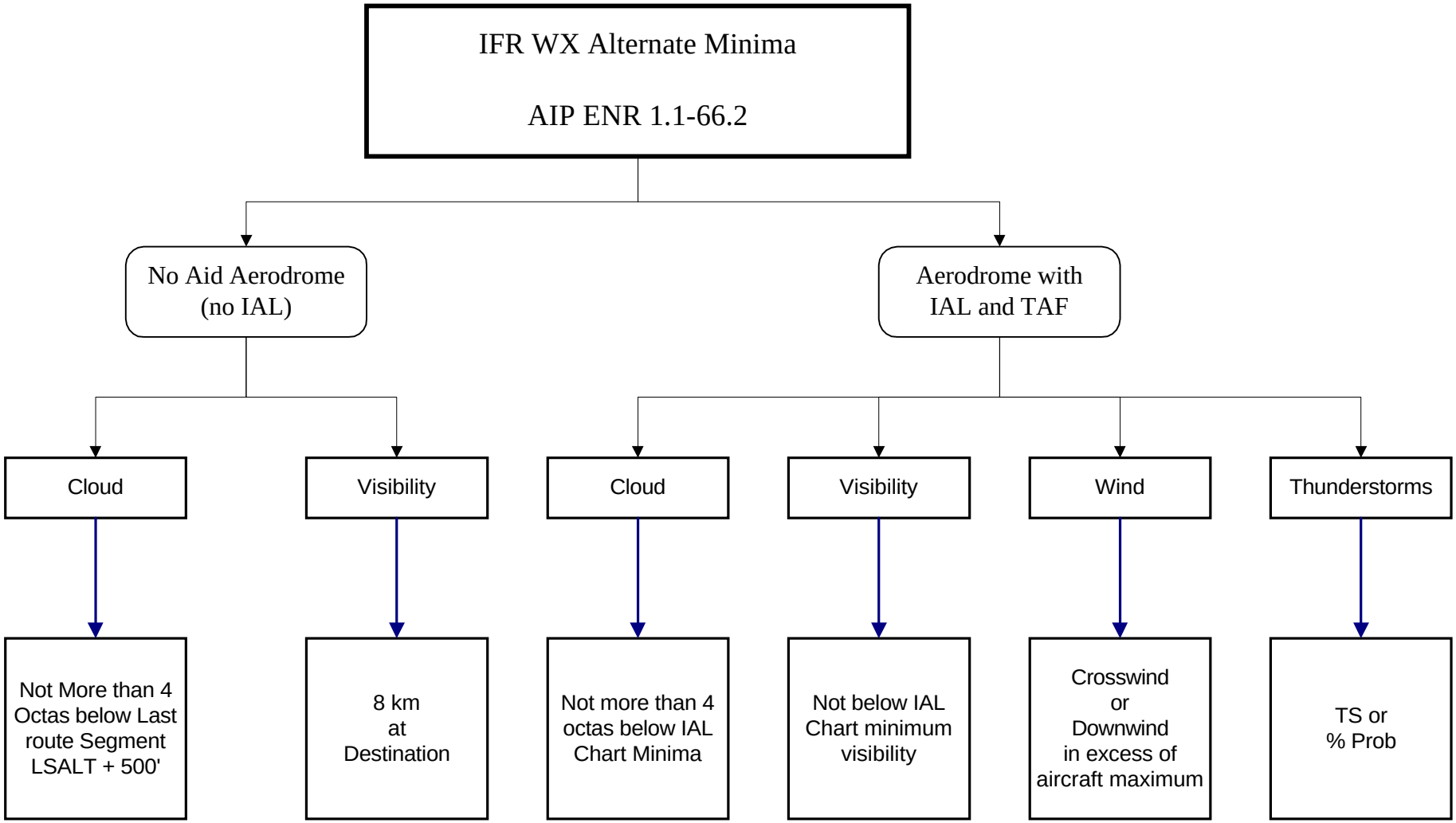
The following pages show graphically how each of the above elements are checked to determine whether an alternate is required.

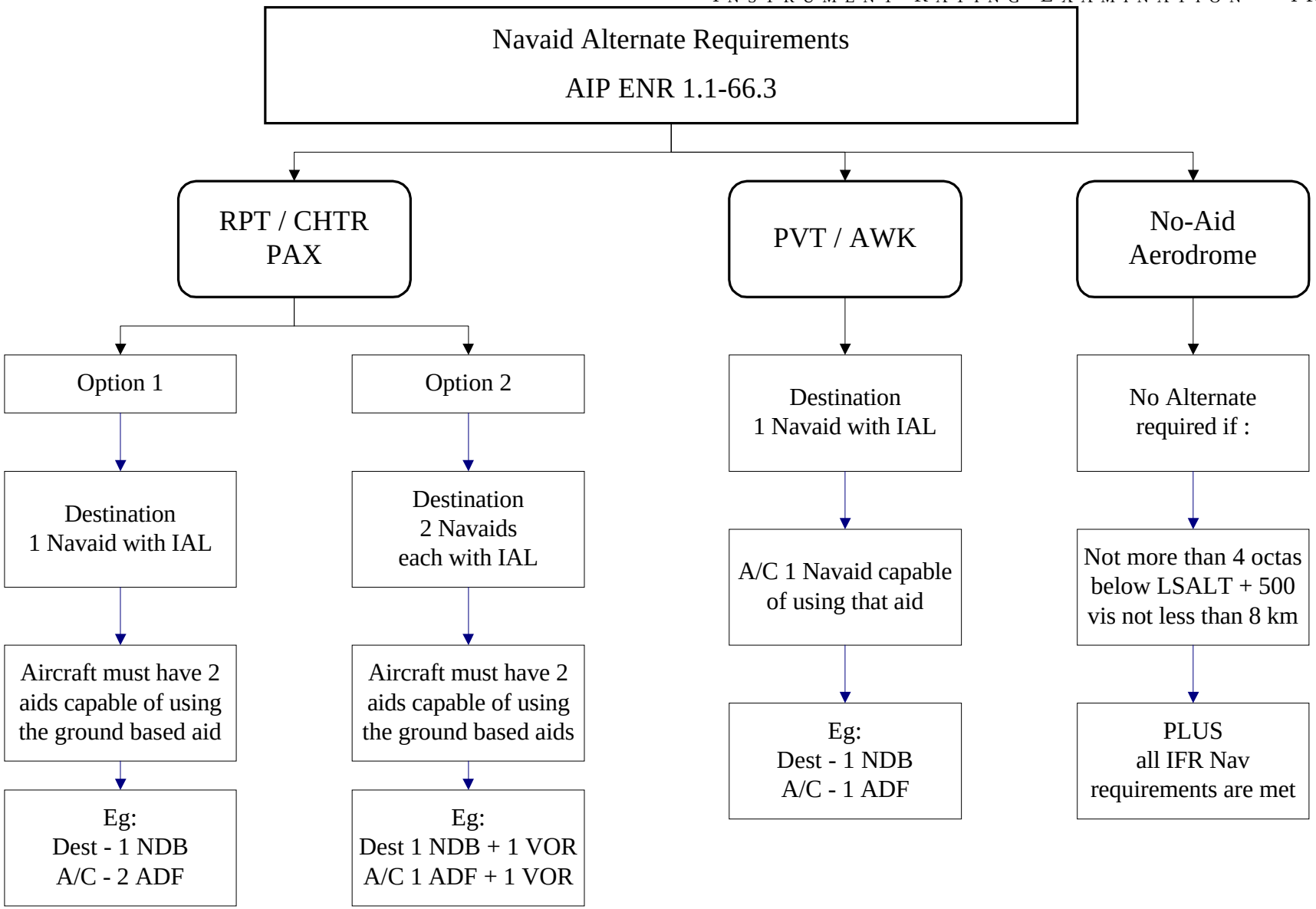
If you do not satisfy ANY of the requirements contained in AIP ENR 1.1 (69) an Alternate is required. The basic rule of Alternate selection is that **AN ALTERNATE CAN NOT REQUIRE AN ALTERNATE** ie: the alternate aerodrome must satisfy all the requirements of AIP ENR 1.1 (69) except where PAL lighting is involved.

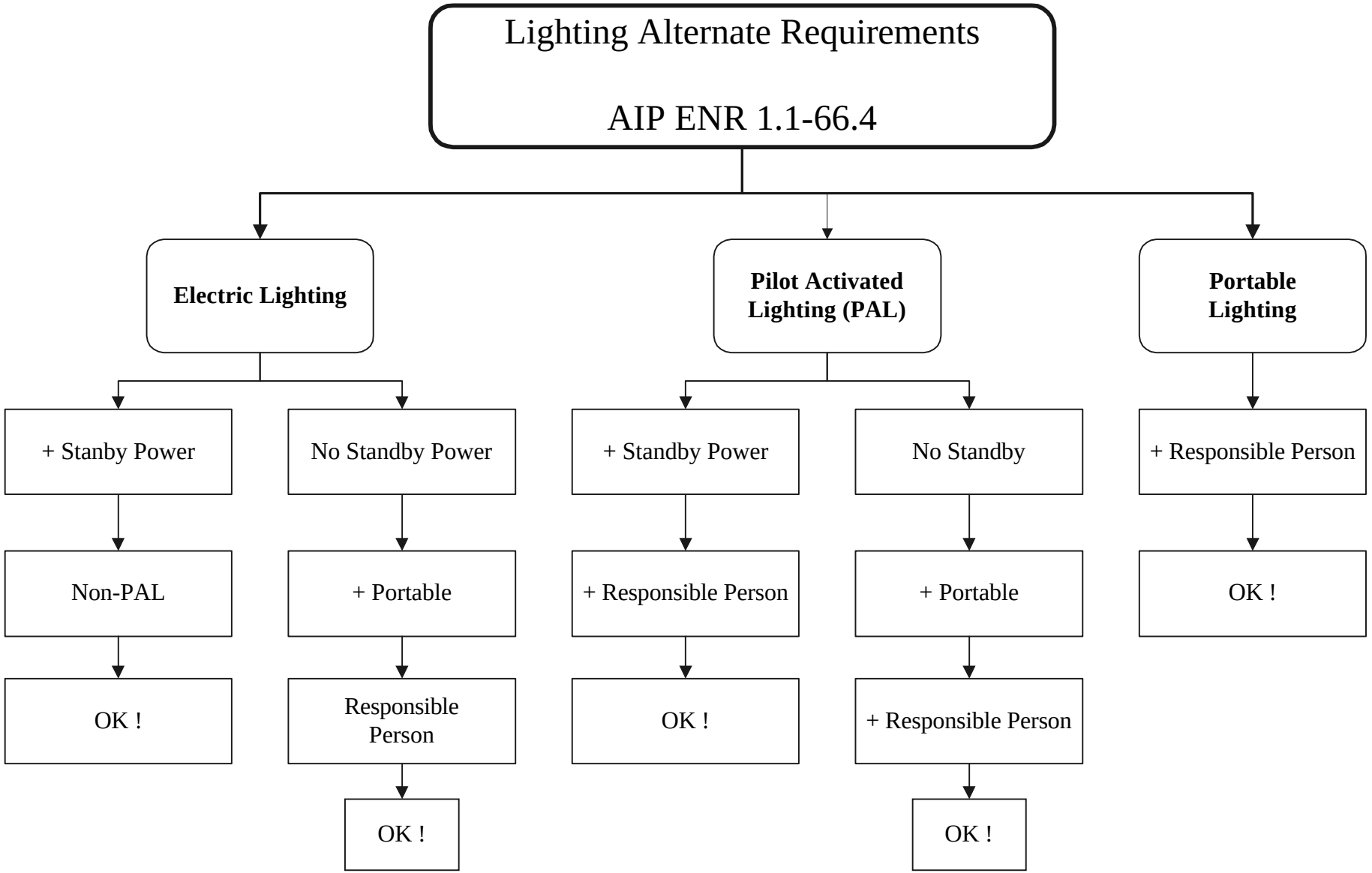
PAL aerodrome as an Alternate *AIP ENR 1.1 (69.4.4)*

This paragraph provides an exemption against the requirement that a PAL aerodrome have a responsible person in attendance. Please note this exemption ONLY applies to the ALTERNATE aerodrome, it cannot be applied when considering whether your destination requires an alternate.


DO I NEED TO PLAN FOR AN ALTERNATE ?
Weather
Check Forecast Versus
Alternate Requirements
AIP ENR 1.1-66.2
Check
Navaid
Requirements
AIP ENR 1.1-66.3
Check
Lighting
Requirements
AIP ENR 1.1-66.4
No
No
No
No Alternate Required


IFR WX Alternate Minima
AIP ENR 1.1-66.2
No Aid Aerodrome (no IAL)
Aerodrome with IAL and TAF
Cloud
Visibility
Cloud
Visibility
Wind
Thunderstorms
Not More than 4 Octas below Last route Segment LSALT + 500'
8 km at Destination
Not more than 4 octas below IAL Chart Minima
Not below IAL Chart minimum visibility
Crosswind or Downwind in excess of aircraft maximum
TS or % Prob

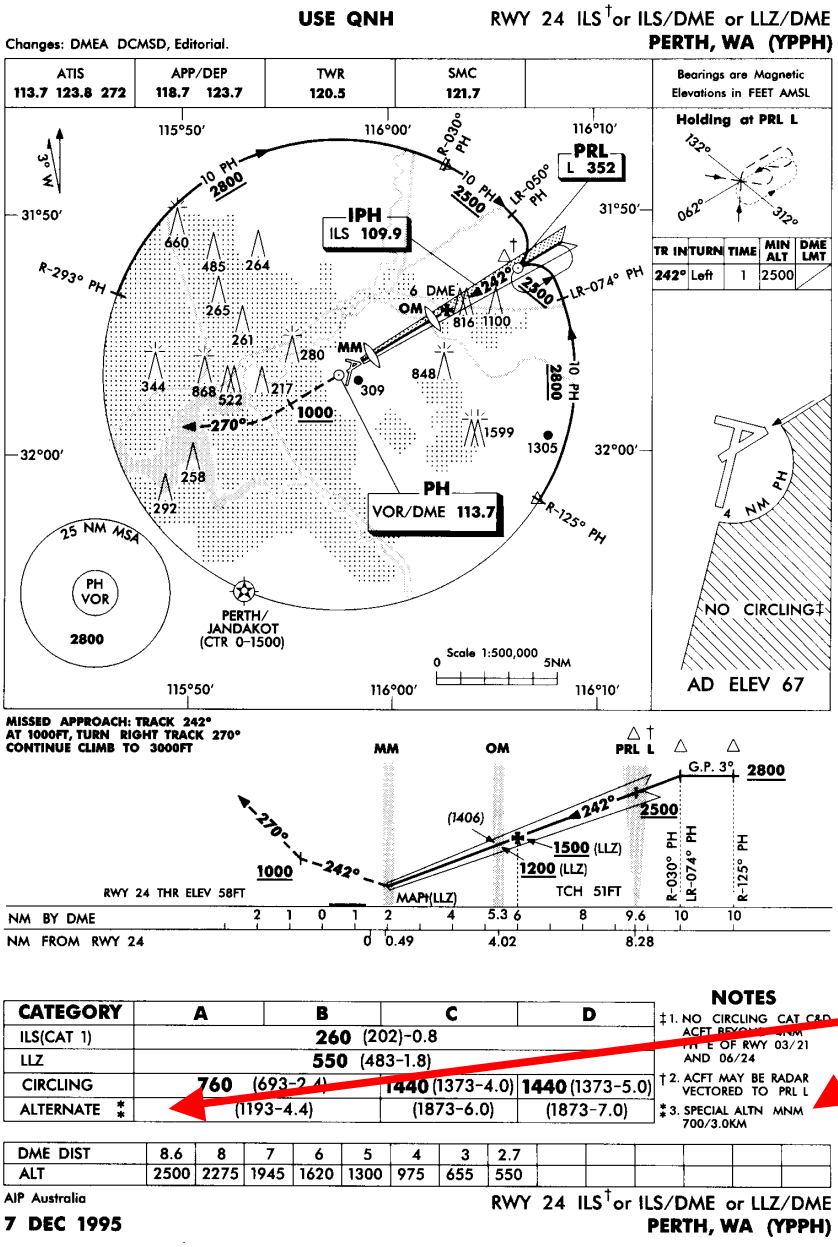

Navaid Alternate Requirements
AIP ENR 1.1-66.3
RPT / CHTR PAX
PVT / AWK
No-Aid Aerodrome
Option 1
Option 2
Destination 1 Navaid with IAL
Destination 2 Navaids each with IAL
Aircraft must have 2 aids capable of using the ground based aid
Aircraft must have 2 aids capable of using the ground based aids
Eg: Dest - 1 NDB A/C - 2 ADF
Eg: Dest 1 NDB + 1 VOR A/C 1 ADF + 1 VOR
Destination 1 Navaid with IAL
A/C 1 Navaid capable of using that aid
Eg: Dest - 1 NDB A/C - 1 ADF
No Alternate required if :
Not more than 4 octas below LSALT + 500 vis not less than 8 km
PLUS all IFR Nav requirements are met


Lighting Alternate Requirements
AIP ENR 1.1-66.4
Electric Lighting
Pilot Activated Lighting (PAL)
Portable Lighting
+ Stanby Power
No Standby Power
+ Standby Power
No Standby
+ Responsible Person
Non-PAL
+ Portable
+ Responsible Person
+ Portable
OK !
OK !
Responsible Person
OK !
+ Responsible Person
OK !
OK !

SPECIAL ALTERNATE MINIMA

Special alternate weather minima are available at some aerodromes which have dual ILS / VOR approach capability. This provides Instrument approach redundancy making it less likely that a landing will not be available due to weather.

If your aircraft has the equipment specified in AIP ENR 1.5 (6.2) the flight can be planned using the Special alternate minima shown in fig 1.



Special Alternate Minima are denoted on the IAL chart by double asterisk. The values are contained in the NOTES section

TAKE OFF MINIMA AIP ENR 1.5 (4.2)

When departing an aerodrome consideration needs to be given to the cloud ceiling and visibility.

The Standard Take off Minima apply at all aerodromes except where indicated in the DAP's.

	Ceiling	Visibility
Multi-engined; (a) two pilot operated, or (b) single pilot operated turbo-jet or (operative) auto-feather equipped. IFR aircraft above 5700 kg. With RWY edge lighting (light spacing not more than 60M) and either RWY centreline lighting or centreline marking	 0 0	 800M 500M
Multi-engined (a) two pilot operated, or (b) single pilot operated turbo-jet or (operative) auto-feather equipped. IFR aircraft not above 5700kg, capable of a gross climb gradient of at least 1.9% under ambient conditions with the loss of the most critical engine. With RWY edge lighting (light spacing not more than 60M) and either RWY centreline lighting or centreline marking	 0 0	 800M 500M
All other IFR Aircraft see NOTE	**300FT**	**2000M**

Note: The PIC is responsible for ensuring that:

(a) terrain clearance is assured until reaching either the en-route LSALT or departure aerodrome MSA
(b) if a return to the departure is not possible that the aircraft's performance and fuel availability is adequate to enable the aircraft to proceed to a suitable aerodrome, having regard to terrain, obstacles and route distance limitations.

If, in the case of multi-engine operations, you plan to return to the departure aerodrome after an engine failure you must ensure that the weather conditions will permit a visual approach in the case of a non-IAL equipped aerodrome or a successful instrument approach.

Aerodrome without Instrument Approach

Weather conditions must be suitable for a visual approach. AIP ENR 1.5 (1.9)

- clear of cloud in sight of ground or water at an altitude NOT LESS THAN MSA OR LSALT.
- Visibility not less than 5000m

Therefore the Take off Minima for an aerodrome without an instrument approach is:

Cloud ceiling **LSALT or MSA**
Visibility **5000M**

Aerodrome with Instrument Approach (es)

If the aerodrome has one or more instrument approaches you must take into consideration the LOWEST MDA/DA available to you.

Example:

You are departing *YXYZ* in a multi-engine aircraft and will need to return to XYZ in the event of an engine failure. The wind is 030/25 kt. What are the Take-off minima?

Points to consider:
- Given that you will know the wind direction and velocity before take-off are any of the runway aligned approaches NOT available?
- Is the aircraft equipped to conduct the Instrument approaches?
- Are you recent to conduct the instrument approaches?

After considering the above factors you choose the LOWEST minima of the available approaches.

From the DAP's extract the MDA's for each of the Instrument Approaches

MDA NDB approach	750' / 2.4km
MDA RWY 21 VOR/DME approach	550' / 3.0km
MDA RWY 03 VOR/DME approach	570' / 3.0km
MDA NDB/DME approach	600' / 2.4km

NOTE

Although you may choose the lowest minima the lowest take-off minima is STILL 300' / 2000M (if you consider that an ILS can have a DA of 250')

The take off minima in the above situation would be – 570' / 3.0km

LOWEST SAFE ALTITUDE (LSALT) AIP GEN 3.3 (3)

When planning an IFR flight a minimum safe en-route altitude or Lowest Safe Altitude must be calculated. The following methods may be used:

1. For routes defined on AIP/MAP (ERC/TAC charts) the LSALT is published on the chart.
2. For routes and route segments not shown in AIP/MAP the LSALT is derived from the WAC chart.
3. For routes and route segments not shown in AIP/MAP the LSALT can also be derived from the TAC chart Grid LSALT.

Calculation of LSALT from WAC charts AIP GEN.3.2 (2.2.1)

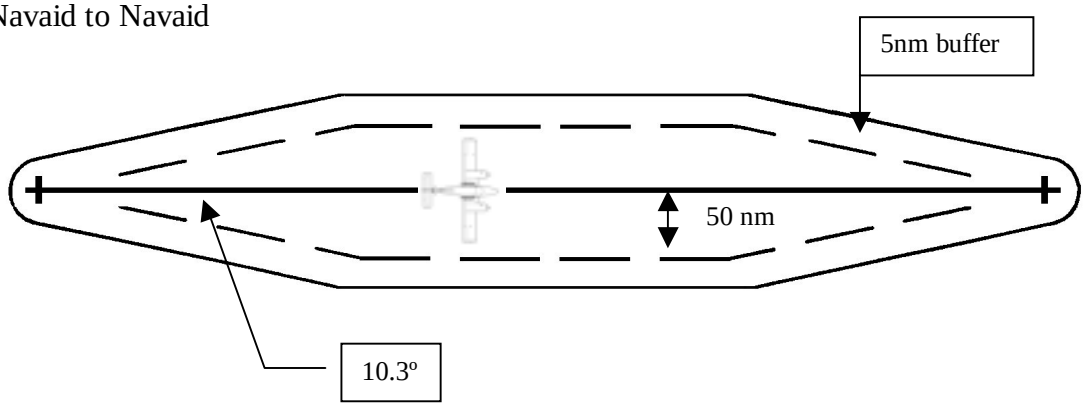
For routes not shown in MAP, the LSALT is calculated either from GRID LSALT or with reference to a topographical chart.

A tolerance area is applied to the intended track. The dimensions of the area depend on the mode of navigation.

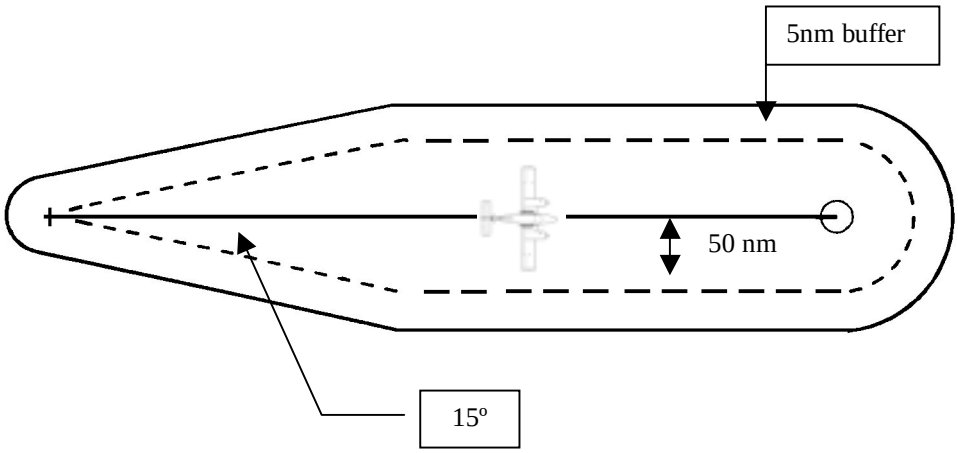
Radio-Aids	Where track guidance is to be provided by radio navaids the allowance is 10.3º either side of track.
Dead Reckoning	If no track guidance is provided the allowance is 15º either side of track.

In both cases the limit of the area is 50nm either side of track. A 5 nm buffer is then applied to the whole area (AIP GEN 3.3 (3.5)).

Navaid to Navaid



No Aid to No Aid



Obstacle Clearance AIP GEN 3.3 (3.5)

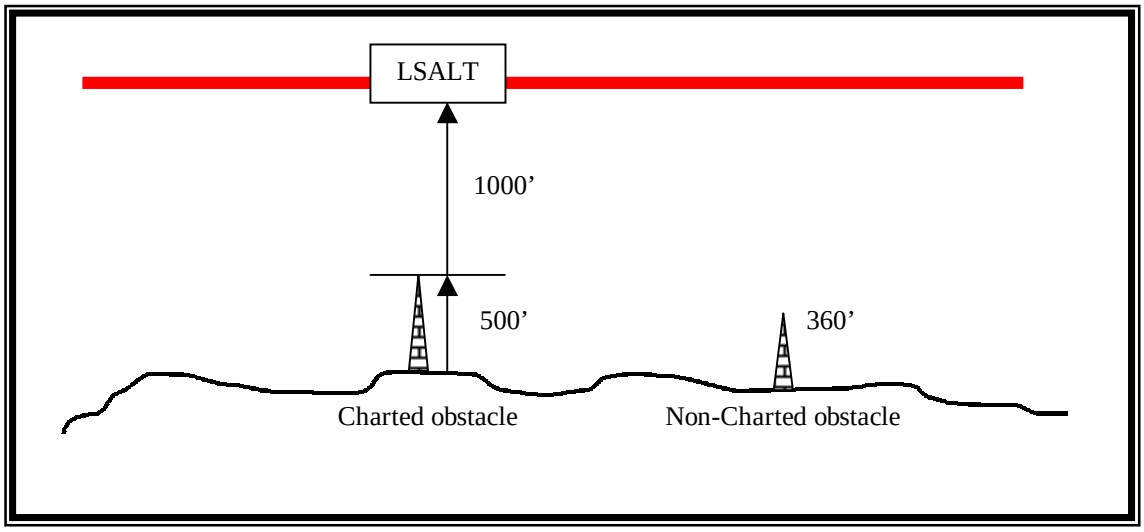
When calculating the LSALT for the above tolerance area's the following method is to be used:

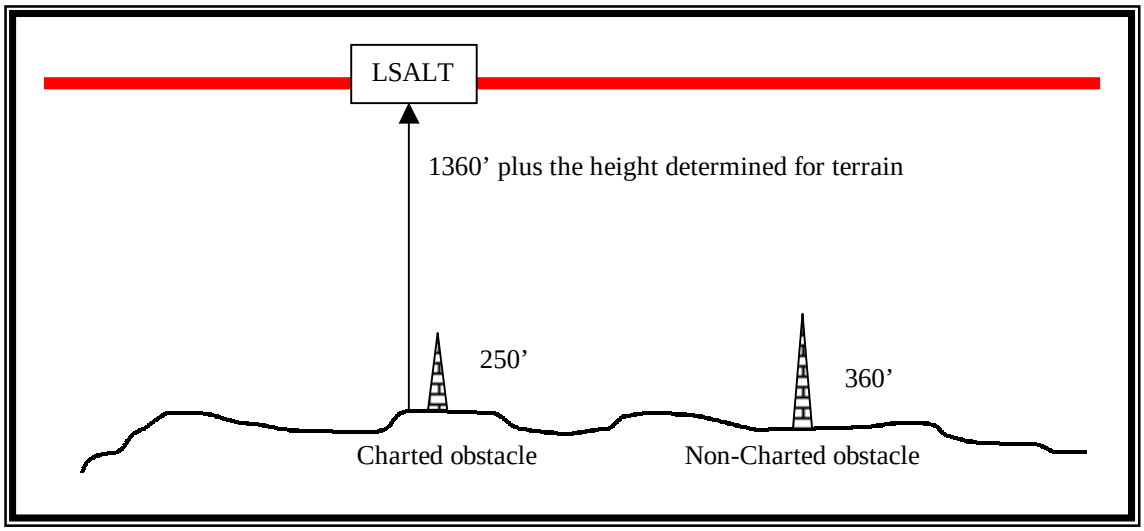
- Add 1000' to the highest obstacle, where the highest obstacle is more than 360' above the height determined for terrain.

- Add 1360' to the height determined for terrain where the highest charted obstacle is less than 360' above the height determined for terrain.

- The Lowest LSALT is 1500'

The above takes into consideration the obstacle reporting requirements of CAR 89Y which says that anyone may erect structures to 150m (eg mobile phone towers) without reporting them.





Calculation of LSALT in the event of navaid failure AIP GEN 3.3 (3.4)

The tolerance area is defined as follows:

20% of the air distance flown from the last positive fix + 5nm

example:

Your last positive fix was 20mins ago. TAS 180 kt.

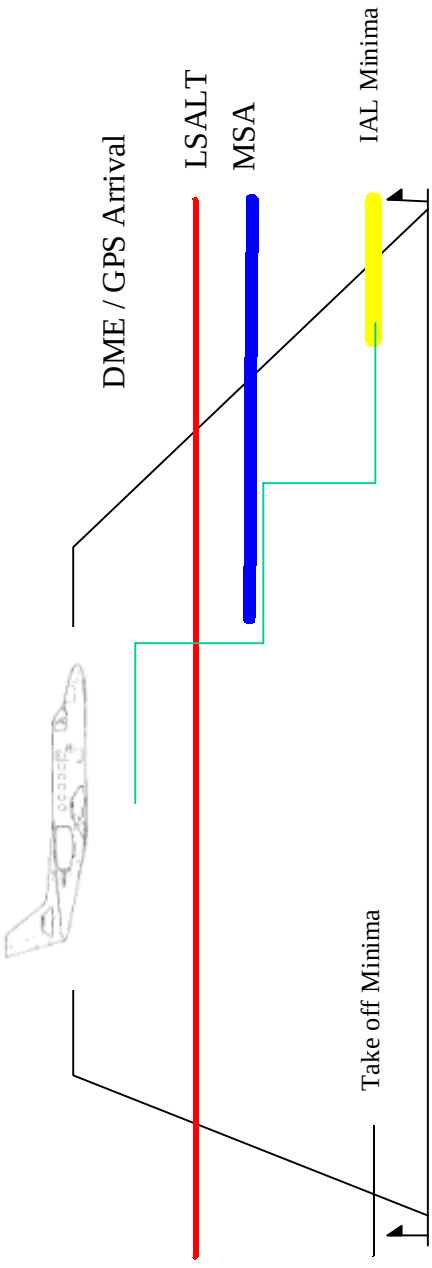
Air distance flown since last positive fix = 20/60 x 180 = 60nm

20% of 60nm = 12nm

The tolerance are = 12 + 5 = 17nm

The LSALT is 1000’ above the highest obstacle within the above obstacle.

DESCENT BELOW LSALT/MSA



Rules for Descent Below LSALT or MSA - AIP DAP IAL 1.2

1. Visual Approach
2. When under Radar Vectors
3. During A DME/GPS arrival
4. Past the IAF for an Instrument Approach

IFR NAVIGATION REQUIREMENTS

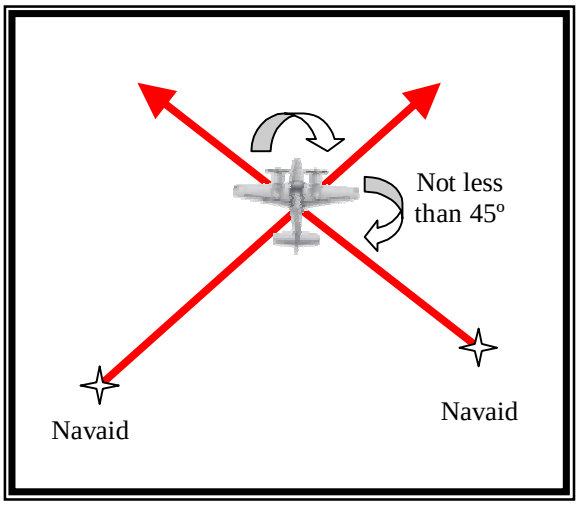
AIP ENR 1.1 (17) Flight under the IFR

An aircraft operating under the IFR must be navigated by:

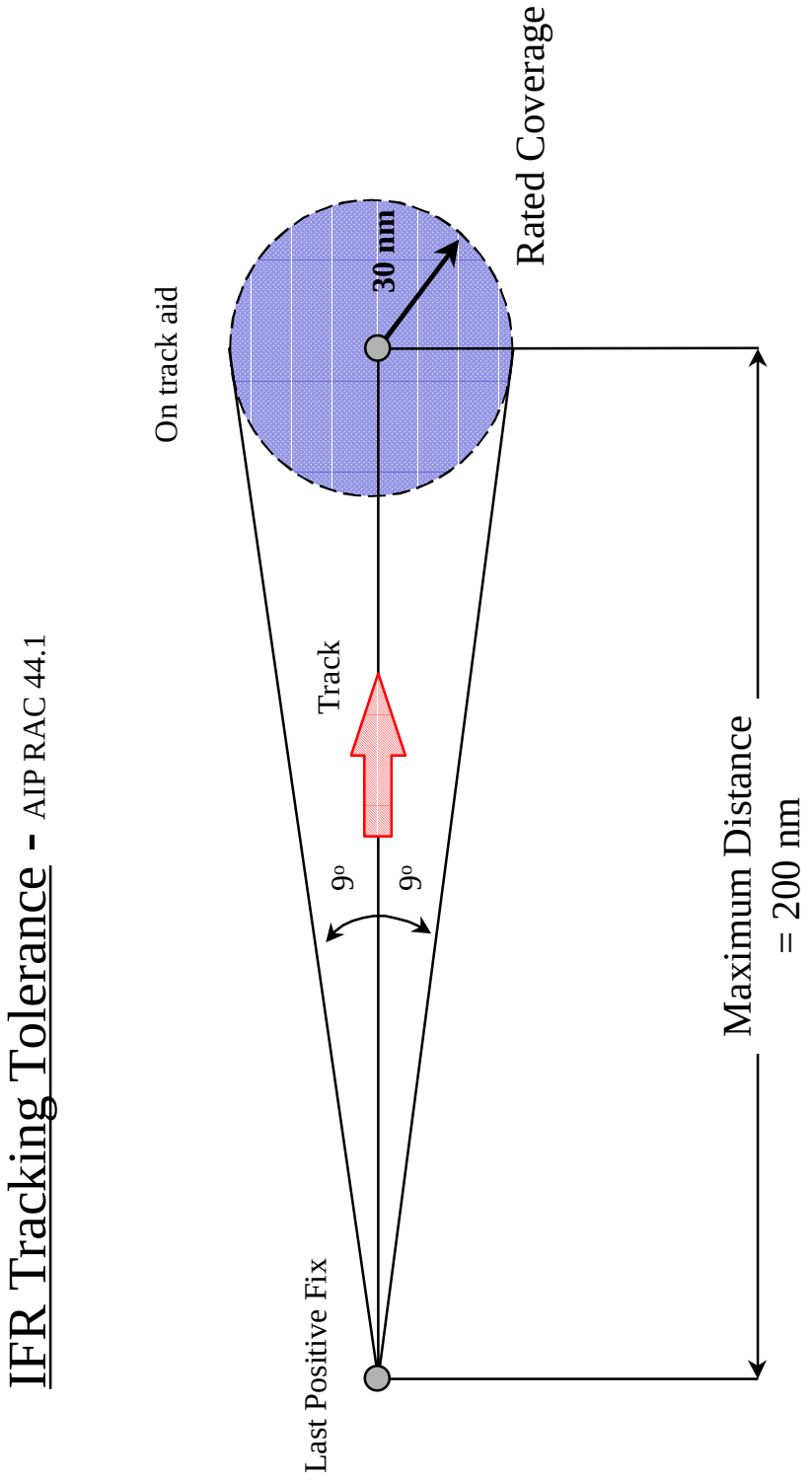
a. A full time licensed navigator; or
b. An approved self contained navigation system, or approved long range radio navigation system; or
c. Use of a radio navigation system or systems on routes where, after making allowance for possible tracking errors of +/- 9º from the last positive fix the aircraft will come within the rated coverage of a radio aid which can be used to fix the position of the aircraft. The maximum time between positive fixes shall not exceed 2 hours.
d. Visual reference to the ground or water by day, on route segments where suitable en-route radio navigation aids are not available, provided that the weather conditions permit flight in VMC and the visual position fixing requirements of ENR 1.1 (17.2.1b) are able to be met.

AIP ENR 1.1 (17.4.6) Position Fixing

A positive radio fix is one determined by the passage of the aircraft over :
a. a NDB; or
b. a VOR station; or
c. a DME; or
d. is one determined by the intersection of two or more position lines which intersect with angles of not less than 45º and which are obtained from NDBs, VORs, Localizers, or DMEs in any combination.



For the purpose of this section, a position line must be within the rated coverage of the aid with the exception that if a fix is determined entirely by position lines from NDBs, the position lines must be within a range of 30nm from each of the NDBs.


IFR Tracking Tolerance - AIP RAC 44.1
On track aid
30 nm
Rated Coverage
Track
9°
9°
Last Positive Fix
Maximum Distance
= 200 nm