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Contents

Conventions, Agreements, Organizations

State has sovereignty over the airspace above its territory. An **aircraft flying over the territory of another state has to follow the rules of state it is overflying.**

Air navigation services over high seas are provided by a contracting state who accepts the responsibility. **Over high seas ICAO rules apply!**

Conventions

Chicago Convention (7th December 1944)	**Creation of ICAO**
Rome Convention (1933/1952)	**Damage caused by foreign aircraft to third parties on the surface.** **(claim compensation within 2 years)**
Warsaw (1929) and Montreal*	**Operator's liability for damage caused on international flights to passengers and goods transported.** ***Unlimited Liability for damaged caused to passengers and goods.**
Tokyo Convention	**Offense against penal law** **Doesn't deal with damages** (**Mnemonic: Penal -> Penis -> In Japan there are rumors that the Penis is small :P**)
Montreal	**Makes acts of violence on board, destruction of aircraft in flight and destroying or damaging any air navigation facility punishable**
Agreement of Paris	**Non-scheduled EU flights**

Contracting states may denounce these conventions, and it shall take effect **six months** following the date on which notification is received by Depositary Governments.

Freedoms of the Air

International Air Transport Agreement – Carriage of traffic between the state of registration of the aircraft and any other participating state.

1st Freedom	Right to overfly a foreign country without landing
2nd Freedom	Right to refuel or carry out maintenance in a foreign country
3rd Freedom	Right to fly from one's own country to another (Portugal – France)
4th Freedom	Right to fly from a foreign country to one's own (France – Portugal)
5th Freedom	Right to fly between two foreign countries during flights which begin or end in one's own (Portugal – Italy – France)
6th Freedom	Right to fly from one foreign country to another one while stopping in one's own country (Italy – Portugal – France)
8th Freedom **(Europe, Cabotage, domestic air services)**	Right to fly between two or more airports in a foreign country while continuing service to one's own country (Rome (Italy) – Milan (Italy) – Portugal)

Organizations

International Civil Aviation Organization (ICAO)

- Created in 1944, Chicago Convention
- Headquarters in Montreal
- Develop principles and techniques for international aviation

ICAO Air Navigation commission finalizes the SARPS for submission for adoption consist of 19 members appointed by ICAO Council **(Mnemonic: 19 annexes, 19 members)**

ICAO Council is responsible for the assembly and other things. It shall **elect its President for 3 years.**

The ICAO Annexes

- Annex 1 - Personnel Licensing
- Annex 2 - Rules of the Air
- Annex 3 - Meteorological Services
- Annex 4 - Aeronautical Charts
- Annex 5 - Units of Measurement
- Annex 6 - Operation of Aircraft
- Annex 7 - Aircraft Nationality and Registration Marks
- Annex 8 - Airworthiness of Aircraft **(Mnemonic: 8 looks like a plane propeller which indicates airworthiness)**
- Annex 9 - Facilitation
- Annex 10 - Aeronautical Telecommunications
- Annex 11 - Air Traffic Services
- Annex 12 - Search and Rescue
- Annex 13 - Aircraft Accident and Incident Investigation **(Mnemonic: Unlucky number, accidents)**
- Annex 14 - Aerodromes
- Annex 15 - Aeronautical Information Services (AIS)
- Annex 16 - Environmental Protection
- Annex 17 - Security
- Annex 18 - The Safe Transportation of Dangerous Goods by Air **(Mnemonic: 18 is the age when we start drinking, smoking, etc … dangerous)**
- Annex 19 - Safety management

Annexes contain **SARPS (Standard and Recommended Practices)**

ICAO (Council) must be informed about differences of a State from the standards in any of the Annexes to the convention **immediately** and such **differences** should **also be published in the national AIP.**

International Air Transport Association (IATA)

It is a **trade association for aviation operators** and others involved with international aviation. Its **mission is to represent, lead and serve the airline industry.**

European Aviation Safety Agency (EASA)

EASA produces rules and regulations. It proposes implementing those rules and regulations and NAA act as competent authorities. It provides legislative proposals to the European Commission for implementation and promotes the highest common standards of safety and environmental protection in civil aviation.

Normally NAAs cannot decline new standards for new type certifications because EASA has jurisdiction.

Eurocontrol

Essential role in **Air Traffic Flow Management in Europe**.

Airworthiness of Aircraft

Standards of Airworthiness are applicable to **aeroplanes of over 5700kg Maximum Certified Take-off Mass, intended for the carriage of passengers, cargo or mail in international air navigation**.

Certificate of Airworthiness is required for any flight operation.

State of Registry is responsible for issuing certificate of Airworthiness and deciding if an aircraft is Airworthy or not.

State of Design shall ensure there exists a continuing integrity programme to ensure airworthiness of aircraft for **aeroplanes over 5700kg Maximum Certified Take-off Mass**.

Aircraft Nationality and Registration Marks

Definitions

Aeroplane - A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Aircraft - Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Glider - A non-power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Rotorcraft - A power-driven heavier-than-air aircraft supported in flight by the reactions of the air on one or more rotors.

Heavier-than-air aircraft - Any aircraft deriving its lift in flight chiefly from aerodynamic forces.

Lighter-than-air aircraft - Any aircraft supported chiefly by its buoyancy in the air

State of Registry - The State on whose register the aircraft is entered.

Nationality, Common and Registration Marks

The nationality or common mark shall consist of a group of characters.

The **nationality mark** shall be selected from the series of nationality symbols included in the radio call signs **allocated to the State of Registry by the International Telecommunication Union.**

The **common mark** shall be selected from the series of symbols included in the radio call signs **allocated to the International Civil Aviation Organization by the International Telecommunication Union. Assignment of the common mark to a common mark registering authority will be made by the International Civil Aviation Organization.**

Registration mark shall be letters, numbers, or a combination of both, **assigned by the State of Registry or common mark registering authority.**

- **The nationality or common mark shall precede the registration mark.**
- When the **first character of the registration mark is a letter**, it **shall be preceded by a hyphen.**

Important:

When letters are used for the registration mark, **combinations shall not be used which might be confused with** the **five-letter combinations used in the International Code of Signals**, the three-letter combinations beginning with Q used in the Q Code, and with the **distress signal SOS**, or **other similar urgent signals**, for **example XXX, PAN and TTT**.

Location and Dimension

Fuselage and Vertical Tail:

Location: On heavier-than-air aircraft, the marks shall appear either **on each side of the fuselage** (or equivalent structure) **between the wings and the tail surface or** on the **upper halves of the vertical tail surfaces.**

Size: At least **30 cm** on **fuselage and on vertical tail surfaces**

Wing:

Location: On heavier-than-air aircraft, the marks shall appear once on the lower surface of the wing structure. They shall be located on the **left half of the lower surface of the wing structure**.

Size: At least **50 cm** on **wing**

Personnel Licensing

Definitions

ICAO Definition of Night – During the period when the center of the Sun's disc is **6º below the horizon.** (period between the end of evening civil twilight and the beginning of morning civil twilight)

Flight time - total time from the moment an aircraft first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight;

Proficiency Check - demonstration of skill to revalidate or renew ratings, and including such oral examination as may be required. **Operator proficiency check (OPC)** is **valid for 6 months**. Can be made **3 months in advance for revalidation. (asked in ANAC)**

Revalidation – Administrative action **within the period of validity** of a rating which allows holder to continue to exercise the privileges of rating for a further specific period.

Renewal – Administrative action taken, **after a rating has expired**, for the purpose of renewing the privileges of the rating or certificate for a further specified period.

Competent authority – An authority designated by the member state to whom a person applies for the issue of pilot licenses or ratings. Example: ANAC

Cross-country - means a flight between a point of departure and a point of arrival following a preplanned route, using standard navigation procedures

Part-FCL

If aircraft is certified for operation by a single pilot but state requires operation with a co-pilot, he shall be entitled to not more than **50% of flight time** towards the total flight time required for a higher grade of pilot license.

When a contracting state renders valid a license from another state, the **validity of the authorization shall not extend beyond 1 year, provided the original license remains valid**

The **exercise of the privileges granted by a license** shall be **dependent upon the validity of the ratings contained** therein, if applicable, and of the medical certificate.

You **can't act as PIC** of an aircraft carrying passengers at night unless, during the **previous 90 day**s, you have **carried out** at least **one landing at night.**

Old pilots:

- **Age 60-64**, shall not act as a pilot of an aircraft engaged in commercial air transport except as a **member of a multi-pilot crew**. (required to be the only crew member that has attained 60 years = old rule not in effect anymore but still one question in database)
- **Age 65,** shall not act as a pilot of an aircraft engaged in commercial air transport.

Types of license

PPL

Minimum age – 17 years

CPL

Age – 18 years to 64 years

Privileges - act as PIC of any aircraft engaged in operations other than commercial air transport.

Requirements:

Integrated:

Minimum **150 hours** which up to **5 hours can be instrument ground time**. These 150 hours include:

(a) 80 hours of dual instruction, of which up to 5 hours may be instrument ground time;

(b) 70 hours as PIC;

(c) **20 hours of cross-country flight as PIC, including a VFR cross-country flight of at least 540 km (300 NM),** in the course of which full stop landings at two aerodromes different from the aerodrome of departure shall be made;

(d) **5 hours flight time shall be completed at night,** comprising 3 hours of dual instruction, which shall include at least 1 hour of cross-country navigation and **5 solo take-offs and 5 solo full stop landings;**

(e) **10 hours of instrument flight instruction, of which up to 5 hours may be instrument ground time** in an FNPT I, FTD 2, FNPT II or FFS. An applicant holding a course completion certificate for the Basic Instrument Flight Module shall be credited with up to 10 hours towards the required instrument instruction time. Hours done in a BITD shall not be credited;

(f) 5 hours to be carried out in an aeroplane certificated for the carriage of at least four persons that has a variable pitch propeller and retractable landing gear.

Modular:

Minimum **200 hours** flight time, including at least:

(a) **100 hours as PIC**, of which **20 hours of cross-country flight as PIC, which shall include a VFR crosscountry flight of at least 540 km (300 NM)**, in the course of which full stop landings at two aerodromes different from the aerodrome of departure shall be made;

(b) **5 hours of flight time shall be completed at night**, comprising 3 hours of dual instruction, which shall include at least 1 hour of cross-country navigation **and 5 solo take-offs and 5 solo full stop landings**;

(c) **10 hours of instrument flight instruction, of which up to 5 hours may be instrument ground time** in an FNPT I, or FNPT II or FFS. An applicant holding a course completion certificate for the Basic Instrument Flight Module shall be credited with up to 10 hours towards the required instrument instruction time. Hours done in a BITD shall not be credited;

(d) 6 hours of flight time shall be completed in a multi-engine aeroplane, if a multi-engine aeroplane is used for the skill test.

(e) Hours as PIC of other categories of aircraft may count towards the 200 hours flight time, in the following cases:

(i) 30 hours in helicopter, if the applicant holds a PPL(H); or

(ii) 100 hours in helicopters, if the applicant holds a CPL(H); or

(iii) 30 hours in TMGs or sailplanes; or

(iv) 30 hours in airships, if the applicant holds a PPL(As); or

(v) 60 hours in airships, if the applicant holds a CPL(As)

MPL

An applicant for a first class or type rating on a single-pilot multi-engine aeroplane shall have completed at least **70 hours as PIC on aeroplanes**.

ATPL

Age – 21 years to 64 years

Privileges – act as **PIC of aircraft engaged in commercial air transport** and **exercise** all the privileges of the holder of an **LAPL, a PPL and a CPL.**

Requirements:

Minimum **1500 hours**. including at least:

(1) 500 hours in multi-pilot operations on aeroplanes;

(2)(i) 500 hours as PIC under supervision; or

(ii) 250 hours as PIC; or

(iii) **250 hours, including at least 70 hours as PIC, and the remaining as PIC under supervision**;

(3) **200 hours of cross-country flight time** of which at least **100 hours shall be as PIC or as PIC under supervision**;

(4) **75 hours of instrument time** of which **not more than 30 hours may be instrument ground time**; and

(5) **100 hours of night flight as PIC or co-pilot.**

Of the 1 500 hours of flight time, **up to 100 hours may be simulator**. Of these 100 hours, only a **maximum of 25 hours may be completed in an FNPT**.

Applicants for an ATPL(A) shall **pass a skill test** to demonstrate the **ability to perform, as PIC of a multi-pilot aeroplane under IFR.**

Flight Instructor (FI)

Minimum age – 18 years

Privileges – Conduct flight instruction for the **issue of: a PPL, SPL, BPL and LAPL** in the appropriate aircraft category; a **CPL in the appropriate aircraft category,** provided that the **FI has** completed **at least 500 hours** of flight time as a pilot on that aircraft category, **including at least 200 hours of flight instruction**;

Requirements:

Hold at least the licence and, where relevant, the rating for which flight instruction is to be given; **Hold** at least a **CPL(A)** or **hold** at least **a PPL(A) and have met the requirements for CPL theoretical knowledge and at least 200 hours flight time.**

Examiner

An examiner certificate shall be **valid for 3 years.**

Ratings

Validity of ratings start counting from the date of issue

Instrument Rating

Validity 1 year.

If Expiry for longer than 7 years: the applicant should undergo the full training course for the issue of the IR.

Requirements:

Have completed at least **50 hours cross-country flight time as PIC**, of which **at least 10 shall be in the relevant category**

To **exercise functions of Instrument Rating (IR)** in **multi-engines aeroplanes**, the applicant shall prove capability to pilot such aircraft in instrument rules and an engine INOP or simulated INOP.

Type Rating

Validity 1 year.

Type ratings shall be established for any type of aircraft considered necessary

Multi-crew co-operation (MCC) needs to be completed in order to obtain the first type-rating on multi-pilot aeroplanes.

If Expiry longer than 3 years: the applicant should again undergo the training required for the initial issue of the rating or, in case of helicopter, the training required for the 'additional type issue', according to other valid ratings held.

Class Ratings

Required for **SEP and MEP aeroplanes** and **Touring Motor Gliders (TMG).**

Single-pilot, single-engine class ratings are valid for 2 years. The rest is 1 year.

Part-MED

Document is **about medical fitness requirements for pilots and medical certificates**

Validity of certificate start counting from the date the medical assessment is issued.

Types of certificate

- ### Class 1 Medical Certificate

  Valid for **12 months until age of 60** (40 if engaged in single-pilot commercial air transport) and **thereafter 6 months.**

  Applicant for and holders of **CPL, MPL or ATPL** shall hold **class 1**

  For a Class 1 Medical Certificate, only the authority can remove limitations

- ### Class 2 Medical Certificate

  Valid for **60 months (5 years) until age of 40**, **24 months** between **age of 40 and 50**, **12 months after age of 50.**

  Applicant for and holders of **PPL** shall hold **class 2**

- ### LAPL Medical Certificate

Decrease in Medical Fitness

Licence holders shall not exercise their license at any time when they:

- are aware of any decrease in their medical fitness which might render them unable to safely exercise their function;
- take or use any prescribed or non-prescribed medication which is likely to interfere with the safe exercise the applicable licence; (**psychoactive substance, ANAC)**
- receive any medical, surgical or other treatment that is likely to interfere with flight safety.

The holder of a medical certificate shall, without undue delay (asked in ANAC), seek advice from an authorized medical examiner (AME) when:

- have undergone a surgical operation or invasive procedure;
- **have commenced the regular use of any medication; (asked in ANAC)**
- have suffered any significant personal injury involving incapacity to function as a member of the flight crew;
- have been suffering from any significant illness involving incapacity to function as a member of the flight crew;
- are pregnant;
- have been admitted to hospital or medical clinic;
- **first require correcting lenses. (asked in ANAC)**

Authority doesn't have to be informed if a license holder is unable to perform the flight crew functions due to illness unless suffering from any illness involving **incapacity to function as a member of the flight crew for a period of at least 21 days.**

Deferment of Medical Examination

Pilot operating in an area distant from designated medical examination facilities **may be deferred at the discretion of the Licensing Authority**, provided that such deferment shall only be made as an exception and **shall not exceed**:

- a **single period of six months** in the case of a flight crew member of an **aircraft engaged in non-commercial operations; (asked in ANAC)**
- **two consecutive periods** each of **three months** in the case of a flight crew member of an **aircraft engaged in commercial operations;**
- in the case of a **private pilot, a single period not exceeding 24 months.**

Rules of the Air

Definitions

Pilot-in-command - The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and **charged with the safe conduct of a flight.** **(asked in ANAC)**

Flight visibility - The visibility forward from the cockpit of an aircraft in flight. **(asked in ANAC)**

Ground visibility - The visibility at an aerodrome as reported by an accredited observer or by automatic systems. **(asked in ANAC)**

Special VFR flight - A VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC. **(asked in ANAC)**

Danger area - An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. **(asked in ANAC)**

Restricted area - An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Prohibited area - An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Coordinated Universal Time (UTC) shall be used and shall be **expressed in hours and minutes** and, when required, **seconds** of the 24-hour day beginning at midnight. **(asked in ANAC)**

Applicability of the Rules of the Air

The rules of the air shall apply to aircraft bearing the nationality and registration marks of a Contracting State, **wherever they may be**, to the extent that they do not conflict with the rules published by the State having jurisdiction over the territory overflown.

Over the high seas these rules apply without exception.

Example:

- UK registered aircraft over the UK - UK rules apply
- UK registered aircraft over France - French and UK rules apply (French have priority)
- UK registered aircraft over the high seas - ICAO rules apply without exception

The **operation of an aircraft** either in flight or on the movement area of an aerodrome shall be in **compliance with the general rules** and, in addition, when in flight, either with:

- the **visual flight rules (VFR)** during VMC only; or
- the **instrument flight rules (IFR)** during VMC or IMC

VMC Criteria Classes A, B, C, D and E Airspace:

At and above 10 000 ft (FL100) the flight visibility requirement is 8 km with 300 m (1000 ft) vertically, and 1500 m horizontally from cloud.

Below 10 000 ft (FL100) the flight visibility requirement is reduced to 5 km.

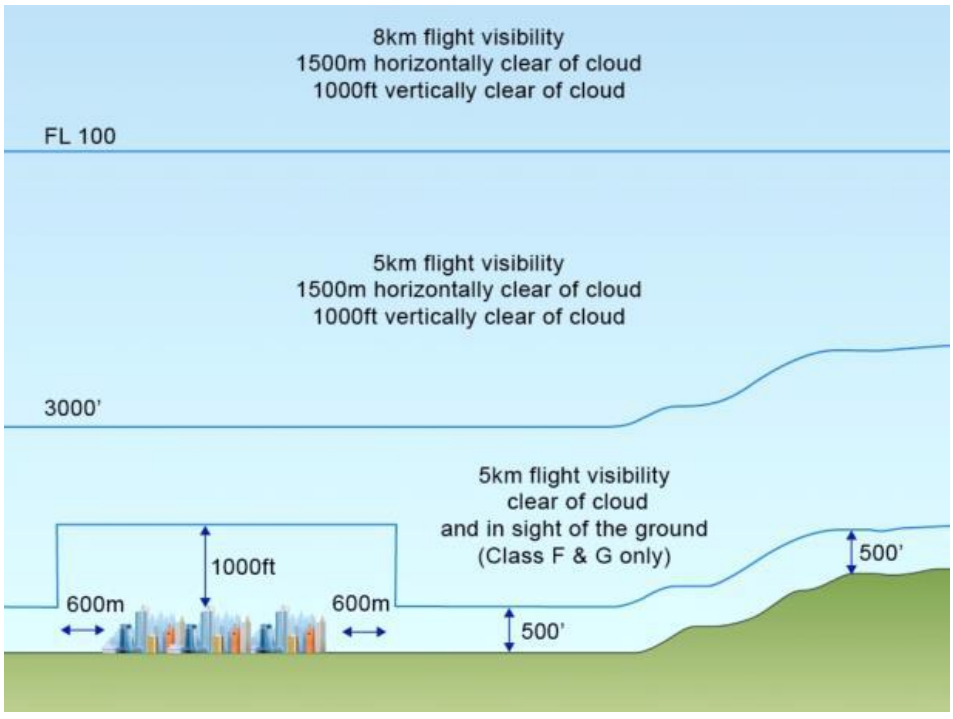
The VMC minima in Class A airspace are included for guidance, **not requirements**, to pilots and do not imply acceptance of VFR flights in Class A airspace.

VMC Criteria Classes F and G Airspace:

At and above 10 000 ft (FL100) the flight visibility requirement is 8 km with 300 m (1000 ft) vertically, and 1500 m horizontally from cloud.

Below 10 000 ft (FL100) but above 3000 ft, the flight visibility requirement is reduced to 5 km.

At and below 3000 ft AMSL or 300 m (1 000 ft) above terrain, **whichever is higher**, the flight visibility remains 5 km but VMC would exist if the aircraft was clear of cloud and within sight of the surface.



Responsibility of pilot-in-command

The **pilot-in-command** of an aircraft shall, whether manipulating the controls or not, be **responsible for the operation of the aircraft in accordance with the rules of the air**. He shall have **final authority** as to the **disposition of the aircraft while in command**. **(asked in ANAC)**

The Rules of the Air may only be broken if absolutely necessary in the interests of flight safety. (asked in ANAC)

Pre-flight action

Before beginning a flight, the pilot-in-command of an aircraft shall become familiar with all available information appropriate to the intended operation. Pre-flight action for flights away from the vicinity of an aerodrome, and for all IFR flights, shall **include a careful study of available current weather reports and forecasts**, **taking into consideration fuel requirements** and an **alternative course of action if the flight cannot be completed as planned**. **(asked in ANAC)**

Problematic use of psychoactive substances

As stated in Part-MED, **no person** whose function is critical to the safety of aviation (safety-sensitive personnel) **shall undertake that function while under the influence of any psychoactive substance**, by reason of which **human performance is impaired.** No such person shall engage in any kind of problematic use of substances.

General Rules

Minimum Heights

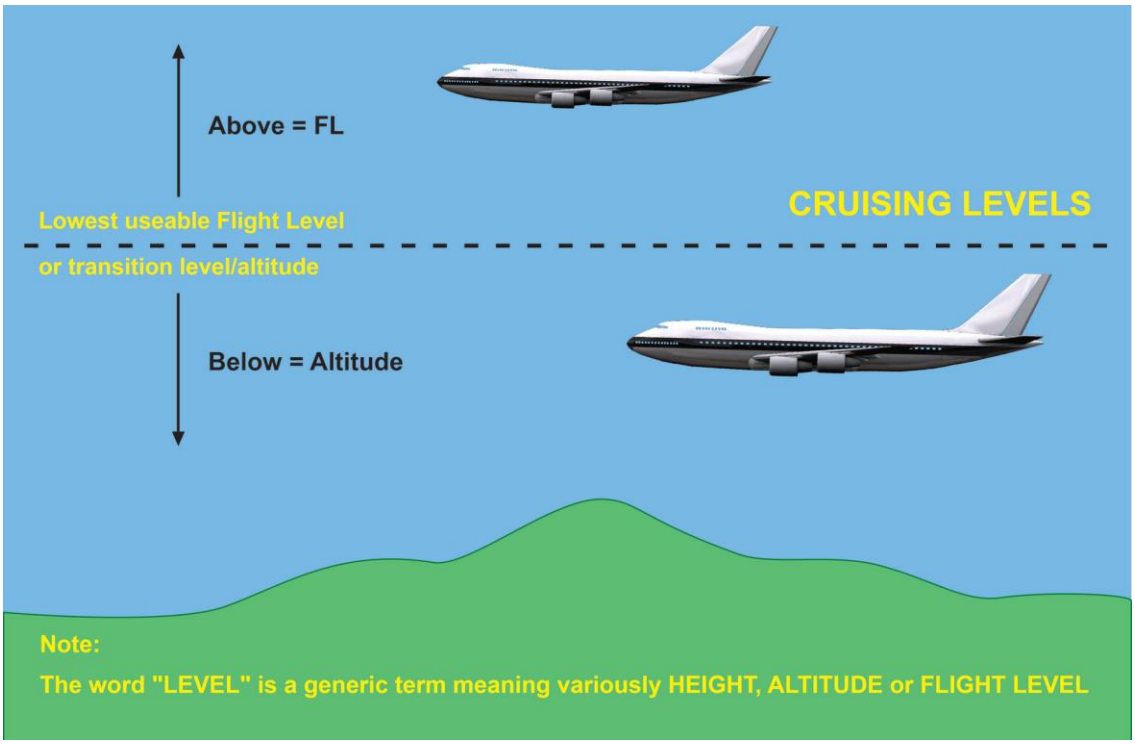
Except when necessary for take-off or landing, or except by permission from the appropriate authority, **aircraft shall not be flown over the congested areas of cities**, towns or settlements or over an open-air assembly of persons, **unless at such a height as will permit, in the event of an emergency arising, a landing to be made without undue hazard** to persons or property on the surface. **(asked in ANAC)**

Note.— *Minimum heights for VFR flights and minimum levels for IFR flights will be studied later.*

Cruising levels

For flights **at or above the lowest usable flight level** or where applicable, above the transition altitude, flights shall be conducted in terms of **flight levels**.

For flights below the lowest usable flight level or where applicable, **at or below the transition altitude**, flights shall be conducted in terms of **altitude**.



Avoidance of collisions

An aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard. The aircraft that has the right-of-way shall **maintain** its **heading and speed**. **(asked in ANAC)**

Aircraft which are obliged to give way are to do so and avoid passing over, under or in front of the other unless it is well clear, and to take into account the effect of wake turbulence.

Approaching Head On

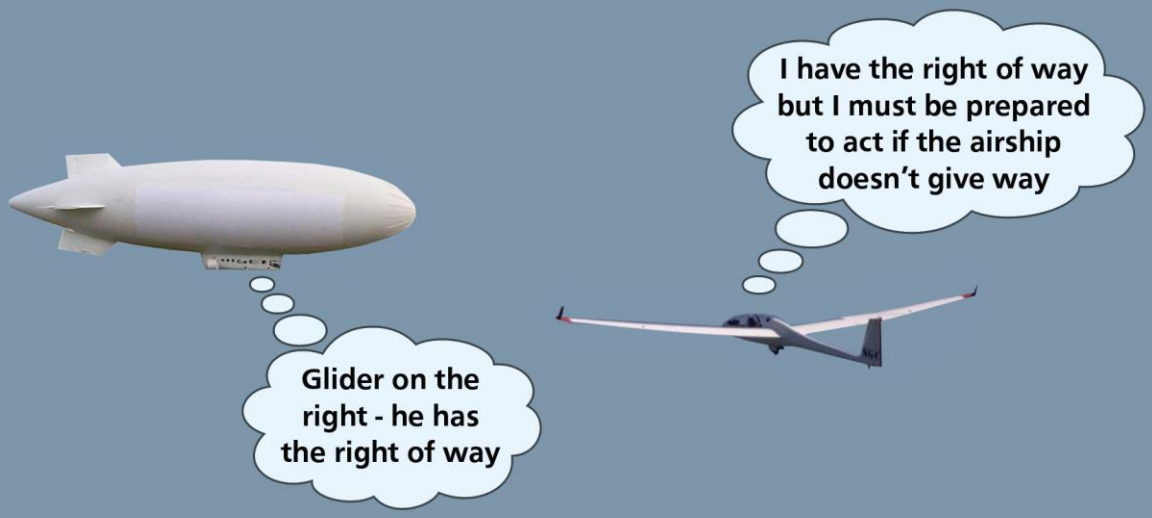
When **two aircraft are approaching head on**, and there is a danger of collision, **each shall alter course to the right**. **(asked in ANAC)**

Converging

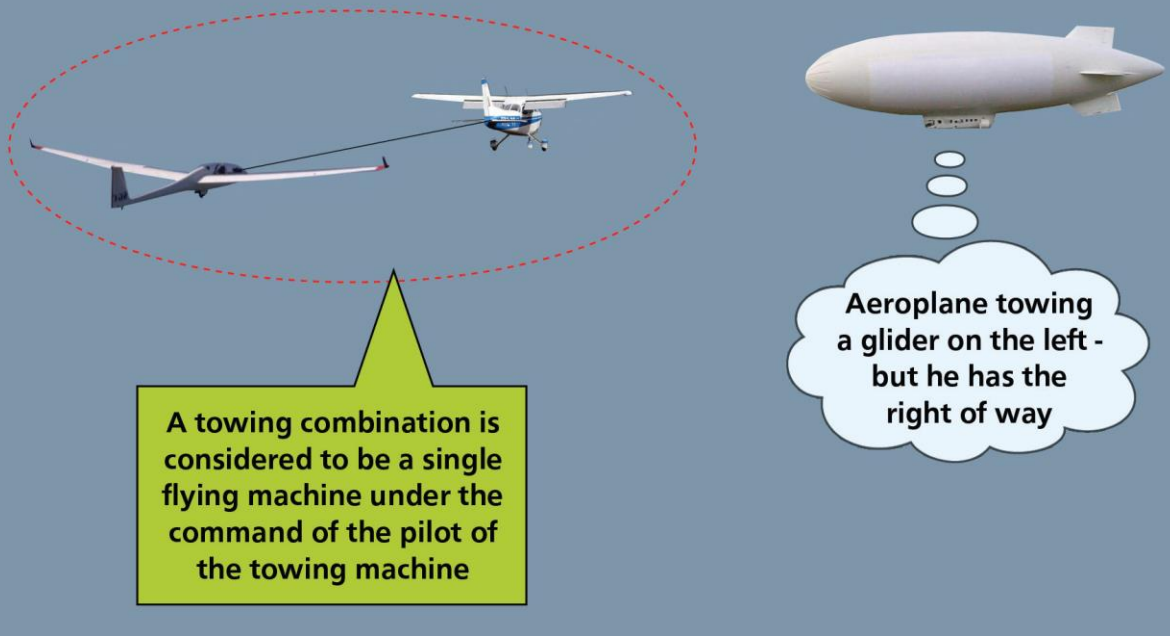
When two aircraft are converging at approximately the same level, **the aircraft that has the other on its right shall give way (Mnemonic: it is the same in the road with cars)**, except as follows:

- **power-driven heavier-than-air aircraft shall give way to airships, gliders and balloons;**
- airships shall give way to gliders and balloons;
- gliders shall give way to balloons;
- power-driven aircraft shall give way to aircraft which are seen to be towing other aircraft or objects.

Powered aircraft must give way to non-powered



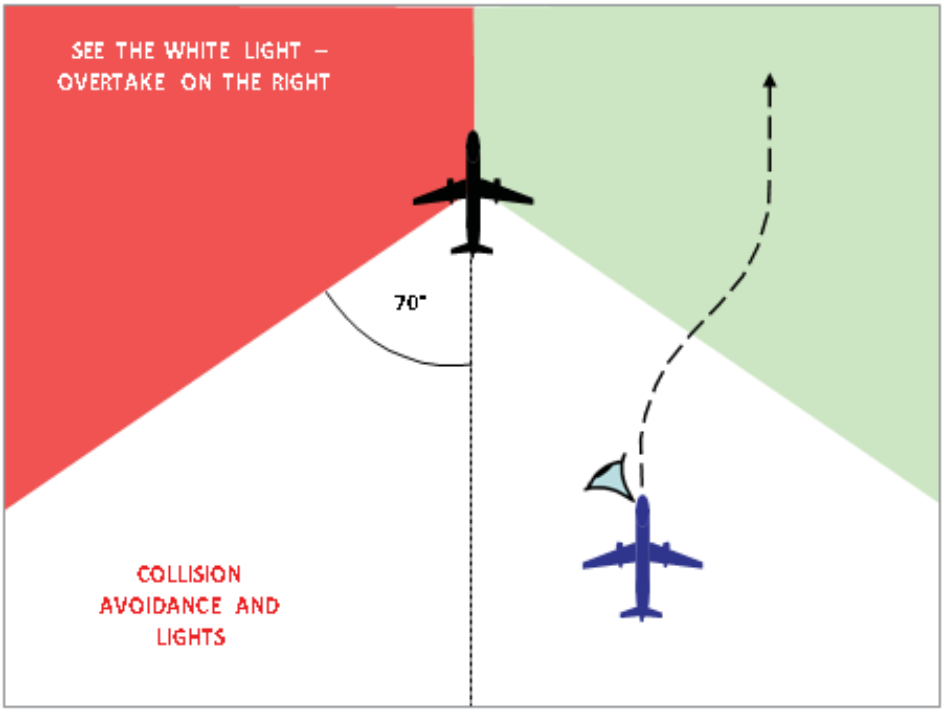
Power driven aircraft shall give way to aircraft which are seen to be towing other aircraft or objects



Overtaking

An overtaking aircraft is **an aircraft that approaches another from the rear on a line forming an angle of less than 70 degrees with the plane of symmetry of the latter** (at night the approaching aircraft would see the white tail light of the aircraft in front). **(asked in ANAC)**

An **aircraft that is being overtaken has the right-of-way** and the overtaking aircraft, whether climbing, descending or in horizontal flight, shall keep out of the way of the other aircraft by **altering its heading to the right**, and maintain this position with regard to the other aircraft until well clear.



Landing

An **aircraft in flight, or operating on the ground** (or water), **shall give way to aircraft landing** or in the final stages of an approach to land (see definition).

When two or more heavier than air aircraft are approaching an aerodrome to land, the aircraft at the higher level shall give way to the aircraft at the lower level, but the lower aircraft must not take advantage of this rule to 'cut in' in front of another aircraft.

In any event, power driven heavier than air aircraft shall give way to gliders. (asked in ANAC)

Emergency Landing

An aircraft that is aware that another aircraft is in an emergency and is compelled to land, shall give way to that aircraft.

Taking Off

An **aircraft taxiing** on the manoeuvring area **shall give way to aircraft taking off or about to take off.**

Surface movement of aircraft

In case of danger of collision between two aircraft taxiing on the movement area of an aerodrome the following shall apply:

- when **two aircraft are approaching head on**, or approximately so, **each shall stop or where practicable alter its course to the right** so as to keep well clear; **(asked in ANAC)**
- when two aircraft are on a converging course, **the one which has the other on its right shall give way**;
- an **aircraft which is being overtaken by another aircraft shall have the right-of-way** and the overtaking aircraft shall keep well clear of the other aircraft.

Holding points and Stop Bars

An aircraft taxiing on the manoeurvring area shall stop and hold at all runway-holding positions **unless otherwise authorized by the aerodrome control tower**.

An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted stop bars (used in poor visibility) and **may only proceed when the lights are switched off**.

Lights to be displayed by aircraft

(Asked in ANAC) From **sunset to sunrise or during any other period which may be prescribed by the appropriate authority** all aircraft in flight or moving on the movement area shall display:

- **anti-collision lights** intended to attract attention to the aircraft; and
- **navigation lights** intended to indicate the relative path of the aircraft to an observer and other lights shall not be displayed if they are likely to be mistaken for these lights.

An **aircraft being towed by night** must display the same lights that are required in flight. **(asked in ANAC)**

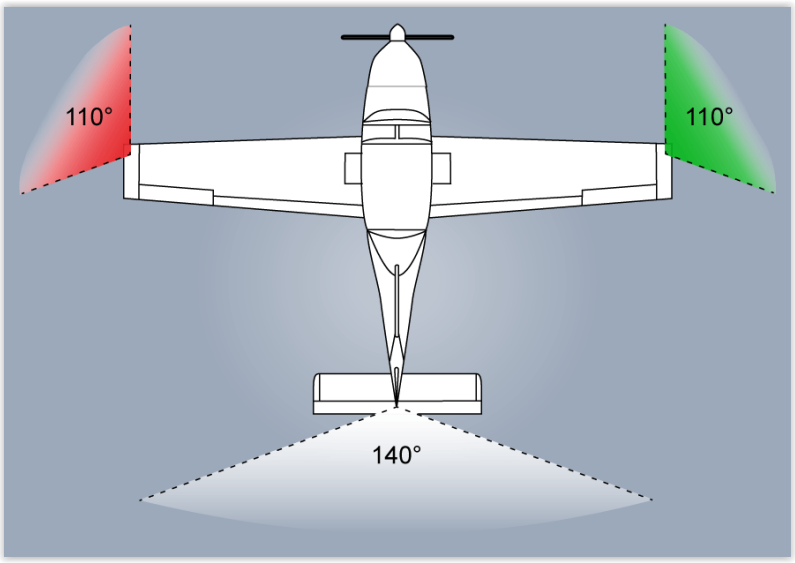
All aircraft operating on the movement area of an aerodrome shall display lights **intended to attract attention to the aircraft**.

All aircraft on the ground **as soon as engines are running shall display red anti-collision lights. (asked in ANAC)**

All **aircraft in flight which are fitted with anti-collision lights shall display the lights by day as well as by night. (asked in ANAC)**

A pilot is permitted to switch off or reduce the intensity of any flashing lights if they are likely to adversely affect the satisfactory performance of duties, or subject an outside observer to harmful dazzle.

Navigation Lights (only at night)



Port = Left in the direction of flight, **Starboard = Right** in the direction of flight

Mnemonic: sta**R**board **R**ight
Asked in ANAC

Simulated IMC

Definition - Reducing the forward visibility of the Pilot Flying (PF) so that he/she has to rely on instruments for attitude and other flight data.

The most important factor is that **simulated IMC can only be carried out in VMC.**

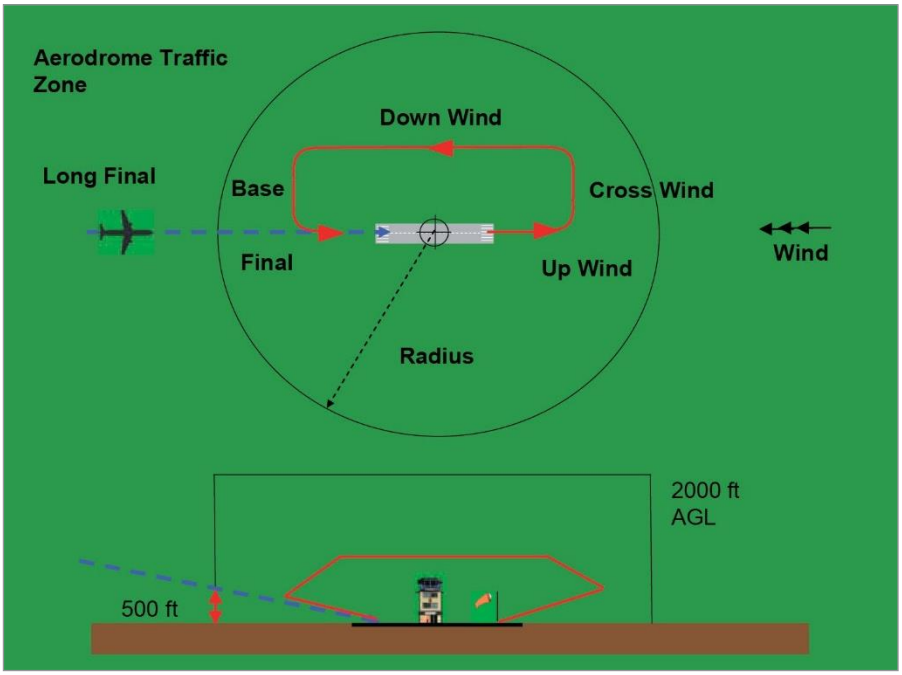
(Asked in ANAC) An aircraft shall not be flown under simulated instrument flight conditions unless:

- **fully functioning dual controls** are installed in the aircraft; and
- a **qualified pilot** occupies a control seat to **act as safety pilot** for the person who is flying under simulated instrument conditions. *(The safety pilot shall have adequate vision forward and to each side of the aircraft, or a competent observer in communication with the safety pilot shall occupy a position in the aircraft from which the observer's field of vision adequately supplements that of the safety pilot.)*

Operation on and in the vicinity of an aerodrome

(Asked in ANAC) An aircraft operated on or in the vicinity of an aerodrome shall, whether or not within an aerodrome traffic zone:

- **observe other aerodrome traffic** for the **purpose of avoiding collision**;
- **conform with or avoid the pattern of traffic** formed by other aircraft in operation;
- make all turns to the **left**, when approaching for a landing and after taking off, unless otherwise instructed;
- **land and take off into the wind unless safety**, the runway configuration, or air traffic considerations determine that a different direction is preferable.



Flight Plans

A flight plan shall be submitted prior to operating:

- any flight or portion thereof to be provided with air traffic control service;
- **any IFR flight within advisory airspace, and changes must be reported**; **(asked in ANAC)**
- any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate the provision of flight information, alerting and search and rescue services;
- any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate coordination with appropriate military units or with air traffic services units in adjacent States in order to avoid the possible need for interception for the purpose of identification;
- any flight across international borders.

A flight plan shall be submitted, before departure, to an air traffic services reporting office or, during flight, transmitted to the appropriate air traffic services unit or airground control radio station, unless arrangements have been made for submission of repetitive flight plans.

Unless otherwise prescribed by the appropriate ATS authority, a **flight plan** for a controlled flight is to be **submitted** at least **60 minutes before departure**, or if submitted in flight, at a time that will ensure its receipt by the appropriate ATSU at least **10 minutes** before the aircraft is estimated to reach the intended point of entry into a control area or advisory area; or the point of crossing an airway or advisory route. **(asked in ANAC)**

The **planned cruising speed** for the flight must be entered in the speed box of a flight plan in **true air speed (TAS) (asked in ANAC)**

If **no location indicator has been assigned** to the aerodrome insert **ZZZZ** in the box and indicate in box 18 of flight plan **DEST/ or ALTN/** (depending which has no location indicator) followed by the name of the aerdrome. **(asked in ANAC)**

Flight Rules

- I if IFR
- V if VFR
- **Y** if IFR first and then change to VFR **(asked in ANAC)** ***Mnemonic: Y (why) would you change to VFR? (VFR is less safe)***
- **Z** if VFR first and then change to IFR **(asked in ANAC)**

Repetitive Flight Plan (RPL)

A flight plan related to a series of frequently recurring, regularly operated flights with identical basic feature which are submitted by the Operator for retention and repetitive use by ATCU.

Shall **only** be used for **IFR flights** operated regularly on the **same day(s) of consecutive weeks** and on **at least 10 occasions**, or **every day over a period of at least 10 consecutive days**. There must be a high degree of stability in the elements of the flights. **(asked in ANAC)**

Closing a Flight Plan

Arrival reports made by aircraft shall contain the following elements of information:

- aircraft identification;
- departure aerodrome;
- destination aerodrome (only in the case of a diversionary landing);
- arrival aerodrome;
- time of arrival.

Note.— Whenever an arrival report is required, failure to comply with these provisions may cause serious disruption in the air traffic services and incur great expense in carrying out unnecessary search and rescue operations.

If pilot lands at different aerodrome than the specified in flight plan, he must ensure that ATS unit at the flight plan destination aerodrome is informed **30 minutes within his planned ETA**. **(asked in ANAC)**

Delays of Flight Plans

In the event of a **delay of 30 minutes** in excess of estimated off-block time (EOBT) for a **controlled flight** or a delay of **60 minutes** for an **uncontrolled flight** for which a flight plan has been submitted, the **flight plan should be amended or cancelled and a new flight plan submitted**. **(asked in ANAC)**

Clearances

In general clearances consist of 5 parts:

- Aircraft identification
- Clearance limit
- Route
- Levels
- Other instructions (time or expiry, departure manoeuvres, communications etc)

If there is any danger on the route, ATC will transmit to the pilot information about **distance and bearing** to the potential threat. **(asked in ANAC)**

An **air traffic control clearance shall be obtained prior to operating a controlled flight**, or a portion of a flight as a controlled flight. Such clearance shall be requested through the submission of a flight plan to an air traffic control unit.

Inadvertent changes to flight plan

Deviation from track: if a controlled flight inadvertently deviates from its track, action shall be taken forthwith to **adjust the heading of the aircraft** to **regain track as soon as practicable**. **(asked in ANAC)**

Variation in true airspeed: if the average true airspeed at cruising level between reporting points varies or is expected to vary by **plus or minus 5 per cent of the true airspeed (asked in ANAC)**, from that given in the flight plan, the **appropriate air traffic services unit shall be so informed.**

Change in time estimate: if the time estimate for the next applicable reporting point, flight information region boundary or destination aerodrome, whichever comes first, is found to be in error in **excess of 2 minutes (asked in ANAC, some manuals say 3, they are outdated!!)** from that notified to air traffic services, or such other period of time as is prescribed by the appropriate ATS authority or on the basis of air navigation regional agreements, a **revised estimated time shall be notified as soon as possible** to the **appropriate air traffic services unit**.

Any deviation from these requirements is to be reported to ATC. **(asked in ANAC)**

If specified, changeover from one VOR beacon to another is to be at the specified changeover point unless otherwise directed. **These are normally every 60 NM**. **(asked in ANAC on PANS-ATM unit)**

Weather deterioration below the VMC

When it becomes evident that flight in VMC in accordance with its current flight plan will not be practicable, a VFR flight operated as a controlled flight shall:

- request an amended clearance enabling the aircraft to continue in VMC to destination or to an alternative aerodrome, or to leave the airspace within which an ATC clearance is required; or
- if no clearance can be obtained, continue to operate in VMC and notify the appropriate ATC unit of the action being taken either to leave the airspace concerned or to land at the nearest suitable aerodrome; or
- **if operated within a control zone (CTR)**, **request** authorization to operate as a **special VFR flight (asked in ANAC)**; or
- request clearance to operate in accordance with the instrument flight rules.

Position Reports

Unless advised to cease position reporting (this usually happens when under radar control), a controlled flight is to make reports at specified positions as soon as possible after reaching the position. The report is to contain:

- The aircraft RTF identification call sign
- The position for the report
- The time the aircraft was over the position (usually the minutes will suffice unless there is a possibility of confusion)
- The level of the aircraft when passing the point
- The next en-route reporting position
- ETA for the next specified point
- (According to ICAO) the name of the next ensuing point.

  Example: *"London Airways this is GABCD, Pole Hill at 35, FL170, Dean Cross at 46, Glasgow next"*

*Note: If **SSR mode "C"** is used, **altitude/FL may be omitted** from the position report.*

Asked in ANAC: Aircraft identification, position, time, flight level, next position and time over, ensuing significant point**)**

Termination of control

A controlled flight shall, except when landing at a controlled aerodrome, advise the appropriate ATC unit as soon as it ceases to be subject to air traffic control service.

Communications Failure

An aircraft operated as a controlled flight shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and establish two-way communication as necessary with, the appropriate air traffic control unit, except as may be prescribed by the appropriate ATS authority in respect of aircraft forming part of aerodrome traffic at a controlled aerodrome.

Confirmation of Communication Failure

ATC will confirm that an aircraft is subject to a communications failure by **requesting it to execute a specific manoeuvre which can be observed by radar or transmit a signal in order to indicate acknowledgement.**

In any case ATC will transmit blind instructions to the aircraft on frequencies on which the aircraft is believed to be listening.

Procedures

If in **visual meteorological conditions (VMC)** regardless of flight rules (VFR or IFR), the aircraft shall:

- **continue to be flown in VMC, landed at the nearest suitable aerodrome and report arrival by the most expeditious means to the appropriate ATCU**. **(asked in ANAC)**

If in **instrument meteorological conditions (IMC)**, the aircraft shall:

- **When being radar vectored proceed in the most direct manner to rejoin the current flight plan route (asked in ANAC, if ATC gives you heading and you lose comms you return in the most direct manner)** and no later than the next significant point **squawking A7600** and taking into consideration the applicable minimum flight altitude.
- If the aircraft is en-route and **in** an area where **radar control** is provided, the pilot is to **squawk A7600 (asked in ANAC)** and maintain the current speed and level for a **period of 7 minutes (asked in ANAC)** and thereafter adjust speed and level in accordance with the filed flight plan.
- If the aircraft is en-route **outside** of an area where **radar control** is provided, the pilot is to maintain the current speed and level for a **period of 20 minutes (asked in ANAC)** following the aircraft's failure to report over a compulsory reporting point (at that point the ATCO will know that there is a communication problem), and thereafter adjust level and speed in accordance with the filed flight plan. *(The 20 minutes is to allow the ATCO time to resolve any potential conflictions that may arise during the transition to the filed flight plan profile.)*

After compliance with the above the pilot is to proceed as follows:

- **Continue according to the filed flight plan route to the appropriate designated navigation aid serving the destination aerodrome** and, when required to ensure compliance with procedure below, **hold over this aid until commencement of descent**.
- **Commence descent at the expected approach time (EAT) or, if no EAT has been received, as close as possible to the estimated time of arrival (ETA) resulting from the current flight plan (asked in ANAC)**
- Complete a normal instrument approach procedure as specified for the designated aid; and **land, if possible, within 30 minutes after the ETA or the last acknowledged EAT, whichever is the later**. **(asked in ANAC)**
- Report to ATC as soon as possible after landing.

Unlawful Interference

An aircraft which is being subjected to unlawful interference shall endeavour to notify the appropriate ATS unit of this fact, any significant circumstances associated therewith and any deviation from the current flight plan necessitated by the circumstances, in order to enable the ATS unit to give priority to the aircraft and to minimize conflict with other aircraft.

If aircraft is subjected to unlawful interference, the **pilot-in-command shall attempt to land as soon as practicable at the nearest suitable aerodrome** or at a dedicated aerodrome assigned by the appropriate authority unless considerations aboard the aircraft dictate otherwise.

• PIC should attempt to continue flying on the assigned track and at the assigned cruising level at least until able to notify an ATS unit or until within radar or ADS-B coverage

• If forced to depart from assigned track/level, without being able to notify ATC, the PIC should, if possible:

- **attempt to broadcast warnings on the VHF channel in use or the VHF emergency frequency**, and other appropriate channels, unless considerations aboard the aircraft dictate otherwise. Other equipment such as on-board transponders and data links should also be used when it is advantageous to do so and circumstances permit (i.e. SSR - **squawk A/7500**, data links etc...); and
- proceed in accordance with procedures established and promulgated in the **Regional Supplementary Procedures (Doc 7030);** or
- if no applicable regional procedures have been established, **proceed at a level which differs from the cruising levels normally used for IFR** flight by:
    - **150 m (500 ft)** in an area where a **vertical separation minimum of 300 m (1 000 ft)** is applied; or
    - **300 m (1 000 ft)** in an area where a **vertical separation minimum of 600 m (2 000 ft)** is applied.

Signals

Distress

Definition - An aircraft (or vessel) is in grave and imminent danger and requests immediate assistance.

- A distress message is preceded by the word **MAYDAY** repeated 3 times.
- Visual signals from an aircraft in distress may include:
  - A succession of RED pyrotechnics
  - A **RED parachute flare (asked in ANAC, in SAR)**

Urgency

Definition - An aircraft has an urgent message to transmit concerning the safety of a ship, aircraft, vehicle or other property of a person on board or within sight.

An urgency message is preceded by the words **PAN PAN** repeated 3 times.

The following signals, used either together or separately, mean that an **aircraft wishes** to give notice of difficulties which compel it to **land without requiring immediate assistance**:

- the **repeated switching on and off of the landing lights (asked in ANAC)**; or
- the repeated switching on and off of the navigation lights in such manner as to be distinct from flashing navigation lights.

SSR/Squawk

Code **7700**. This is the civil emergency code and is used unless a specific identification code has been allocated by a radar controller and the aircraft has been identified.

Code **7600**. This is the squawk to indicate radio failure and should be used at all times when a failure occurs regardless of the ATC service being provided.

Code **7500**. This code indicates unlawful interference. Its use does not imply that the fact is being generally advertised. Discretion and confidentiality will be preserved by the ATC authority until the pilot mentions the fact by RTF. A pilot may prefer to use the 7700 squawk to indicate the severity of the situation.

(Asked in ANAC. Mnemonic: 77 go to heaven, 76 radio fix, 75 man with knife)

Code 7000. This code indicates that the aircraft is operating in an area where a radar service is available from an ATCU but the aircraft is not in receipt of the service. It implies that the aircraft is operating under VFR.

Code 2000. This code is used to indicate that an aircraft is entering an area where a radar service is available and will be requesting that service. Usually used by aircraft entering a domestic FIR from an Oceanic control area.

Code 0000. This code is reserved to indicate that the aircraft transponder is in some manner unserviceable or inaccurate.

Visual Warning of Incursion

By day and night; a series of **projectiles discharged** from the ground at intervals of 10 secs, each **showing** on bursting **red and green lights** or stars, are used to **warn aircraft that they are flying in or about to enter restricted, prohibited or danger areas**. **(asked in ANAC)**

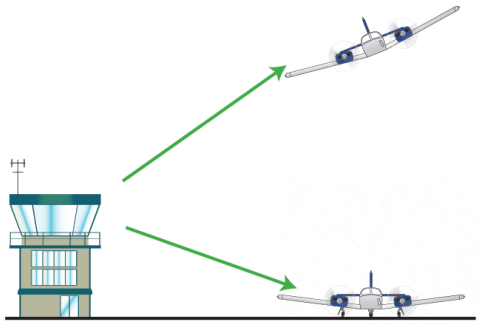
Aerodrome Traffic

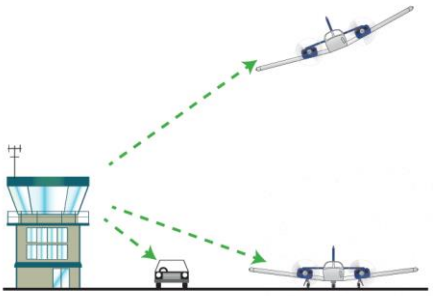
Non-radio traffic on or in the vicinity of an aerodrome is to keep a good look out for visual signals from ATC. Aeroplanes with radios are also to comply with instructions given visually. The lamp used by ATC to communicate (Aldis lamp) is directional with a narrow beam **If you see a signal light from the tower, you must assume that it is meant for you.**

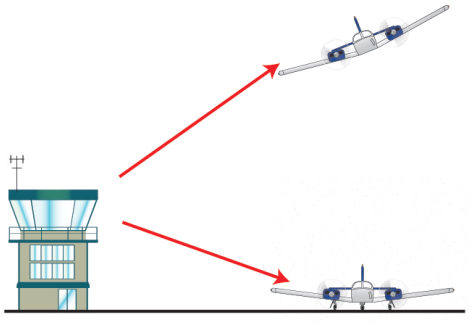
Light and pyrotechnic signals

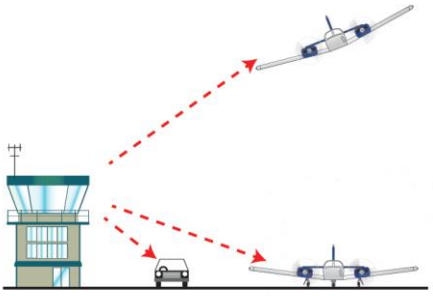
Light	From Aerodrome Control to:	
	Aircraft in Flight	Aircraft on the Ground
Steady Green	**Cleared to land**	**Cleared for take-off**
Steady Red	**Give way to other aircraft and continue circling**	**Stop**
Green flashes	**Return for landing** and await landing clearance	**Cleared to taxi**
Red flashes	**Aerodrome unsafe, do not land**	**Vacate the landing area in use**
White flashes	Land at this aerodrome after receiving clearance to land and then proceed to the apron	Return to the starting point on the aerodrome
Red pyrotechnic (flare)	**Notwithstanding any previous instructions, do not land for the time being**	

Notes: *1. Lights in* ***bold****, are* ***asked in ANAC (you should know all of these, it is easy :D)***

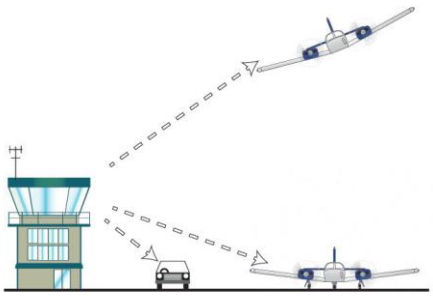
Signal		Meaning
Steady green.		Cleared to land. Cleared to take off.

Signal		Meaning
Green flashes.		Return for landing and await landing clearance. Cleared to taxi.

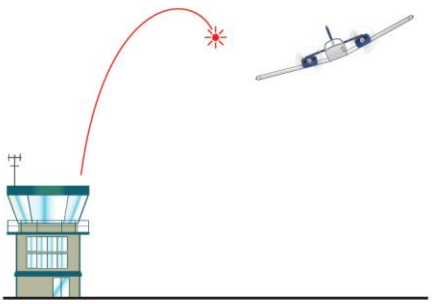
Signal		Meaning
Steady red.		Give way to other aircraft and continue circling. Stop.

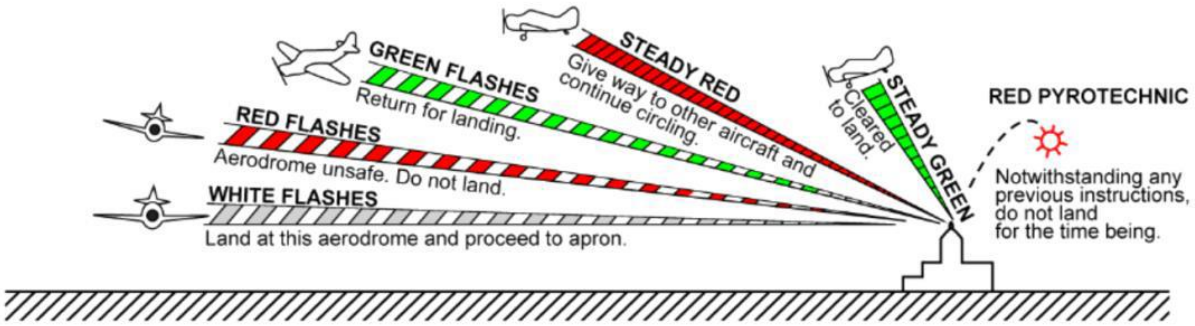
Signal		Meaning
Red flashes.		Aerodrome unsafe, do not land. Taxi clear of the landing area.

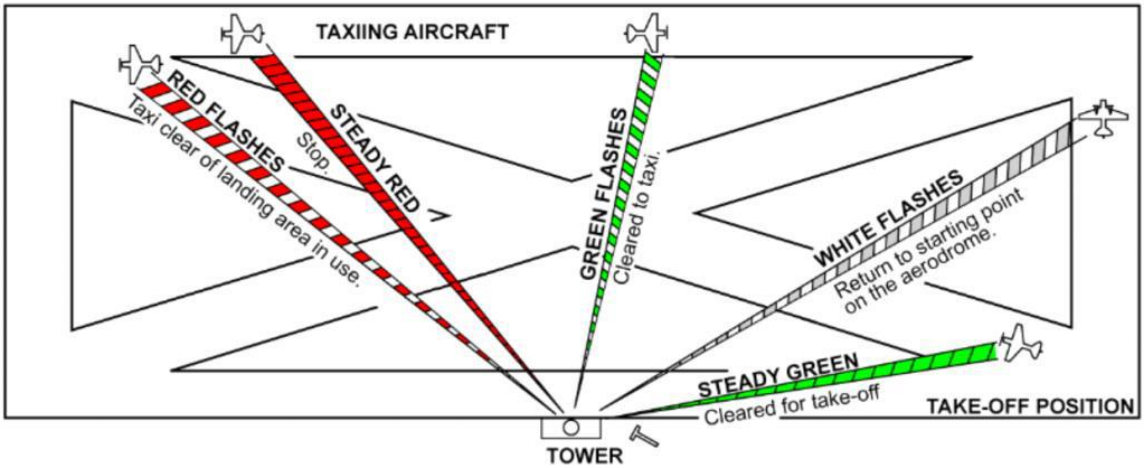
Signal	Meaning
White flashes.	Land at this aerodrome after receiving clearance to land and then proceed to the apron. Return to the starting point on the aerodrome.



Signal	Meaning
Red pyrotechnic (flare).	Notwithstanding any previous instructions, do not land for the time being.







Acknowledgement by an aircraft

a) When in flight:

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

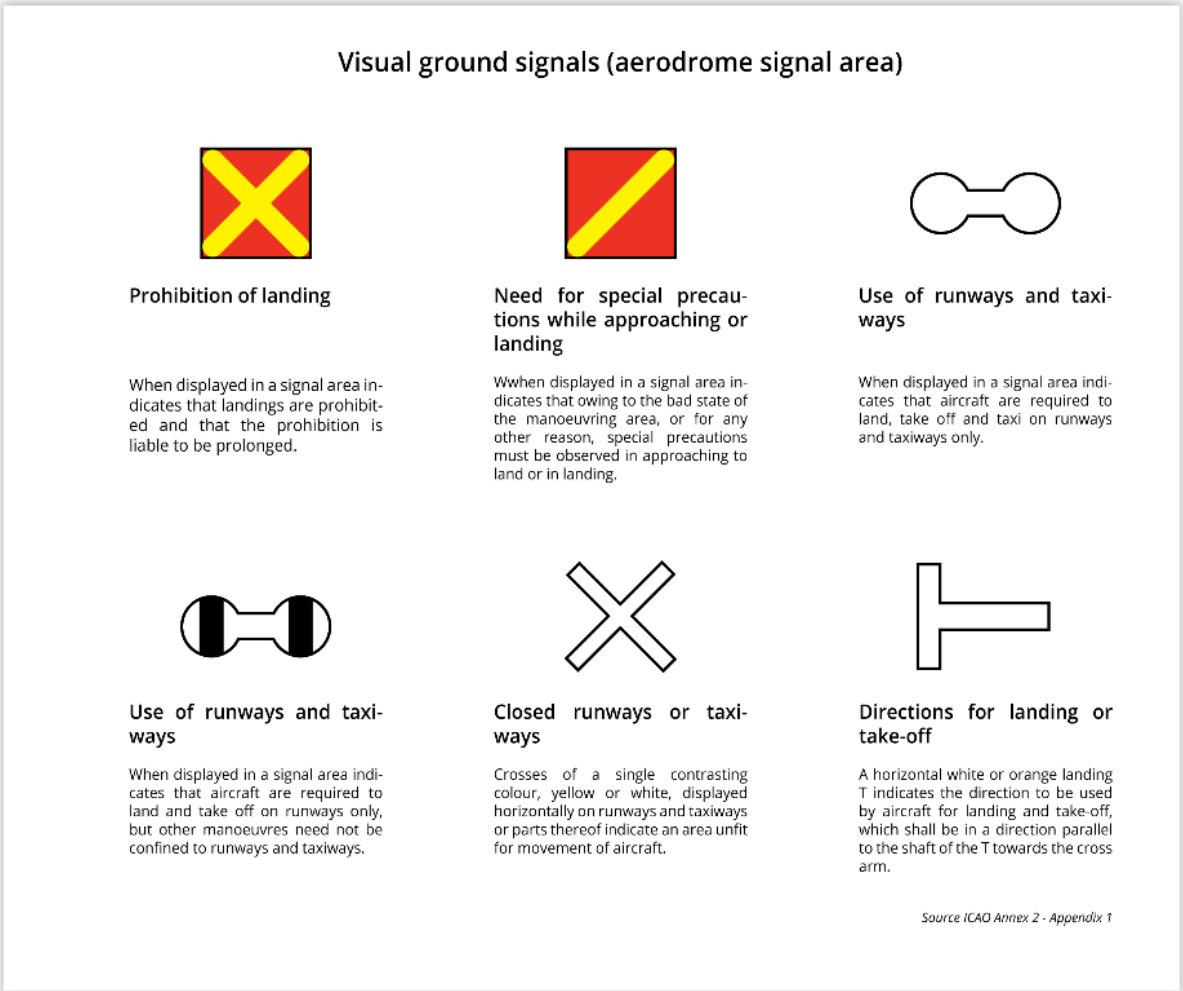
b) When on the ground:

- during the hours of daylight: — by moving the aircraft's ailerons or rudder;
- during the hours of darkness: — same as in flight.

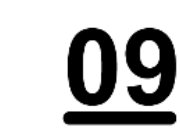
Visual Ground Signals

The following signals may be shown on an aerodrome, either in the **signal square** or at other locations on the apron or movement area. A signal square is to be **visible from the air anywhere in the vicinity of the aerodrome**.

The absence of a signal square indicates that the aerodrome is not to be used by non-radio traffic.

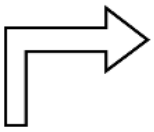


Visual ground signals (aerodrome signal area)



Directions for landing or take-off

A set of two digits displayed vertically at or near the aerodrome control tower indicates to aircraft on the manoeuvring area the direction for take-off, expressed in units of 10 degrees to the nearest 10 degrees of the magnetic compass.

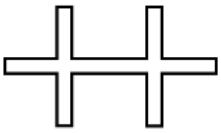


Right-hand traffic

When displayed in a signal area, or horizontally at the end of the runway or strip in use, a right-hand arrow of conspicuous colour indicates that turns are to be made to the right before landing and after take-off.

Air traffic services reporting office

The letter C displayed vertically in black against a yellow background indicates the location of the air traffic services reporting office.



Glider flights in operation

A double white cross displayed horizontally in the signal area indicates that the aerodrome is being used by gliders and that glider flights are being performed.

Source ICAO Annex 2 - Appendix 1

Marshalling signals

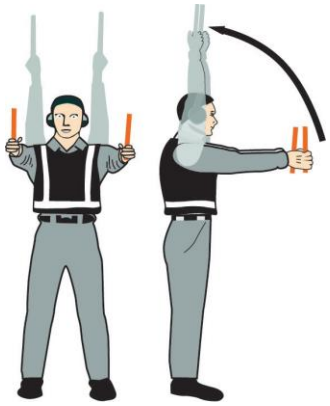
From a signalman to an aircraft

Wingwalker/guide

Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body.

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

Notes: *1. Signals in this **color**, are **asked in ANAC***

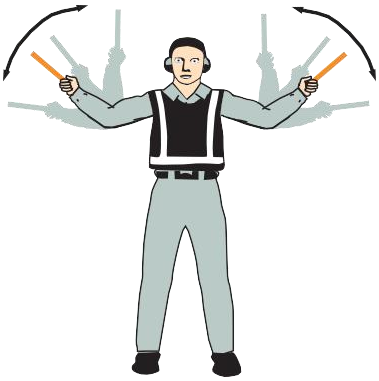


Identify gate

Raise fully extended arms straight above head with wands pointing up. **You should proceed to this gate.**

Proceed to next signalman or as directed by tower/ ground control

Point both arms upward; move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.



Straight ahead

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

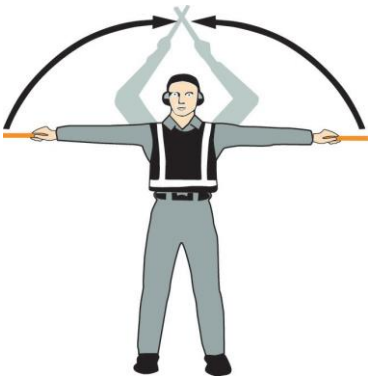
Turn left (from pilot's point of view)

With right arm and wand extended at a 90-degree angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

Notes: *1. Signals in this **color**, are **asked in ANAC***

Turn right (from pilot's point of view)

With left arm and wand extended at a 90-degree angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.



Normal stop

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

Emergency stop

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

Set brakes

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

Notes: *1. Signals in this **color**, are **asked in ANAC***

Release brakes

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

Chocks inserted

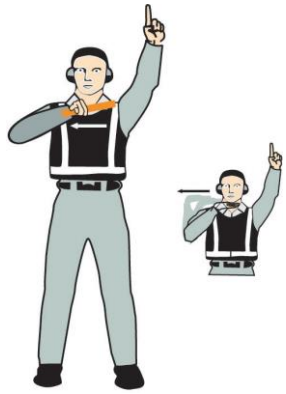
With arms and wands fully extended above head, move **wands inward in a “jabbing” motion until wands touch**. **Ensure** acknowledgement is received from flight crew.

Chocks removed

With arms and wands fully extended above head, move wands outward in a “jabbing” motion. Do not remove chocks until authorized by flight crew.

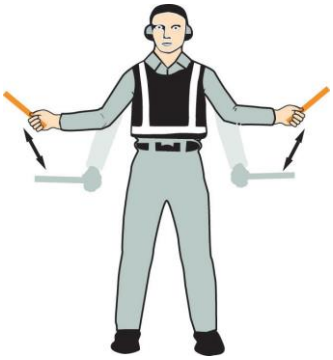
Start engine(s)

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



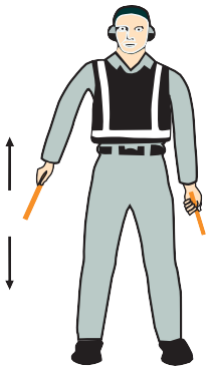
Cut engines

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



Slow down

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



Slow down engine(s) on indicated side

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

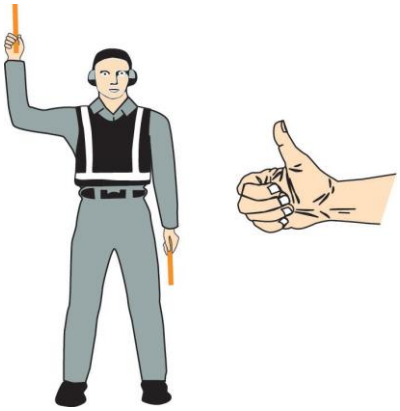
Notes: *1. Signals in this **color**, are **asked in ANAC***

Turns while backing (for tail to starboard)

Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.

Turns while backing (for tail to port)

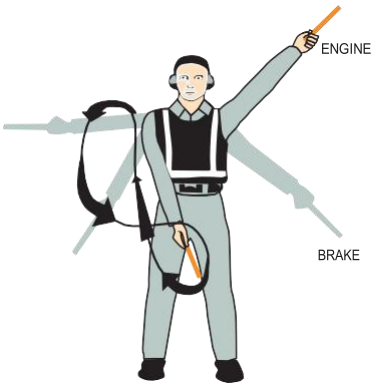
Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.



Affirmative/all clear

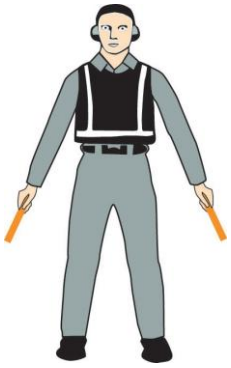
Raise right arm to head level with wand pointing up or **display hand with "thumbs up"**; left arm remains at side by knee.

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



Fire

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



Hold position/stand by

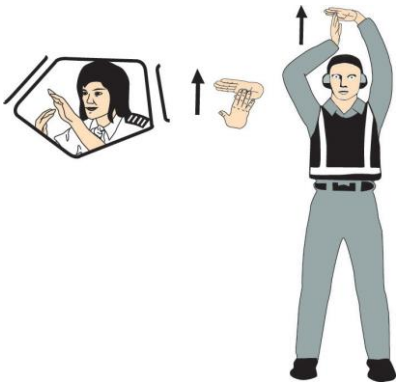
Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.

Dispatch aircraft

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

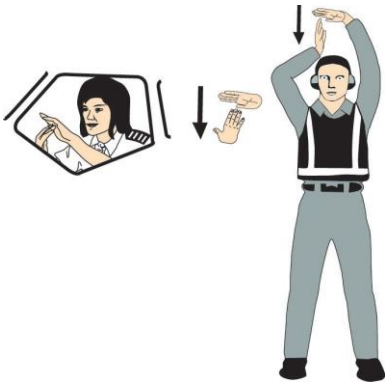
Do not touch controls (technical/servicing communication signal)

Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.



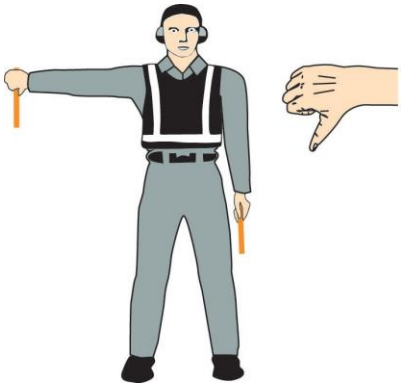
Connect ground power (technical/servicing communication signal)

Hold arms fully extended above head; open left hand horizontally and move finger tips of right hand into and touch open palm of left hand (forming a “T”). At night, illuminated wands can also be used to form the “T” above head



Disconnect power (technical/servicing communication signal)

Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a “T”); then move right hand away from the left. Do not disconnect power until authorized by flight crew. At night, illuminated wands can also be used to form the “T” above head.



Negative (technical/servicing communication signal)

Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with “thumbs down”; left hand remains at side by knee.

Establish communication via interphone (technical/ servicing communication signal)

Extend both arms at 90 degrees from body and move hands to cup both ears.

Open/close stairs (technical/servicing communication signal)

With right arm at side and left arm raised above head at a 45-degree angle, move right arm in a sweeping motion towards top of left shoulder.

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

From the pilot of an aircraft to a signalman

Brakes engaged.

Raise arm and hand with fingers extended horizontally in front of face, **then clench fist**.

Brakes released.

Raise arm with fist clenched horizontally in front of face, then extend fingers.

Insert chocks.

Arms extended palms facing outwards, **move hands inwards to cross in front of face.**

Ready to start engine indicated.

Raise the number of fingers on one hand indicating the number of the engine to be started. For this purpose the aircraft engines shall be numbered as follows, No. 1 engine shall be the port outer engine, No. 2, the port inner engine, No. 3, the starboard inner engine and No. 4, the starboard outer engine.

Remove chocks.

Hands crossed in front of face, palms facing outwards, move arms outwards.

Visual Flight Rules (VFRs)

Except when operating as a special VFR flight, **VFR flights** shall be conducted so that the aircraft is **flown in conditions equal or greater to VMC**.

(Asked in ANAC) Except when a clearance is obtained from an air traffic control unit, VFR flights shall not take off or land at an aerodrome within a control zone, or enter the aerodrome traffic zone or traffic pattern:

- when the **ceiling is less than 450 m (1 500 ft);** or
- when the **ground visibility is less than 5 km**.

Prohibition of VFR flight

VFR flights between sunset and sunrise, or such other period as may be prescribed by the appropriate ATS authority, shall be operated in accordance with the conditions prescribed by such authority.

VFR flights require an ATC clearance to operate:

- **above FL 200**; **(asked in ANAC, highest FL for VFR flight is normally this one because it doesn't need ATC clearence)**
- at transonic and supersonic speeds.

VFR is not permitted in RVSM airspace so **if RVSM applies then the upper limit would be FL290**. **(asked in ANAC)**

Except when **necessary for take-off or landing, or except by permission from the appropriate authority**, a **VFR flight shall not be flown**:

- over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a **height less than 300 m (1 000 ft) above the highest obstacle within a radius of 600 m from the aircraft**; **(asked in ANAC)**
- elsewhere, at **a height less than 150 m (500 ft) above the ground or water**. **(asked in ANAC)**

Don't forget about safety Minimum Heights studied in General Rules!

VFR Flight Levels

Except where otherwise indicated in air traffic control clearances or specified by the appropriate ATS authority, **VFR flights** in **level cruising flight** when **operated above 900 m (3 000 ft) AGL**, or a higher datum as specified by the appropriate ATS authority, **shall be conducted at a cruising level appropriate to the magnetic track** of the aircraft in accordance with the **semi-circular rule**.

VFR flights are to comply with ATC instructions:

- when operated within Classes B, C and D airspace;
- when forming part of aerodrome traffic at controlled aerodromes; or
- when operated as special VFR flights.

Communications

Controlled VFR flights and VFR flights into airspace where the ATS authority considers it advisable, are to **maintain** 2-way RTF **communication** with a controlling or monitoring ATSU and **make position reports as necessary**. In **airspace** classified as **class E, F or G, VFR flights may operate without two-way communications (non-radio)**.

Flight Plan

Estimated total time (EET) - The time put in field 16 of a VFR flight plan is the **time from take-off until arrival overhead the destination aerodrome**. **(asked in ANAC)**

An aircraft operated in accordance with the visual flight rules which wishes to change to compliance with the instrument flight rules shall:

- if a flight plan was submitted, communicate the necessary changes to be effected to its current flight plan; or
- when so required, submit a flight plan to the appropriate air traffic services unit and obtain a clearance prior to proceeding IFR when in controlled airspace.

Special VFR

As studied in definitions, SVFR is a VFR flight cleared by ATC to operate **within a CTR** in **meteorological conditions below VMC**.

It is only applicable to flights **into, out of, or within a CTR**.

Ground visibility within the CTR can't be less than 1500 m (asked in ANAC) before a SVFR flight is permitted to enter the CTR to land, take off and depart, cross or operate locally within the CTR.

Responsibility for remaining clear of obstacles on the ground **rests with pilot-in-command**. **(asked in ANAC, PANS-ATM)**

Instrument Flight Rules (IFRs)

Aircraft shall be equipped with suitable **instruments and with navigation equipment appropriate to the route to be flown**. **(asked in ANAC)**

Minimum Levels

Except when **necessary for take-off or landing, or except when specifically authorized by the appropriate authority**, an IFR flight shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:

- over high terrain or in mountainous areas, at a level which is **at least 600 m (2 000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft**; **(asked in ANAC)**
- elsewhere, at a level which is **at least 300 m (1 000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.** **(asked in ANAC)**

Change from IFR flight to VFR flight

A change of flight rules must **only be at the request of the pilot**.

Where a pilot elects to change from IFR to VFR and the flight plan was not annotated Y in field 8, the pilot is to notify the ATS authority that flight under IFR is cancelled using the phrase **"cancelling my IFR flight"** **(asked in ANAC)** and then the necessary changes to the current flight plan are to be passed.

When an aircraft operating under the instrument flight rules is flown in or encounters visual meteorological conditions it shall not cancel its IFR flight unless it is anticipated, and intended, that the flight will be continued for a reasonable period of time in uninterrupted visual meteorological conditions.

IFR within Controlled Airspace (CAS)

IFR flights within CAS are to **comply with instructions issued by the appropriate ATC unit**.

IFR flights in cruising flight shall be flown at a cruising level, or when authorized to employ cruise climb techniques, between two levels or above a level, selected from:

- The table of cruising levels of Semi-Circular Rule
- A modified table of cruising levels, if applicable, for flight above FL410 (see below).

IFR outside Controlled Airspace (CAS)

The following rules apply to IFR flights outside CAS:

Cruising Levels

IFR flights outside CAS are to be flown at cruising level appropriate to the magnetic track of the aircraft.

The first usable level must provide a **500ft margin** above **3000 ft AMSL** (first altitude where VFR cruising levels have to be appropriate to the magnetic track) and **1000ft AGL (asked in ANAC)**

Communications

IFR flights operating outside CAS **but within or into areas** or along routes designated by the authority as those **where the filing of a flight plan is required**, are to establish communication and maintain a continuous listening watch with the ATS unit providing a flight information service (FIS).

Position Reports

An IFR flight outside CAS and required to either submit a flight plan or maintain a listening watch with the unit providing an FIS, is to **make position reports**.

For flights operating off ATS routes (airways) or in a defined operating area, position reports are to be made at intervals of 1 hour after an initial report has been made, this initial report shall be made 30 minutes after leaving CAS or after commencing the controlled flight.

Where a position report is meaningless (prolonged controlled flight operations in a confined area) an 'operations normal' call is to be made at hourly intervals to prevent unnecessary activation of the alerting service.

Example: "London Control this is GADRF operations normal at 1020, 2000 ft and below. Will call again at 1120"

Semi-circular Flight Level Rules and RVSM

Tracks are specified as being either 'eastbound' or 'westbound'. **Eastbound tracks are 000°M - 179°M inclusive**, and **westbound, 180°M - 359°M inclusive**. **(asked in ANAC, if exercise gives track and heading use track, not heading and it is magnetic, not true degrees)**

Specific FLs are allocated to VFR and IFR traffic.

IFR FLs are whole thousands of feet whereas VFR levels are whole thousands plus 500ft up to FL285.

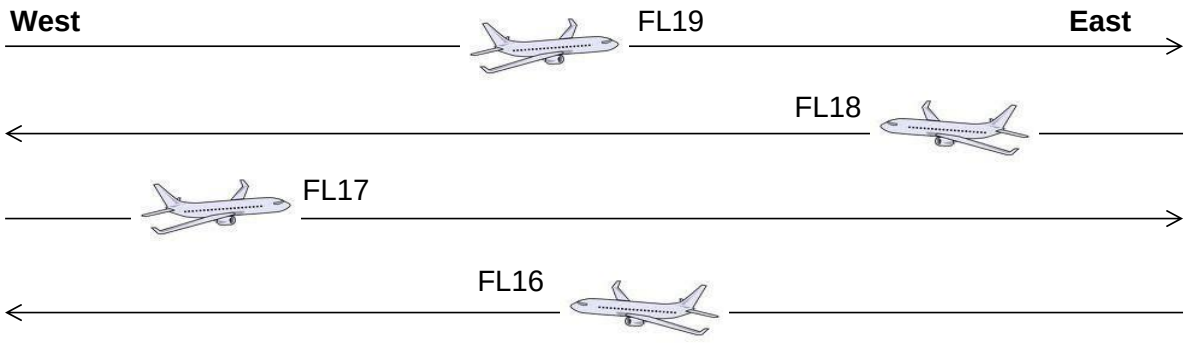
Eastbound levels are defined as **'odd'** and **westbound** as **'even'** from the first two digits of the FL number.

Normal **separation** is **1000ft between opposite tracks** and **2000ft if flying in same direction**. **(asked in ANAC)**. Above FL290, generally, the vertical separation is **2000ft between opposite tracks** and **4000ft if flying in same direction (asked in ANAC)** and IFR levels are all odd, and VFR levels are even.

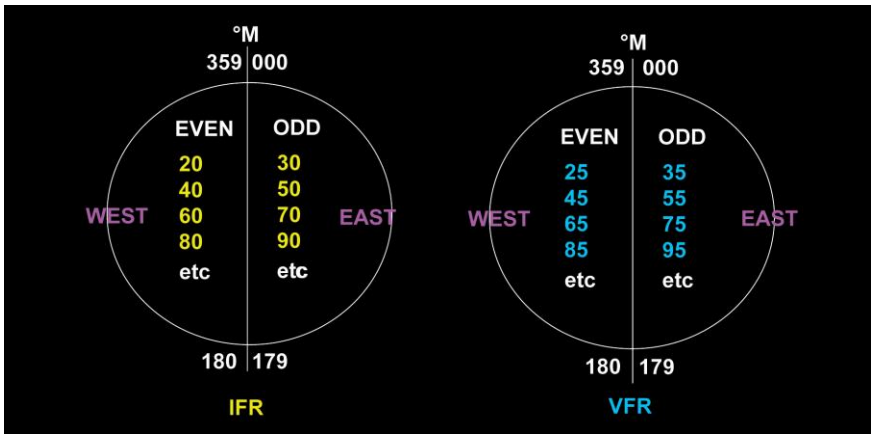
Below FL290 (1000ft separation opposite tracks)

IFR example

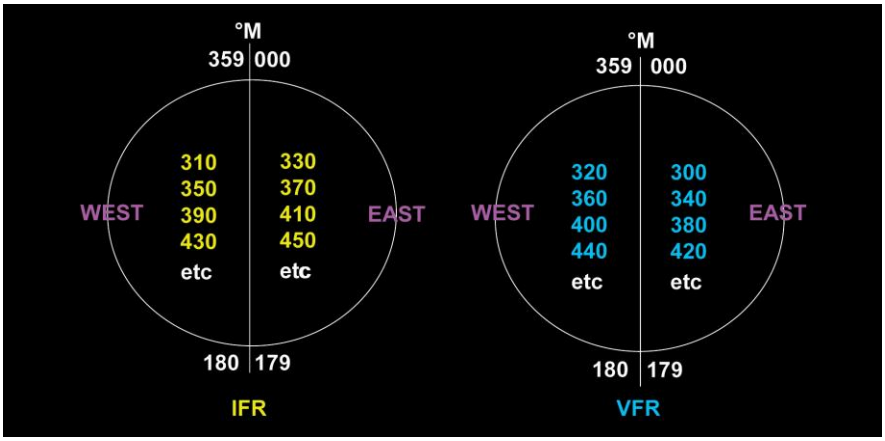
Your aircraft has track between **0°** and **179°**, your flight level or altitude must be **odd.**
Your aircraft has track between **180°** and **359°**, your flight level or altitude must be **even**



IFR and VFR (asked in ANAC)



Above FL290 (2000ft separation opposite tracks) (asked in ANAC)

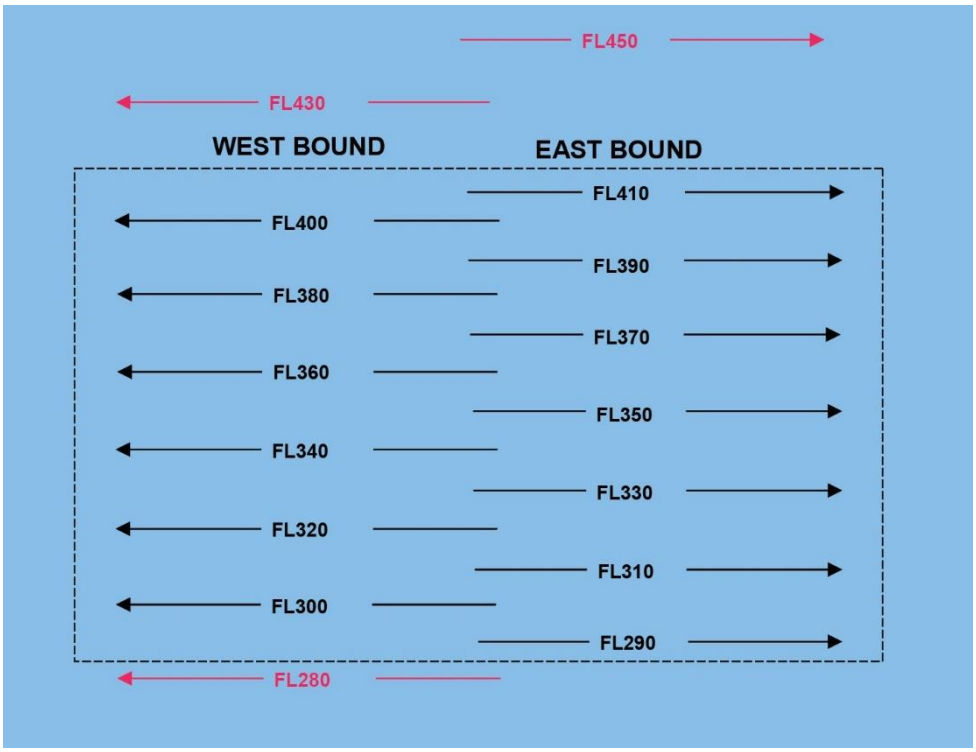


RVSM above FL290 (asked in ANAC)

In order to make more FLs available to IFR, a system has been adopted which prohibits VFR flight (thus making VFR levels available to IFR traffic).

In order to achieve this, the **separation** between IFR levels between FL290 and FL410 inclusive is **reduced from 2000ft to 1000ft (asked in ANAC)**. This is called **Reduced Vertical Separation Minima (RVSM)**. It is a requirement of aircraft using the RVSM system that they be fitted with A/TCAS and be approved by the airspace authority.

Above FL410 the altimeter errors are considered too great to continue the 1000ft separation so above FL410 2000ft separation between opposite tracks still apply.



Interception of Civil Aircraft

An aircraft which is intercepted by another aircraft shall immediately:

- follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals;
- notify, if possible, the appropriate air traffic services unit;
- attempt to establish radiocommunication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency **121.5 MHz**, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency **243 MHz**; **(asked in ANAC)**
- if equipped with SSR transponder, **select Mode A*, Code 7700**, unless otherwise instructed by the appropriate air traffic services unit. **(asked in ANAC)**
- if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.

***Students get confused and think that you have to switch from Mode C to Mode A, but that is wrong. You just change the code, it states Mode A because this is the mode that displays the code.**

Interception Phraseology

Phrases used by Intercepting Aircraft			Phrases used by Intercepted Aircraft		
Phrase		**Meaning**	**Phrase**		**Meaning**
Call sign	KOL SA-IN	What is your call sign?	Call sign	KOL SA-IN	My call sign is (call sign)
Follow	FOL-LO	Follow me	Wilco	VILL-KO	Understood will comply
Descend	DEE-SEND	Descend for landing	**Can not**	KANN NOTT	Unable to comply
You land	YOU-LAAND	Landing at this aerodrome	Repeat	REE-PEET	Repeat your instruction
Proceed	PRO-SEED	You may proceed	**Am lost**	AM LOSST	Position unknown
			Mayday	MAYDAY	I am in distress
			Hijack	HI-JACK	I have been hijacked
			Land	LAAND	I request to land at (place name)
			Descend	DEE-SEND	I require descent

Notes: *1. In the second column, the syllables to be emphasized are underlined.*

*2. Words in this **color**, are **asked in ANAC***

If **radio contact with the intercepting aircraft is established** but **communication in a common language is not possible**, attempts shall be made to convey essential information and acknowledgement of instructions by **using the phrases and pronunciations as described in table**.

If any instructions received by radio from any sources **conflict** with those given by the intercepting aircraft by visual signals or radio, the intercepted aircraft **shall request immediate clarification while continuing to comply with the instructions given by the intercepting aircraft**. **(asked in ANAC. The fighter has weapons, the controller doesn't :P)**

Signals by Intercepting Aircraft and Responses by Intercepted Aircraft

INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
DAY - Rocking wings from a position slightly above and ahead of, and normally to the left of the intercepted aircraft and, after acknowledgement, a slow level turn, normally to the left, on the desired heading. **NIGHT** - Same and, in addition, flashing navigational lights at irregular intervals. **Note 1:** Meteorological conditions or terrain may require the intercepting aircraft to take up a position slightly above and ahead of, and to the right of the intercepted aircraft and to make the subsequent turn to the right. **Note 2:** If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of racetrack patterns and to rock its wings each time it passes the intercepted aircraft	You have been intercepted follow me	**AEROPLANES:** **DAY** - **Rocking wings and following.** **NIGHT** - Same and, in addition, flashing navigational lights at irregular intervals. **HELICOPTERS:** **DAY** or **NIGHT** - Rocking aircraft, flashing navigational lights at irregular intervals and following. **Note:** Additional action required to be taken by intercepted aircraft is prescribed in RAC section.	**Understood will comply**
DAY or **NIGHT** - **An abrupt breakaway manoeuvre from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft.**	**You may proceed**	**AEROPLANES: DAY** or **NIGHT**-Rocking wings. **HELICOPTERS: DAY** or **NIGHT**- Rocking aircraft	Understood will comply
DAY - Circling aerodrome, lowering landing gear and over flying runway in the direction of landing or, if the intercepted aircraft is a helicopter, over flying the helicopter landing area. **NIGHT** - Same and, in addition, showing steady landing lights.	Land at this aerodrome	**AEROPLANES:** **DAY** - Lowering landing gear, following the intercepting aircraft and, if after over-flying the runway landing is considered safe, proceeding to land. **NIGHT** - Same and, in addition, showing steady landing lights (if carried). **HELICOPTERS:** **DAY** or **NIGHT**-Following the intercepting aircraft and proceeding to land, showing a steady landing light (if carried)	Understood will comply

Notes: *1. Words in this **color**, are **asked in ANAC***

Signals Initiated by Intercepted Aircraft and Responses by Intercepting Aircraft

INTERCEPTED Aircraft Signals	Meaning	INTERCEPTING Aircraft Responds	Meaning
AEROPLANES: **DAY**-Raising landing gear while passing over landing runway at a height exceeding 300 m (1000 ft) but not exceeding 600 m (2000 ft) above the aerodrome level, and continuing to circle the aerodrome. **NIGHT**-Flashing landing lights while passing over landing runway at a height exceeding 300 m (1000 ft) but not exceeding 600 m (2000 ft) above the aerodrome level, and continuing to circle the aerodrome. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is inadequate	**DAY or NIGHT**-if it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate aerodrome, the intercepting aircraft raises its landing gear and uses the Series 1 signals prescribed for intercepting aircraft.	Understood follow me
		If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood you may proceed
AEROPLANES: **DAY or NIGHT**-Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply	**DAY or NIGHT** - Use Series 2 signals prescribed for intercepting aircraft	Understood
AEROPLANES: **DAY or NIGHT**-**Irregular flashing of all available lights** **HELICOPTERS:** **DAY or NIGHT** - Irregular flashing of all available lights.	**In distress**	**DAY or NIGHT** - Use Series 2 signals prescribed for intercepting aircraft	Understood

Notes: *1. Words in this **color**, are **asked in ANAC***

PANS-OPS

The ICAO document that **specifies the recommendations for instrument procedures** is **PANS OPS**. The term '**PANS-OPS**' is commonly used to refer to the content of **ICAO Doc 8168**. The correct title of the document is "**Procedures for Air Navigation Services - Aircraft Operations**". **(asked in ANAC)**

The document is printed in two volumes:

- Vol 1 - Flight Procedures;
- Vol 2 - Construction of Visual and Instrument Flight Procedures.

Abbreviations

(All of these are asked in ANAC :/)

AAL - Above Aerodrome Level

AGL - Above ground level

DA/H – Decision altitude/height

DER - Departure end of the runway

MAPt - Missed approach point

MDA/H - Minimum descent altitude/height

MOC - Minimum obstacle clearance

OCA/H - Obstacle clearance altitude/height

OIS - Obstacle identification surface

SID - Standard instrument departure

STAR - Standard instrument arrival **(Americans call it different "Standard Terminal Arrival", you should learn this one!)**

Definitions

(All of these are also asked in ANAC, I know it sucks)

Aerodrome elevation - The elevation of the highest point of the landing area.

Base turn - A turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal.

Decision altitude (DA) or decision height (DH) - A specified altitude or height in a precision instrument approach operation at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1.— **Decision altitude (DA)** is **referenced to mean sea level** and decision height (DH) is **referenced to the threshold elevation**.

Final approach segment (FAS) - That segment of an instrument approach procedure in which **alignment and descent for landing are accomplished**.

Minimum descent altitude (MDA) or minimum descent height (MDH) - A specified altitude or height in a non-precision instrument approach operation or circling approach operation below which descent must not be made without the required visual reference.

Note 1.— **Minimum descent altitude (MDA)** is **referenced to mean sea level** and **minimum descent height (MDH)** is **referenced to the aerodrome elevation** or to the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH) - The lowest altitude, **referenced to Mean Sea Level (asked in ANAC)**, or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Procedure turn - A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Radial - A magnetic bearing extending from a VOR station.

Transition altitude - The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes

Transition level - The lowest flight level available for use above the transition altitude.

Instrument approach procedure (IAP) - A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows:

- **Non-precision approach (NPA) procedure** - An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.
- **Approach procedure with vertical guidance (APV)** - An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.
- **Precision approach (PA) procedure** - An instrument approach procedure based using precision lateral and vertical guidance **(azimuth, elevation and distance information) (asked in ANAC)** with minima as determined by the category of operation.

All procedures depict tracks. **Pilots should attempt to maintain the track by applying corrections to heading for known wind**. **(asked in ANAC)**

All examples of calculations in this document are based on an altitude of 600 m (2 000 ft) above mean sea level (MSL) and a temperature of international standard atmosphere **(ISA) +15°C** unless otherwise stated. **(asked in ANAC)**

Departure Procedures

General Criteria

A departure procedure is established for each runway where instrument departures are expected to be used. It will include procedures for the various categories of aircraft.

The **design of** an instrument departure procedure is, in general, **dictated by the terrain surrounding the aerodrome**. **(asked in ANAC)**

The procedures assume that pilots will not compensate for wind effects when being radar vectored.

They also **assume** that **pilots will compensate for known or estimated wind effects when flying departure routes** which are expressed as tracks to be made good. **(asked in ANAC)**

These procedures also **assume** that **all engines are operating**.

Wherever possible a **straight departure will be specified**, which is aligned with the runway.

Where a **departure** route **requires a turn of more than 15°** to avoid an obstacle, a **turning departure** is constructed. **(asked in ANAC)**

In determining the track over which the aircraft will fly **speed is the determining factor** **(asked in ANAC)**. Aircraft are categorized by the maximum speed that the departure procedure can be flown.

Obstacle Clearance

Obstacle clearance could be provided by assessing the highest obstacle to be flown over and by applying a safety margin to the obstacle height. An **obstacle clearance altitude or height (OCA/H)** can thus be obtained. This is the method of obtaining MSA and with refinements, minimum descent altitude/height (MDA/H) for non-precision procedures.

The **minimum obstacle clearance equals 0ft at the departure end of the runway (DER)**. **(asked in ANAC)**

An **en-route obstacle** is any building, structure or erection which is **150 meters or more above ground level** **(asked in ANAC)**, excluding any building, structure or erection which is:

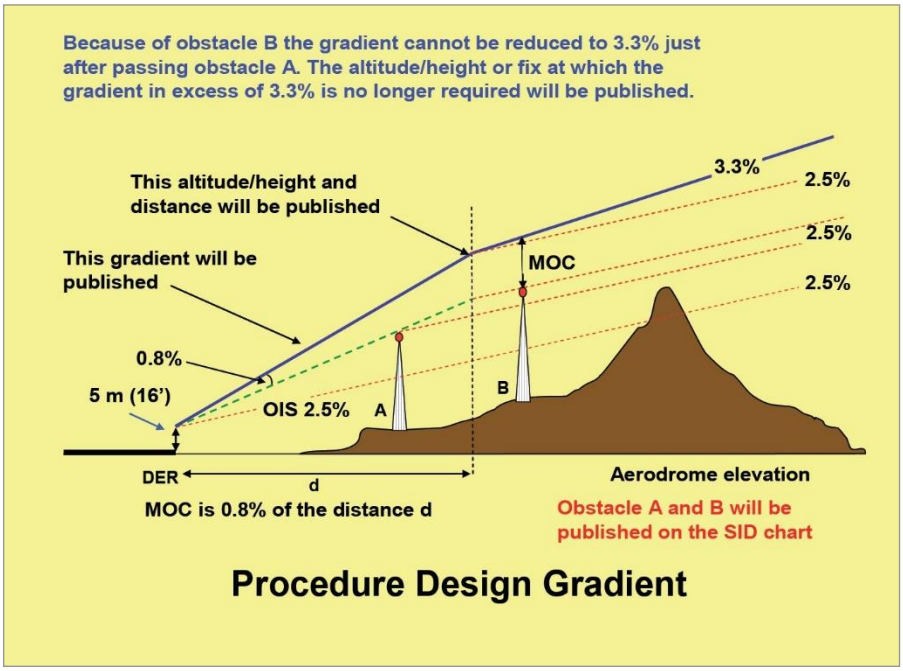
- In the vicinity of a licensed aerodrome, and
- to which section 47 of the Civil Aviation Act 1982 (warning of presence of obstacles near licensed aerodromes) applies.

Procedure Design Gradient (PDG)

Unless otherwise published, minimum **PDG is 3.3% with all engines operating (asked in ANAC)**

The **PDG is made up** of **2.5% gradient of obstacle identification surfaces (OIS)** or the gradient based on the most critical obstacle penetrating these surfaces (whichever is higher), plus **0.8% increasing obstacle clearance (MOC)**. **(asked in ANAC)**

PDG = OIS + MOC



Emergencies

It is the **responsibility of the operator** to **establish procedures to cover the case of engine failure or an emergency in flight which occurs after V1**. **(asked in ANAC)**

Standard Instrument Departures

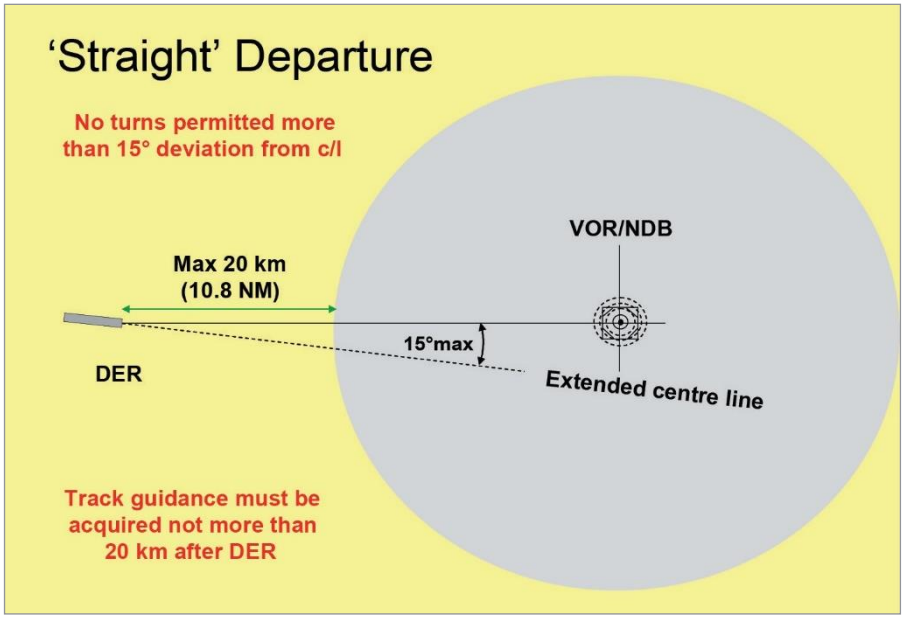
There are **two basic types of departure route**, **straight**, or **turning**. Departure routes are based on **track guidance acquired** within **20 km (10.8 NM)** from the end of the runway (DER) for **straight departures**, and within **10 km (5.4 NM)** after completion of turns for **turning departures**. **(asked in ANAC)**

When flying the route, the **pilot is expected to correct for known wind and to remain within the protected airspace**. **(asked in ANAC)**

Pilot reaction time taken into account is 3s (asked in ANAC)

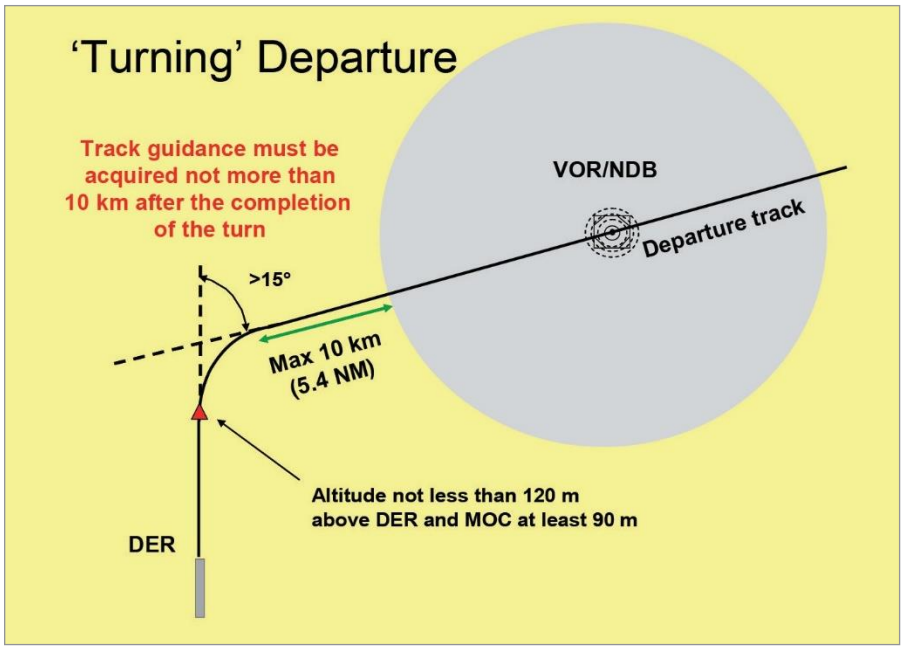
Straight Departure

A straight departure is one in which the **initial departure track is within 15° of the alignment of the runway (asked in ANAC)**. Track guidance may be provided by VOR, NDB or RNAV.



Turning Departure

If the **departure track requires a turn of more than 15° (asked in ANAC),** a turning area is constructed and the turn required is commenced upon reaching a specified altitude/ height, or at a fix or at a facility (VOR, NDB etc...). Straight flight is assumed until reaching an **altitude not less than 120 m (394 ft)** above the elevation of the DER.



Types of turns in turning departures

(Asked in ANAC) Turns may be specified at:

- an **altitude/height**; and
- a **fix** or **facility**.

Omnidirectional Departure

In cases where **no track guidance is provided**, departure procedures are designed using the **omnidirectional** method. In other words, once off the end of the runway and at a safe height, the **aircraft can be navigated in any direction required to achieve the initial en-route point**.

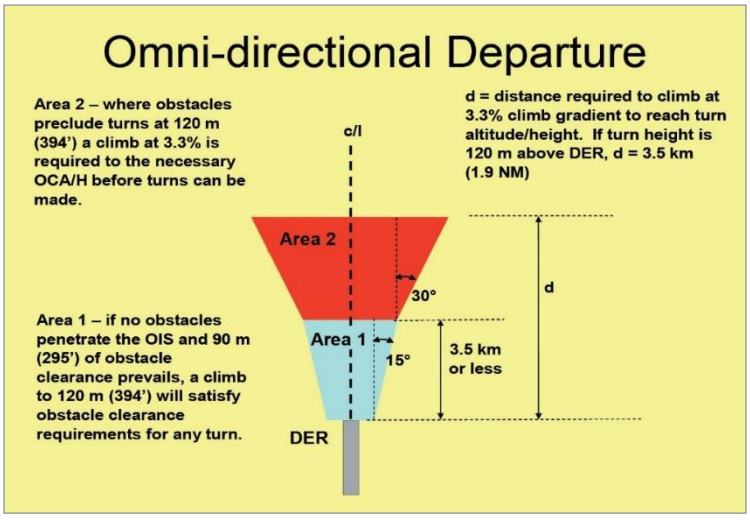
Since the point of lift-off will vary, the departure procedure assumes that **a turn** at **120 m (394 ft)** above the elevation of the aerodrome **is not initiated sooner than 600 m from the beginning of the runway**.

Where obstacles do not permit development of omnidirectional procedures, it is necessary to:

- fly a standard instrument departure (SID) route; or
- ensure that ceiling and visibility will permit obstacles to be avoided by visual means.

The basic procedure ensures:

- the aircraft climbs on the extended runway centre line to **120 m (394 ft) before turns can be specified (asked in ANAC)**; and
- **at least 90 m (295 ft) of obstacle clearance is provided before turns greater than 15° are specified**. **(asked in ANAC)**



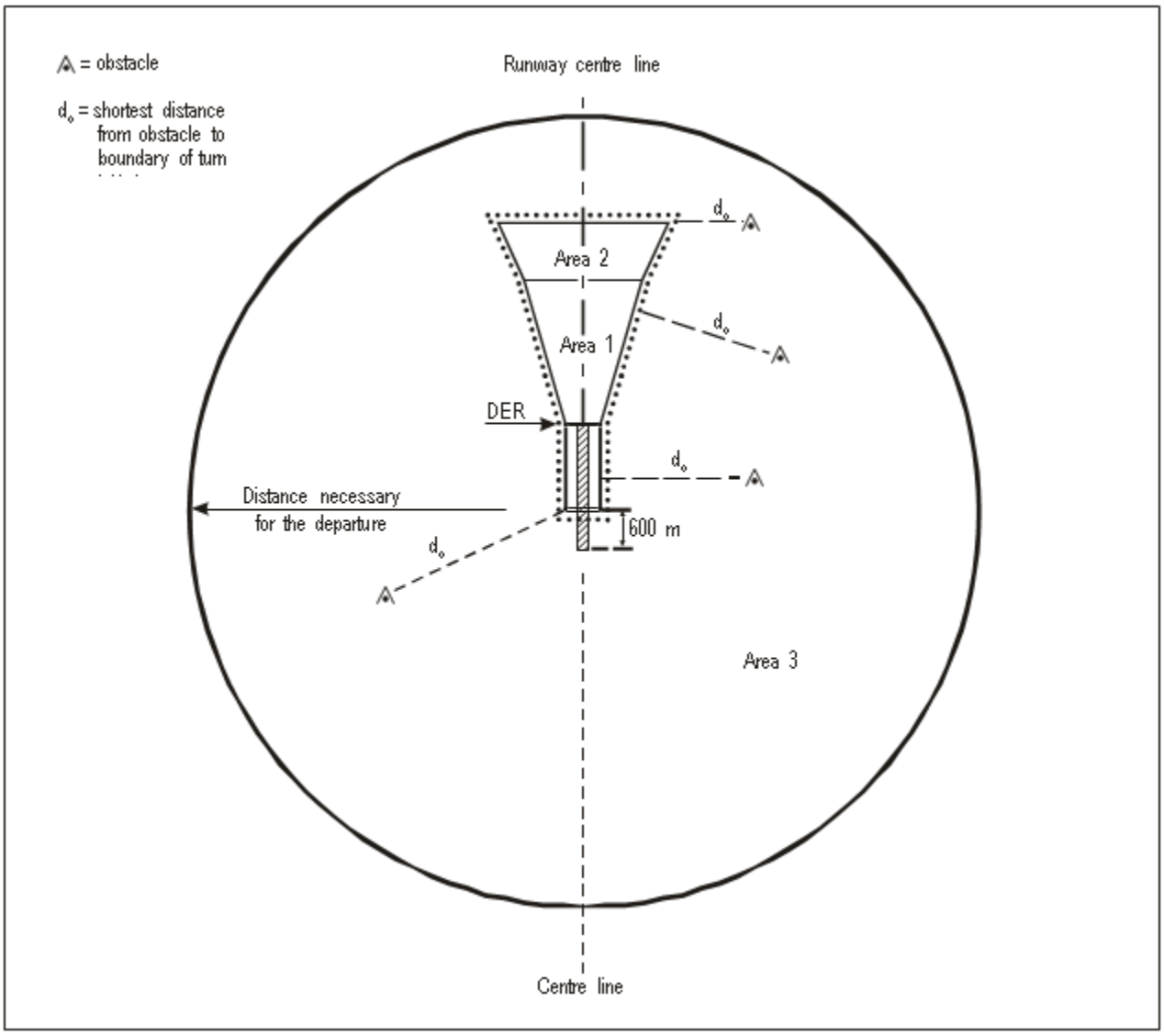
Omnidirectional departures normally allow departures in any direction. **Restrictions are expressed as:**

a) sectors to be avoided; or

b) sectors having minimum gradients and/or minimum altitudes.

These sectors are described by **bearings and distance (asked in ANAC)** from the centre of Area 3.

Area 3 for omnidirectional departures



Approach Procedures

The design of an instrument approach procedure is, in general, **dictated by the terrain surrounding the aerodrome**, the type of operations contemplated and the aircraft to be accommodated.

Aircraft performance has a direct effect on the airspace and visibility required for the various manoeuvres associated with the conduct of instrument approach procedures. **The most significant performance factor is aircraft speed. (asked in ANAC)**

Aircraft Categories

Aircraft categories will be referred by their letter designations as follows:

Speeds for procedure calculations in knots (kt)

Aircraft category	V_{at}	*Range of speeds for initial approach*	*Range of final approach speeds*	*Maximum speeds for visual manoeuvring (circling) ****	*Maximum speeds for missed approach*	
					Intermediate	*Final*
A	<91	90/150(110*)	70/100	100	100	110
B	**91/120**	120/180(140*)	85/130	**135**	130	150
C	121/140	160/240	115/160	**180**	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90

V_{at} — Speed at threshold based on 1.3 times stall speed V_{so} or 1.23 times stall speed V_{s1g} in the landing configuration at maximum certificated landing mass. (Not applicable to helicopters.)

* Maximum speed for reversal and racetrack procedures.

** Maximum speed for reversal and racetrack procedures up to and including 6 000 ft is 100 kt, and maximum speed for reversal and racetrack procedures above 6 000 ft is 110 kt.

***Just remember that aircraft **category A starts with 100 kts**. Then, for each one you just have to **add 35 kts to the previous aircraft category**:

- **Aircraft category B: 135 kts** (100 kts from category A + 35 kts).
- **Aircraft category C: 180 kts** (135 kts from category B + 35 kts = 170 kts; here you choose the closest answer which will be 180 kts).
- Aircraft category D: 205 kts (170 kts calculated from category C + 35 kts).
- Aircraft category E: 240 kts (205 kts from category D + 35 kts).

Notes:** 1. Categories in this **color**, are **asked in ANAC

The instrument approach chart (IAC) will specify the individual categories of aircraft for which the procedure is approved. Normally, **procedures will be designed to provide protected airspace and obstacle clearance for aircraft up to and including Category D (asked in ANAC)**. However, where airspace requirements are critical, procedures may be restricted to lower speed categories.

Types of Approach

Straight-in approach

Wherever possible, a straight-in approach will be specified which is aligned with the runway centre line. In the case of non-precision approaches, a straight-in approach is considered acceptable if the **angle between the final approach track and the runway centre line is 30° or less**. **(asked in ANAC)**

Circling approach

Obstacle Clearance Altitude/Height (OCA/H)

For each individual approach procedure an obstacle clearance altitude/height (OCA/H) is calculated in the development of the procedure and published on the instrument approach chart. In the case of precision approach and circling approach procedures, an OCA/H is specified for each category of aircraft.

Obstacle clearance altitude/height (OCA/H) is:

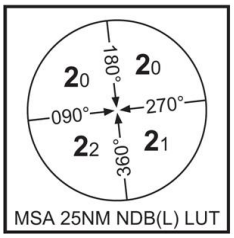
- in a **precision approach** procedure, the lowest altitude (OCA) or alternatively the **lowest height above the elevation of the relevant runway threshold (OCH), at which a missed approach must be initiated to ensure compliance with the appropriate obstacle clearance criteria (asked in ANAC)**; or
- in a **non-precision approach** procedure, the lowest altitude (OCA) or alternatively the lowest height above aerodrome elevation or **the elevation of the relevant runway threshold, if the threshold elevation is more than 2 m (7 ft) below the aerodrome elevation (OCH) (asked in ANAC)**, below which an aircraft cannot descend without infringing the appropriate obstacle clearance criteria; or
- in a visual (circling) procedure, the lowest altitude (OCA) or alternatively the lowest height above the aerodrome elevation (OCH) below which an aircraft cannot descend without infringing the appropriate obstacle clearance criteria.

When determining the **OCA** for a precision approach, obstacle height (size) is referenced to **MSL**. **(asked in ANAC)**

When determining the **OCH** for a precision approach, obstacle height (size) is referenced to **threshold elevation**. **(asked in ANAC)**

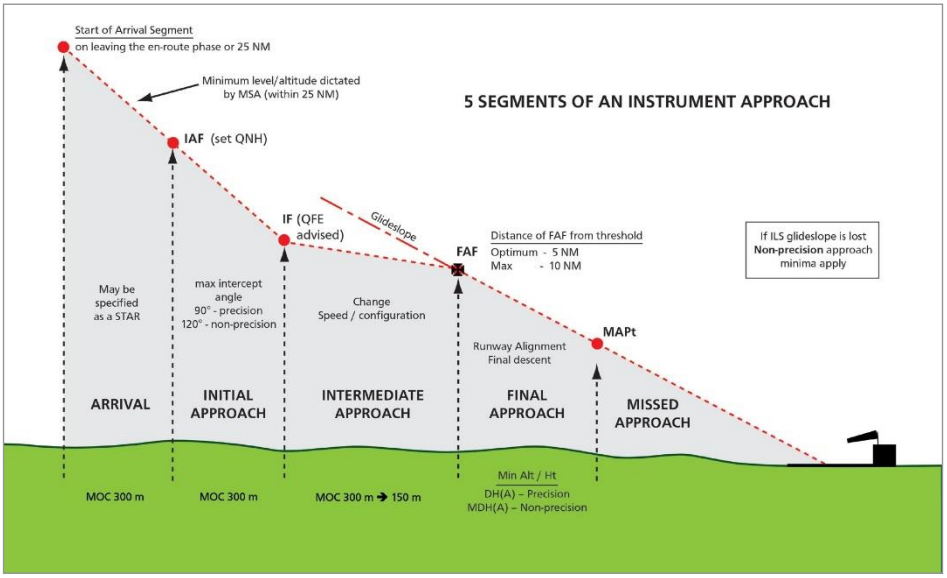
Minimum sector altitudes (MSA)

Minimum sector altitudes or terminal arrival altitudes are established for each aerodrome and **provide not less than 300 m (1 000 ft) obstacle clearance within 46 km (25 NM) of the navigation aid, initial approach fix or intermediate fix associated with the approach procedure for that aerodrome. (asked in ANAC)**



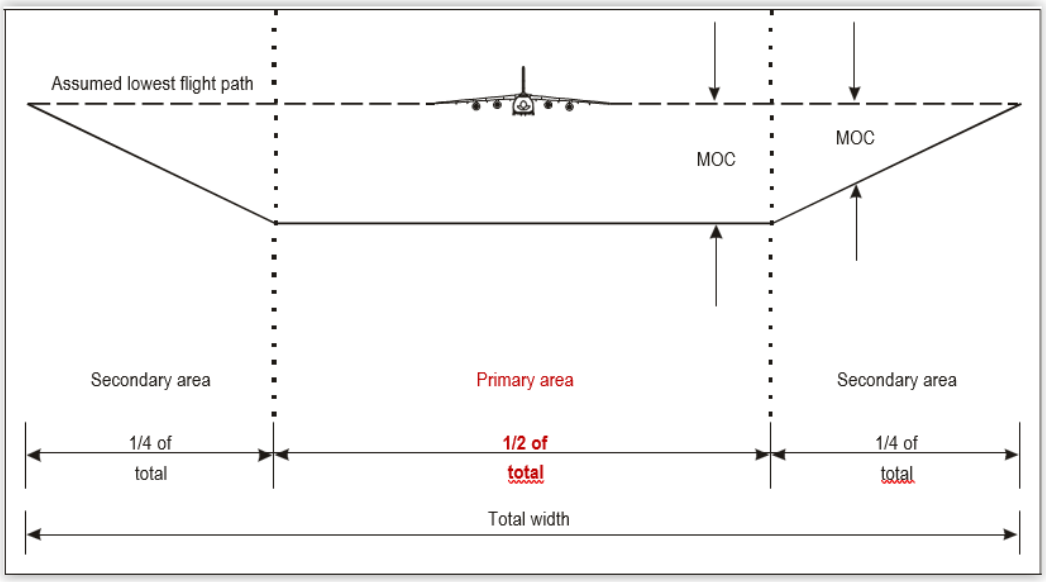
MSA as shown on the ILS/DME plate for London/Luton. The altitude is shown in thousands and hundreds of feet e.g. 22 is 2 200 ft. The segments shown relate to the aircraft track e.g. the NW segment will include all arrival route tracks between 090 and 180 mag terminating at the LUT NDB.

An instrument approach procedure may have **five separate segments**. They are the **arrival, initial, intermediate, final and missed approach segments (asked in ANAC)**. The approach segments begin and end at designated fixes.



Physical Characteristics of Segments

The vertical cross section of each segment is divided into **primary** and **secondary** MOC **areas**. **Full obstacle clearance is applied over the primary area**, reducing to zero at the outer edges of the secondary areas. **(asked in ANAC)**



Primary area - A defined area symmetrically disposed about the nominal flight track in which **full obstacle clearance is provided**. **(asked in ANAC)**

Secondary area – A defined area on each side of the primary area located along the nominal flight track in which **decreasing obstacle clearance is provided**.

Total width is **±5NM either side of centre line for SID/STAR procedures (asked in ANAC)** and ±10NM either side of centre line for Airways.

(Asked in ANAC) The **protection areas** associated with instrument approach procedures are determined with the assumption that **turns are performed at a bank angle of**:

- **25º or the bank angle giving a 3°/second turn rate**, whichever is lower, for **departure** (above 3000ft) and **approach instrument procedures**;
- **20º** for **circling-to-land** with prescribed flight tracks and;
- **15º** for **missed approach procedures**.

Fix Tolerance

Because all navigation facilities and waypoints have accuracy limitations, the geographic point which is identified is not precise but may be anywhere within an area called the fix tolerance area which surrounds its plotted point of intersection.

	VOR	*ILS*	*NDB*
System use accuracy of facility providing track	**±5.2°**	±2.4°	±6.9°
System use accuracy of facility NOT providing track	**±4.5°**	±1.4°	±6.2°

Notes:** 1. Values in this **color**, are **asked in ANAC, a trick for these questions is to choose the answer closest to 5 even if it asks for 2 values! (works for all of them as of 06/04/2019)

Surveillance Radar

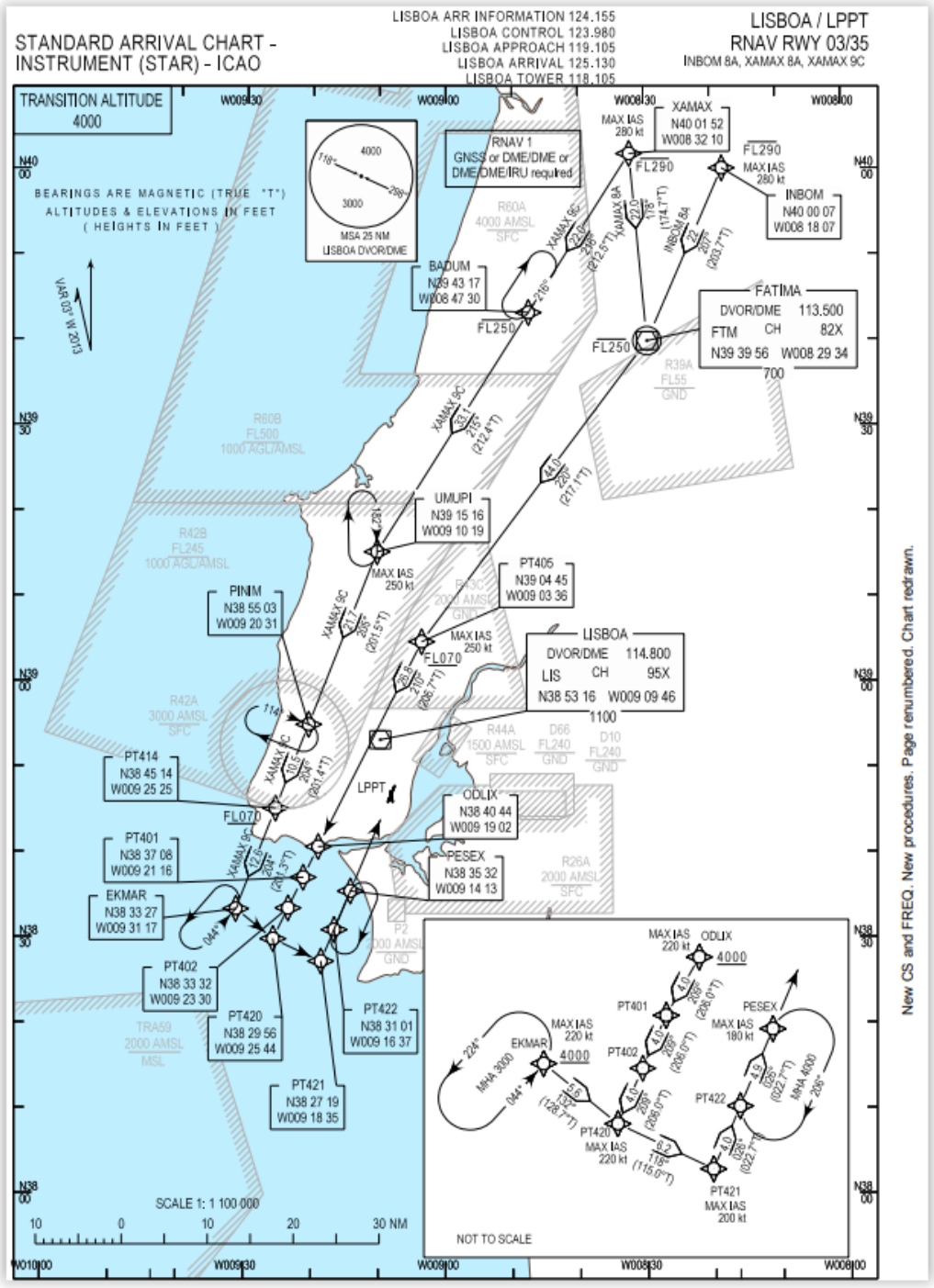
- Terminal Area Surveillance Radar (TAR): Within 20 NM = ±1.5 km (0.8 NM)
- En route Surveillance Radar (RSR): **Within 40 NM** = **±3.1 kms** (1.7 NM) **(asked in ANAC)**

DME: **±0.46 km (0.25 NM) + 1.25 per cent of the distance to the antenna (asked in ANAC)**

Arrival Segment

A **standard instrument arrival (STAR)** route permits transition from the en-route phase to the approach phase. When necessary or where an operational advantage is obtained, arrival routes from the en-route phase to a fix or facility used in the procedure are published.

The **arrival route normally ends at the IAF (asked in ANAC)**. **Omnidirectional or sector arrivals can be provided taking into account minimum sector altitudes (MSA)**. **(asked in ANAC)**



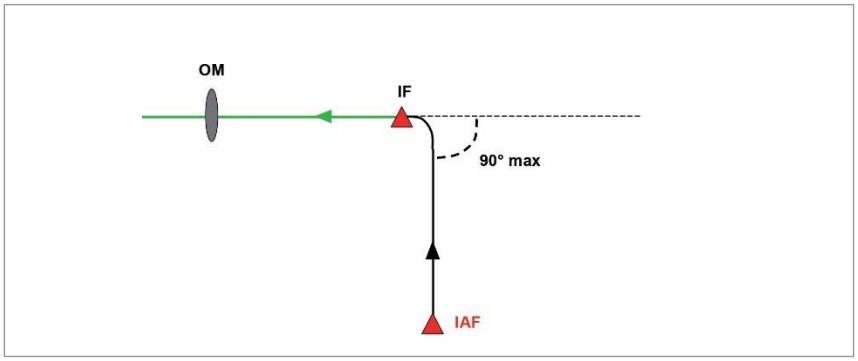
Initial approach Segment

The initial approach segment **begins at the initial approach fix (IAF)**, this is at the **end of a STAR**, and **ends at the intermediate fix (IF)**. **(asked in ANAC)**

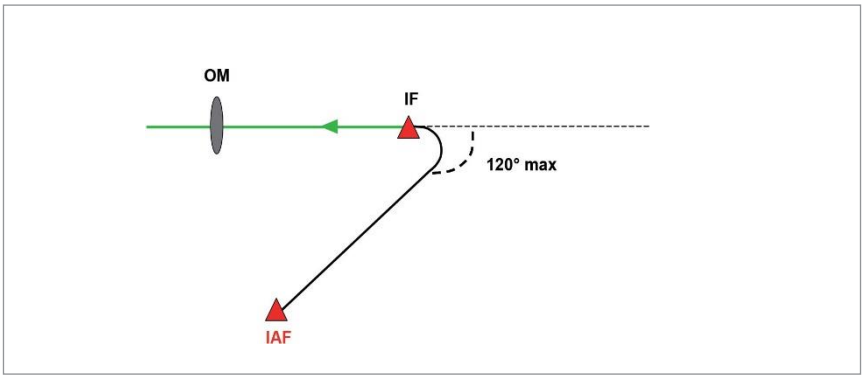
In the initial approach, the aircraft has left the en-route structure and is manoeuvring to enter the intermediate approach segment. **Aircraft speed and configuration will depend on the distance from the aerodrome, and the descent required**. **(asked in ANAC)**

Normally track guidance is provided along the initial approach segment to the IF, with a **maximum angle of interception of**:

- 90° for a precision approach; and



- 120° for a non-precision approach.



Minimum obstacle clearance

The initial approach segment provides **not less than 300 m (1 000 ft) of obstacle clearance in the primary area** **(asked in ANAC)**, reducing laterally to zero at the outer edge of the secondary area.

Types of Manoeuvres

If a straight-in approach is not possible (or feasible), a reversal procedure, racetrack or holding pattern is required, may be established using a facility on the aerodrome that serves both as the IAF and the MAPt.

Reversal Procedure

The reversal procedure may be in the form of a procedure or base turn. Entry is restricted to a specific direction or sector. In these cases, a specific pattern — normally a base turn or procedure turn — is prescribed.

There are **three** generally recognized manoeuvres related to the reversal procedure, each with its own airspace characteristics:

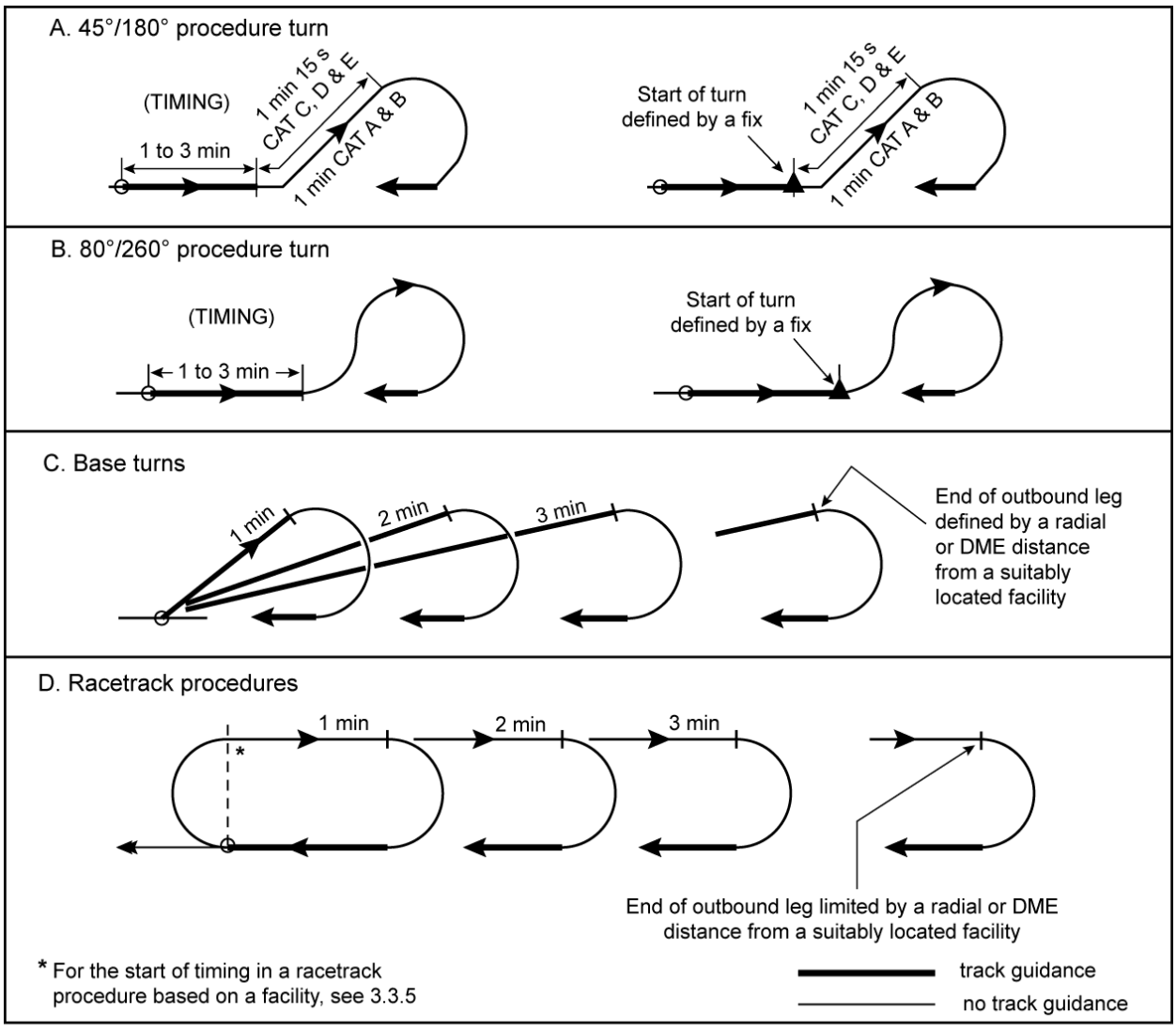
- **45°/180° procedure turn**. This requires track guidance to a point (timed or DME) where a 45° turn is made followed by a straight leg of either **1 minute (category A or B aircraft)** or **1 minute and 15 seconds (category C, D and E) (asked in ANAC)**. At the end of the timed leg a rate 1 turn is made through 180° to bring the aircraft into a position to intercept the reciprocal of the outbound track at an interception angle of 45°.

- **80°/260° procedure turn**. This requires track guidance to a point (timed or DME) where an 80° rate 1 turn is made followed immediately by an opposite direction 260° rate 1 turn. In still air, this should bring the aircraft on to the reciprocal of the outbound track. Also in still air, the procedure should take exactly 2 minutes.

- **Base turn**. Where accurate outbound track guidance can be provided by an NDB or VOR, a base turn can be specified where the inbound track is not the reciprocal of the outbound track. The specified outbound track is followed to a predetermined point at which a rate 1 turn is made so that the aircraft rolls out on the required inbound track. The **outbound track and/or** the **timing may be different for the various categories of aircraft**.

Racetrack Procedure

A racetrack consists of a turn from the inbound track through 180° at the facility or a fix after which, the outbound leg is flown to a point defined by time or a fix at which another turn through 180° is made to bring the aircraft back on to the inbound track. It is used where aircraft are **required to enter a holding pattern prior to commencing the instrument procedure**, and where the orientation of the holding pattern does not permit either a procedure turn or a base turn to be used. It will normally be specified as an ‘alternate procedure’ and specific instructions will be included on the plate.



(ICAO Figure I-4-3-1 - Types of reversal and racetrack procedures)

Flight procedures for racetrack and reversal procedures

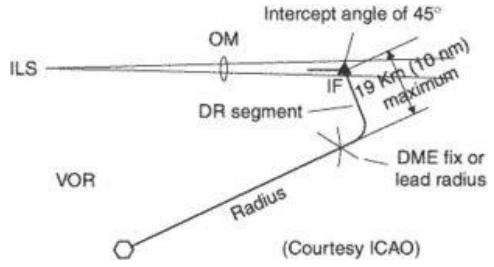
Descent

The aircraft shall cross the fix or facility and fly outbound on the specified track, descending as necessary to the procedure altitude/height **but no lower than the minimum crossing altitude/height associated with that segment**. If a further descent is specified after the inbound turn, this descent shall not be started until the aircraft is established on the inbound track. An aircraft is considered established when it is:

- within **half full scale deflection for the ILS and VOR (asked in ANAC)**; or
- within **±5°** of the **required bearing for the NDB**. **(asked in ANAC, choose answer closest to 5!)**

Dead reckoning (DR) segment

Where an operational advantage can be obtained, an ILS procedure may include a dead reckoning (DR) segment from a fix to the localizer. **The DR track will intersect the localizer at 45° and will not be more than 19 km (10 NM) in length (asked in ANAC)**. The point of interception is the beginning of the intermediate segment and will allow for proper glide path interception.



Intermediate approach Segment

This is the segment during which the aircraft **speed and configuration should be adjusted (asked in ANAC)** to prepare the aircraft for final approach. **For this reason**, **the descent gradient is kept as shallow as possible (asked in ANAC)**.

It **starts at the IF, located at the end of the initial segment (asked in ANAC), and ends at the FAF**. If no FAF exists, it ends when the aircraft is established on the final inbound track.

Minimum obstacle clearance (MOC)

During the intermediate approach, the obstacle clearance requirement **reduces from 300 m (984 ft) to 150 m (492 ft) (asked in ANAC) in the primary area**, reducing laterally to zero at the outer edge of the secondary area.

Final approach Segment

The beginning of the final segment depends upon the type of approach and the availability of a suitable final approach fix (FAF). This is the **segment in which alignment and descent for landing are made (asked in ANAC)**. Final approach may be made to a runway for a straight-in landing, or to an aerodrome for a visual manoeuvre.

Minimum obstacle clearance (MOC)

90 m (295 ft) without FAF

75 m (246 ft) with FAF (asked in ANAC)

Descent Gradient

The minimum/**optimum descent gradient**/angle in the final approach of a procedure with FAF is 5.2% / **3.0°**.

Where a **steeper descent gradient is necessary**, the **maximum permissible** is **6.5%** / 3.7° for Category A and B aircraft. **(asked in ANAC)**

An ILS glide path/MLS elevation angle **in excess of 3.0°** is used only **where alternate means available to satisfy obstacle clearance requirements are impractical**. **(asked in ANAC)**

Types of final approach

The criteria for final approach vary according to the type. These types are:

- Non-precision approach (NPA) with final approach fix (FAF);
- NPA without FAF;
- Approach with vertical guidance (APV); and
- Precision approach (PA).

NPA with FAF

For a **non-precision procedure with a FAF**, the final **segment starts at the FAF and ends at the MAPt**. The FAF will be positioned on the final approach track at a distance from the threshold of the landing runway that permits aircraft configuration for final approach/landing and descent from the intermediate altitude to the MDA/H. MOC is incorporated in the calculation of MDA/H. The **optimum distance of the FAF from the threshold is 5 NM** and the **maximum is 10 NM**.

NPA without FAF

This situation will normally occur at an aerodrome where there is only one facility on or near the aerodrome that is used as both the IAF and the MAPt. In this case it is unlikely that the final approach track will be aligned with the runway centre line and therefore descent to MDA/H will be made when the aircraft is established inbound on the final approach track.

Precision Approach

Final approach point (FAP) is the point in space on the final approach track where the intermediate approach altitude/height intercepts the nominal glide path/microwave landing system (MLS) elevation angle. **(asked in ANAC)**

The final approach segment **begins at the final approach point (FAP) (asked in ANAC, Mnemonic: Precision faP)**.

The intermediate approach altitude/height **generally intercepts the glide path**/MLS elevation angle at **heights** from **300 m (1 000 ft) to 900 m (3 000 ft) (asked in ANAC)** above runway elevation. ILS glide path is normally intercepted **between 3 NM and 10 NM from the threshold (asked in ANAC).**

FAP maximum distance from threshold is 10NM (asked in ANAC).

The protection area assumes that the pilot **does not normally deviate** from the centre line **more than halfscale deflection (1/2) after being established on track**. **(asked in ANAC)**

Obstacle Free Zone

For **precision approaches**, an obstacle free zone has been established for Category II and III operations to provide protection in the event of a balked landing.

Aircraft category	Wing Span (m)	**Vertical distance between the wheels and the GP antenna**
H	30	3 metres
A, **B**	60	**6 metres**
C, D	65	7 metres
D_L	80	8 metres

Notes:** 1. Values in this **color**, are **asked in ANAC

In the event of **loss of glide path/MLS elevation angle guidance during the approach**, the **procedure becomes a non-precision approach**. You can initiate a go-around or **continue by using the LOC signals**. **(asked in ANAC)**

Determination of MDA/H or DA/H

State of the aerodrome determines the OCA/H for an approach procedure. **(asked in ANAC)**

The **appropriate authority of the state of the aerodrome** also establishes **the lowest aerodrome operational minima** for instrument approaches **(asked in ANAC)**. Aerodrome operating minima for landing are based on **Runway Visual Range** and **cloud ceiling**. **(asked in ANAC)**

The **frequency of meteorological reports** is not considered when establishing Aerodrome Operating Minima. **(asked in ANAC)**

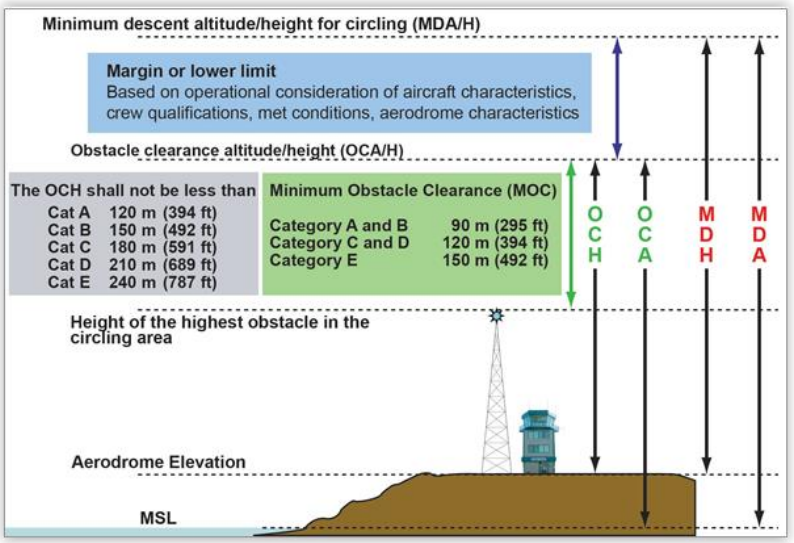
OCA/H + Safety Margin = MDA/H or DA/H (asked in ANAC)

(Asked in ANAC)

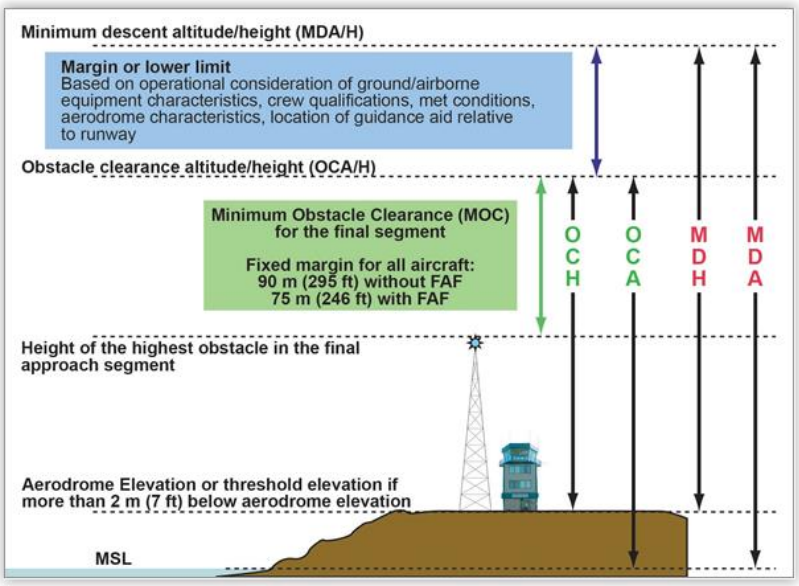
- **Circling approach (visual)**: minimum descent altitude or height (**MDA / MDH**)
- **Non-precision approach**: minimum descent altitude or height (**MDA / MDH**)
- **Precision approach**: decision altitude or height (**DA / DH**)

In **Precision Approaches** procedures specialist **considers obstacles both in the approach and in the missed approach areas** in the calculation of the OCA/H for a procedure. **The calculated OCA/H is the height of the highest approach obstacle or equivalent missed approach obstacle**, **plus an aircraft category related allowance. (asked in ANAC)**

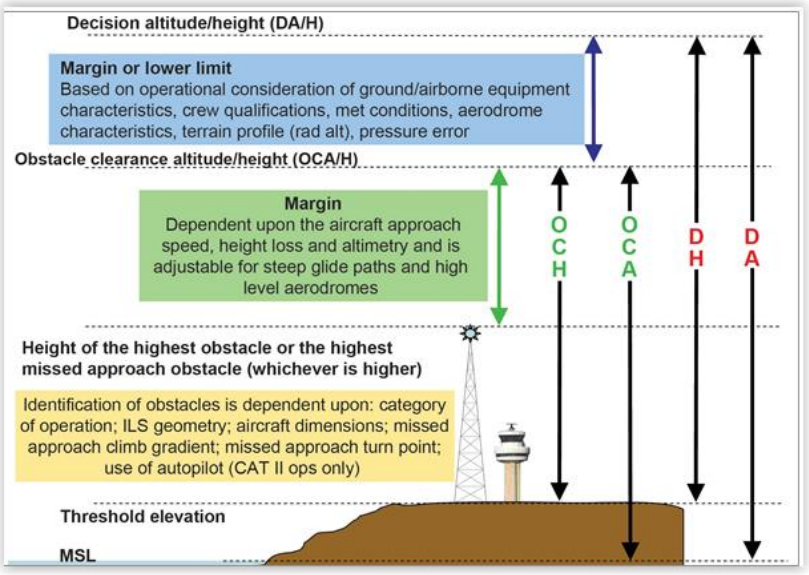
Minimum descent altitude/height (MDA/H) **cannot be lower** than Obstacle Clearance altitude/height (OCA/H). **(asked in ANAC)**



Circling approach (visual)



Non-precision approach



Precision approach

Missed approach Segment

That segment is used for the missed approach, the procedure to be followed if the approach cannot be continued. A missed approach procedure shall be established for each instrument approach and shall specify a point where the procedure begins and a point where it ends.

During the missed approach phase of the instrument approach procedure, the pilot is faced with the demanding task of changing the aircraft configuration, attitude and altitude. For this reason, the design of the missed approach has been kept as simple as possible and **consists of three phases (initial, intermediate and final)**. **(asked in ANAC)**

The missed approach should be **initiated not lower than** the **decision altitude/height (DA/H) in precision approach procedures**, or at a specified point in **non-precision approach procedures not lower than** the **minimum descent altitude/height (MDA/H)**. **(asked in ANAC, "lowest level for a missed approach procedure")**

If a **missed approach is initiated before the MAPt** the pilot should **proceed at any altitude/height at or above that for the procedure** but **has to pass the MAPt**. **(asked in ANAC)**

Missed approach point in a procedure may be defined by:

- the **point of intersection of an electronic glide path with the applicable DA/H** in APV or **precision approaches (asked in ANAC)**; or
- a **navigation facility, a fix, or a specified distance from the final approach fix (FAF)** in **non-precision approaches (asked in ANAC)**.

(Asked in ANAC) Normally procedures are based on a minimum **missed approach climb gradient of 2.5%**. A **gradient of 2% may be used in the procedure construction if the necessary survey and safeguarding have been provided**.

Initial Phase

The initial phase **begins at the MAPt** and **ends at the point where climb is established (asked in ANAC)**. This phase requires the concentrated attention of the pilot on establishing the climb and the changes in aeroplane configuration. It is assumed that guidance equipment is not extensively utilized during these manoeuvres, and for this reason, **no turns are specified in this phase**.

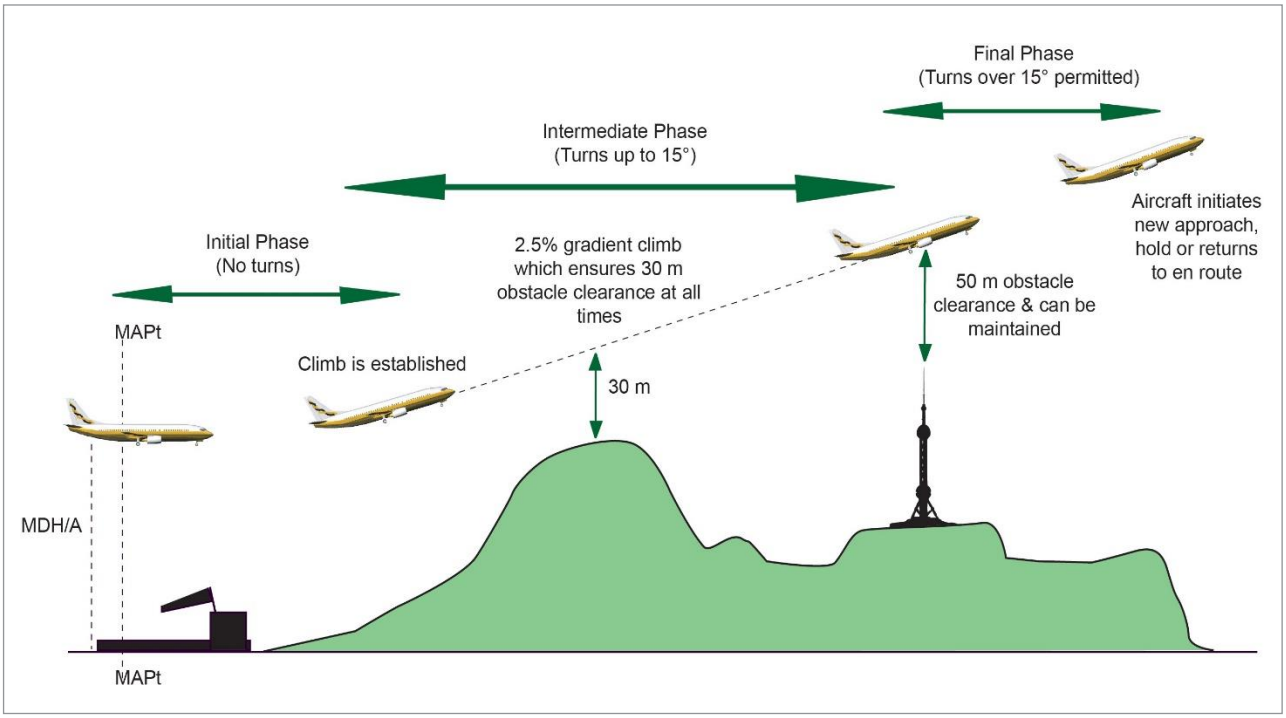
Intermediate Phase

The intermediate phase **begins at the point where climb is established**. The climb is continued, normally straight ahead. The **MOC in this segment is 30 m (asked in ANAC)** and the **segment ends to the first point where 50 m (164 ft) obstacle clearance is obtained and can be maintained**. **(asked in ANAC)**

The intermediate missed approach **track may be changed by a maximum of 15°** from that of the initial missed approach phase. During this phase, it is assumed that the aircraft begins track corrections.

Final Phase

The final phase **begins at the point where 50 m (164 ft) obstacle clearance is first obtained and can be maintained (asked in ANAC)**. It extends to the point where a new approach, holding or a return to en-route flight is initiated. **Turns may be prescribed in this phase**.



Turning missed approach

Turns in a missed approach procedure are only prescribed where terrain or other factors make a turn necessary.

The following parameters are specific to turning missed approaches:

- bank angle: 15° average achieved;
- speed
- wind: where statistical data are available, a maximum 95 per cent probability on an omnidirectional basis is used. Where no data are available, omnidirectional wind of 56 km/h (30 kt) is used; and
- flight technical tolerances:
    - **pilot reaction time: 0 to +3 s (asked in ANAC)**; and
    - bank establishment time: 0 to +3 s.

Area Navigation (RNAV) Arrival and Approach Procedures

Area navigation (RNAV) approach procedures based on **DME/DME** are **not required to specify a reference facility**. **Slant Range = What DME indicates (asked in ANAC, if DME says 7NM slant range is 7NM)**

Area navigation (RNAV) approach procedures based on **VOR/DME** are assumed to be **based on one reference facility (asked in ANAC)** composed of a VOR and collocated DME equipment. The reference facility will be indicated.

(These are asked in ANAC)

The VOR/DME RNAV approach procedure is a **non-precision approach procedure.**

The DME/DME approach procedure is a **non-precision approach procedure.**

A **DME/DME approach procedure is more precise** than a VOR/DME.

(Asked in ANAC) Aircraft equipped with RNAV systems which have been approved by the State of the Operator for the appropriate level of RNAV operations may use these systems to carry out VOR/DME RNAV approaches, providing that before conducting any flight it is ensured that:

- the RNAV equipment is serviceable;
- the pilot has a current knowledge of how to operate the equipment to optimize navigation accuracy; and
- the published VOR/DME facility upon which the procedure is based is serviceable.

(Asked in ANAC) The factors on which the navigation accuracy of the VOR/DME RNAV depends are:

- ground system tolerance;
- airborne receiving system tolerance;
- flight technical tolerance;
- system computation tolerance; and
- distance from the reference facility.

Normally only one stepdown fix is specified. However, in the case of a VOR/DME procedure several DME fixes may be depicted, each with its associated **minimum crossing altitude**. **Never pass the fix below the specific crossing altitude**. **(asked in ANAC)**

Visual Manoeuvering (circling) approach

Visual manoeuvring (circling) is the term used to describe the phase of flight after an instrument approach has been completed. It brings the aircraft into position for landing on a runway which is not suitably located for straight-in approach. **(asked in ANAC)**

Each circling situation is different because of variables such as runway layout, final approach track, wind velocity and meteorological conditions. Therefore, there can be no single procedure designed that will cater for conducting a circling approach in every situation. **(asked in ANAC, key word is wind velocity in that question)**

A circling approach is a visual flight manoeuvre **keeping the runway environment in sight while at MDA/H**. **(asked in ANAC)**

Obstacle clearance

When the visual manoeuvring (circling) area has been established, the **obstacle clearance altitude/height (OCA/H)** is **determined for each category of aircraft, and may be different for each one of them**. **(asked in ANAC)**

Minimum descent altitude/height (MDA/H)

(All of them asked in ANAC) Descent below MDA/H should not be made until:

- visual reference has been established and can be maintained;
- the pilot has the landing threshold in sight; and
- the required obstacle clearance can be maintained and the aircraft is in a position to carry out a landing.

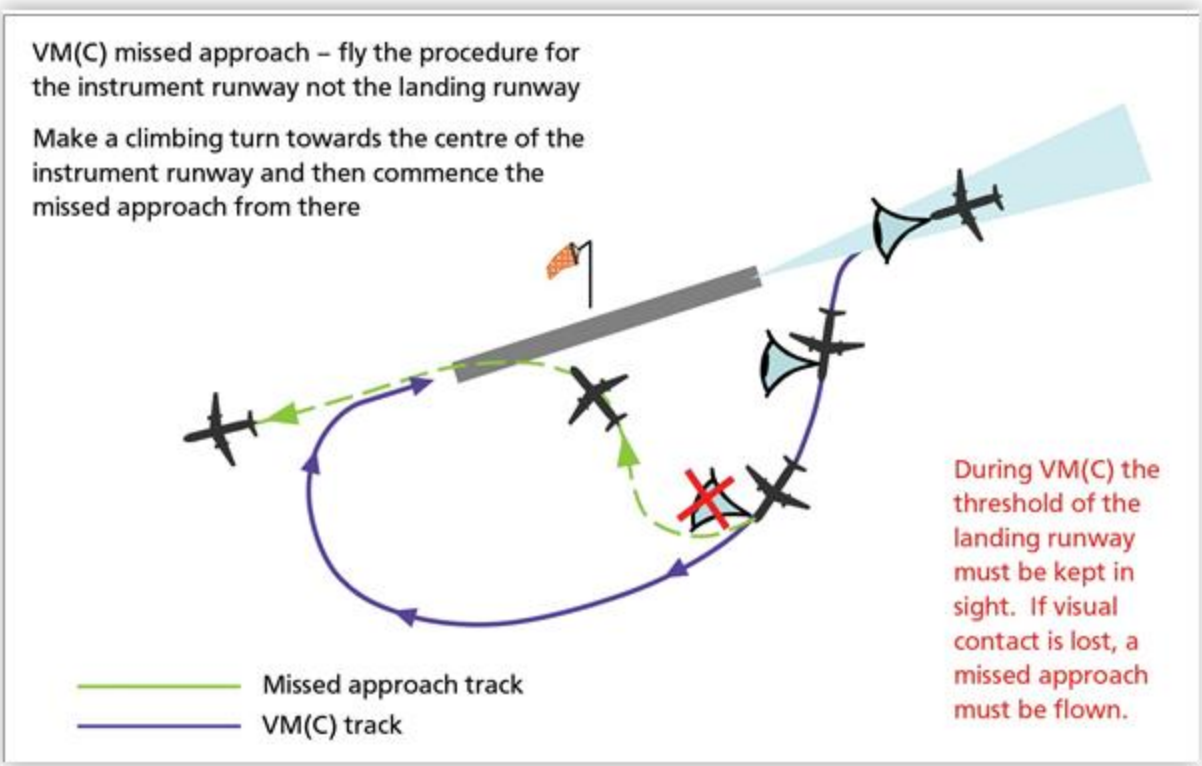
Visual manoeuvring (circling) area exclusions

A sector in the circling area where a prominent obstacle exists may be ignored for OCA/H calculations **if it is outside the final approach and missed approach areas**. **(asked in ANAC)**

When this option is exercised, the published procedure **prohibits circling within the entire sector in which the obstacle is located**. **(asked in ANAC)**

Missed Approach Procedure while Circling

If **visual reference is lost while circling to land** from an instrument approach, the missed approach specified for that particular procedure must be followed. The pilot will **make an initial climbing turn toward the landing runway and overhead the aerodrome (asked in ANAC)**. At this point, the pilot will establish the aircraft climbing on the missed approach track.



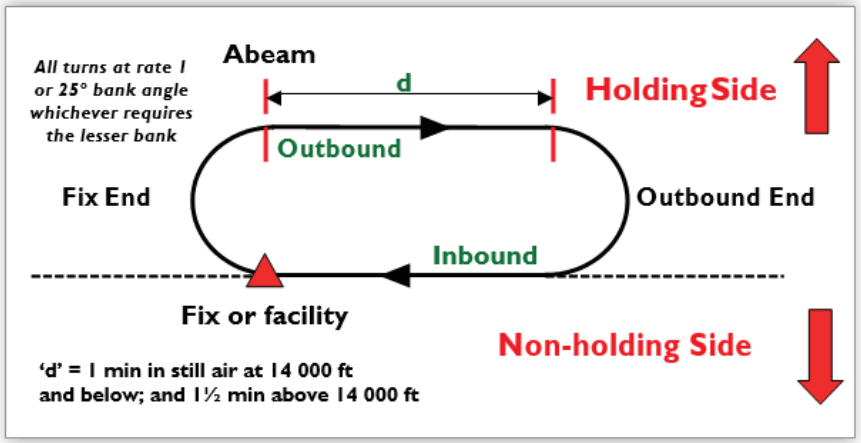
Holding Procedures

Holding is a predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

General Criteria

Shape and Terminology

A **standard holding pattern has starboard (right) turns (asked in ANAC)**. If port turns are required, the approach plate will be annotated to indicate the fact or ATC will instruct it. A left-hand pattern is a mirror image of the standard pattern.



Be careful with some questions - they do NOT say "non-standard holding pattern" but instead they might say "non-standard holding fix", this means a standard holding pattern at a non-standard place so right turns are made!

Normally, the **first aircraft to arrive over a holding** fix or visual holding location **should be at the lowest available holding level (asked in ANAC)**, with following aircraft at successively higher levels.

Speeds

Max holding speeds (IAS)

- At / Below FL140: **230 kt (asked in ANAC)**
- FL140 – FL200 (inclusive): 240 kt
- FL200 – FL340 (inclusive): 265 kt
- Above FL340: M 0.83

Bank angle/rate of turn

All turns are to be made at a **bank angle of 25° or at a rate of 3° per second**, **whichever requires the lesser bank**. **(asked in ANAC)**

Allowance for known wind

All procedures depict **tracks**. Pilots should **attempt to maintain the track** to remain in protected airspace by **making allowance for known wind** by **applying corrections** both to **heading and timing (asked in ANAC)**. This should be done during entry and while flying in the holding pattern.

Time/distance outbound

The still air time for flying the outbound entry heading should not exceed:

- **one minute if at or below** 4 250 m (**14 000 ft**); **(asked in ANAC)** or
- **one minute and 30 seconds if above** 4 250 m (**14 000 ft**). **(asked in ANAC)**

Where DME is available, the length of the outbound leg may be specified in terms of distance instead of time.

Start of outbound timing

Outbound timing begins over or abeam the fix, whichever occurs later (asked in ANAC). If the abeam position cannot be determined, start timing when the turn to outbound is completed.

ATC notification

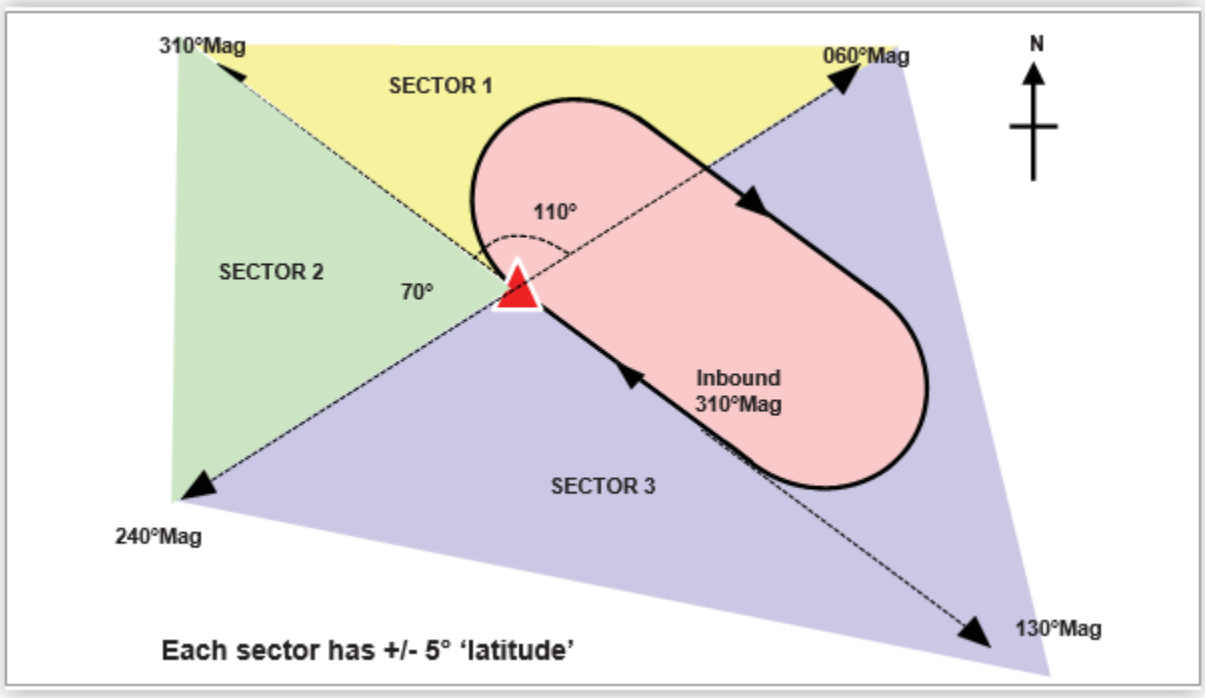
If for any reason a pilot is unable to conform to the procedures for normal conditions, **air traffic control should be advised as early as possible**. **(asked in ANAC)**

Shuttle

A shuttle is descent or climb conducted in a holding pattern. **(asked in ANAC)**

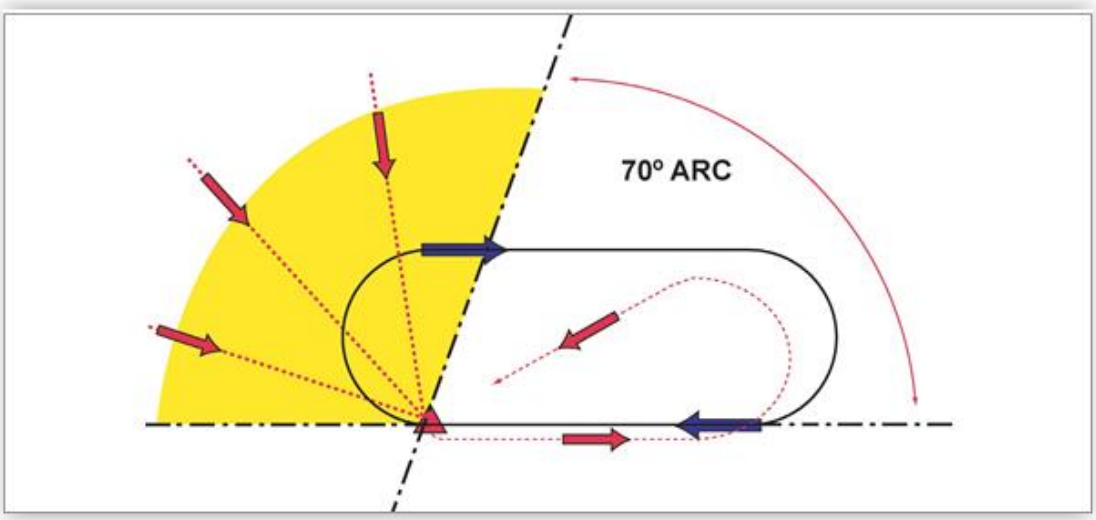
Holding entry

The entry into the holding pattern shall be **according to magnetic heading (asked in ANAC)** in relation to the three entry sectors, recognizing a **zone of flexibility of 5° on either side of the sector boundaries (asked in ANAC)**.



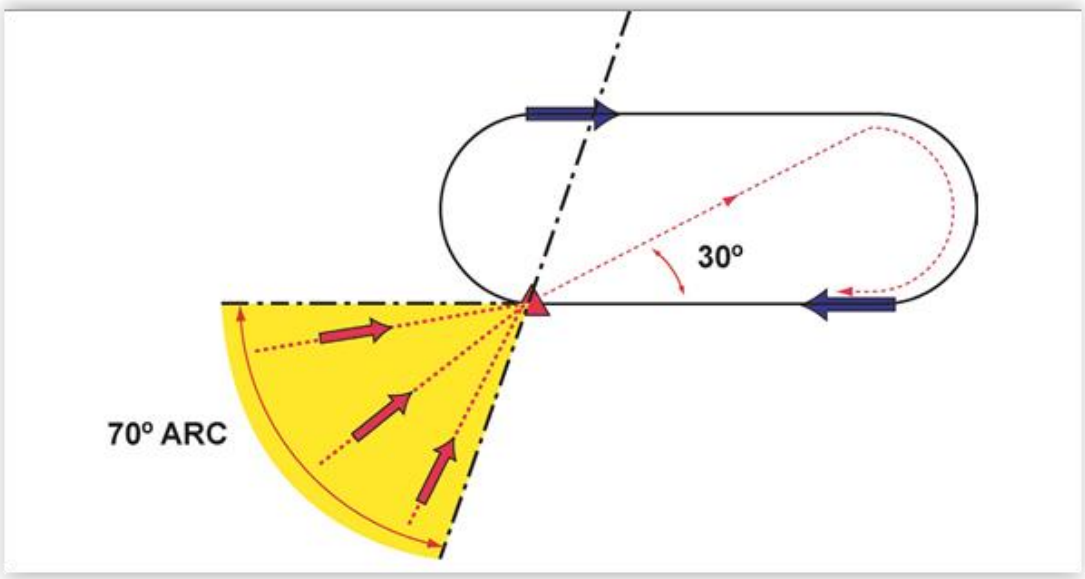
Sector 1 (Parallel Entry) Procedure

Having reached the fix, the aircraft is turned left onto an outbound heading to make good a track reciprocal to the stated inbound holding track. This is maintained for the appropriate period of time relating to the altitude of the aircraft, and then the aircraft is turned left to return to the fix. On the second time over the fix, the aircraft is turned right to follow the holding pattern.



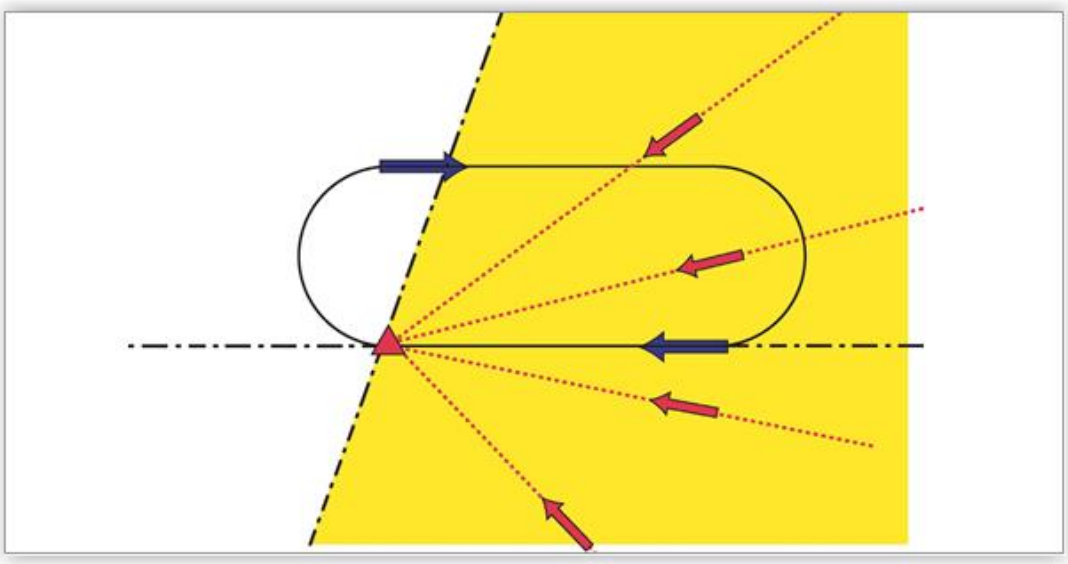
Sector 2 (Offset Entry/Teardrop) Procedure

Having reached the fix, the aircraft is turned onto the heading to make good the track **diverging 30° left of the reciprocal of the inbound holding track** **(asked in ANAC)**. This is maintained for the appropriate period of time relating to the altitude of the aircraft, and then the aircraft is turned right onto the holding track to return to the fix. On the second time over the fix, the aircraft is turned right to follow the holding pattern. The **outbound time on a 30º offset** track is the **same** as the normal **outbound time**. **(asked in ANAC)**

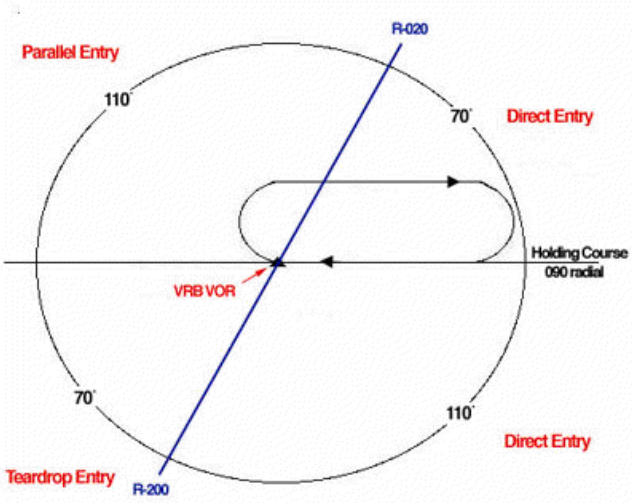


Sector 3 (Direct Entry) Procedure

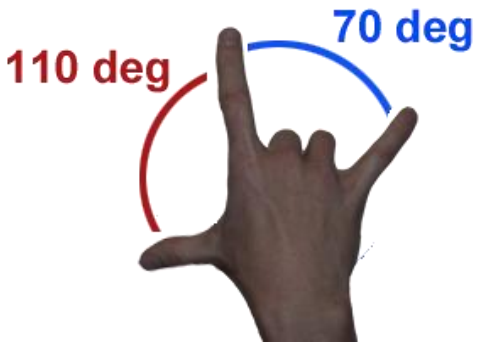
Having reached the fix, the aircraft is turned right to follow the holding pattern.

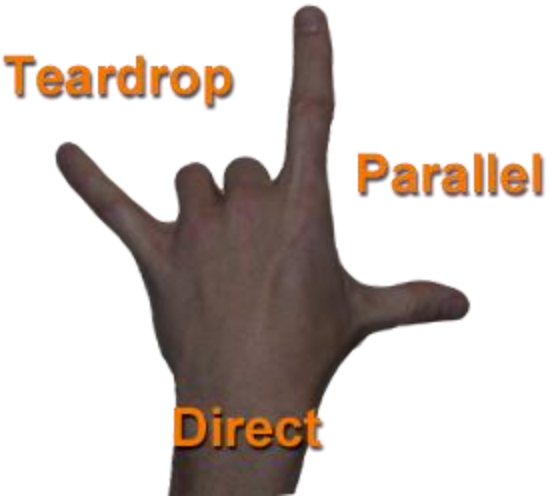


Determining the entry (asked in ANAC)

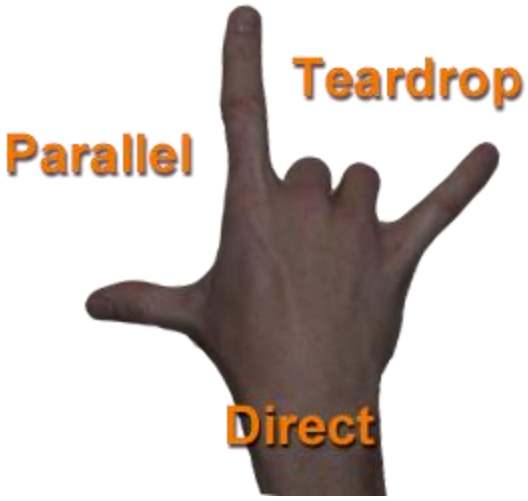


Just put your hand like so, and notice how your fingers naturally approximate the 70 degree / 110 degree angles:





Use the left hand for nonstandard left turns.



Use the right hand for standard right turns.

Source: https://cbpowell.wordpress.com/2011/01/17/foolproof-and-fast-holding-pattern-entries/
(In this website you can learn how to do it **using the heading bug** and then it will be easier to understand my explanation and you will also learn how to it in real life when you are flying!)

Steps:

1. Check **our heading**
2. Make the **intervals of degrees** for each entry.
   Right turn:
   From radial (**our heading**º - 110º) to **(our heading)**º it is a parallel, from **(our heading)**º to (**our heading**º + 70º) it is a teardrop/offset, the rest is direct.

   Left turn:
   From radial (**our heading**º - 70º) to **(our heading)**º it is a teardrop/offset, from **(our heading)**º to (**our heading**º + 110º) it is a parallel, the rest is direct.

3. **Check where the outbound course/radial is located**, and you will know what entry to use!

Don't forget there exists a zone of flexibility of 5° on either side of the sector boundaries

If exercise gives **inbound course** you **add 180º to the value**, if it gives **outbound course or radial, use this value**

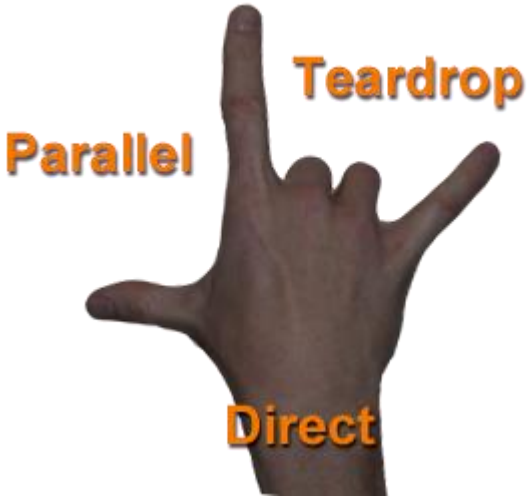
ANAC example:

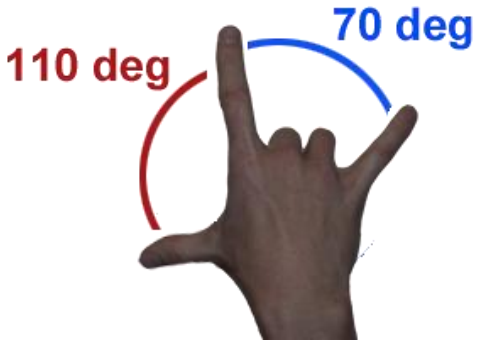
All turns to the right, 1 minute outbound, inbound Magnetic Track 010º

You are approaching the fix on **Magnetic Track 190º (no wind this means track is equal heading)**

We need to use Outbound course! So, Outbound = 010º + 180º = 190º

Right turns, so right hand!





Steps:

1. Our **heading is 190º**
2. From heading (**190º** - 110º) to **190º** it is a parallel, from **190º** to (**190º** + 70º) it is a teardrop/offset, the rest is direct.

   So **80º to 190º = parallel**, **190º to 260º = offset**, **260º to 80º direct**.

3. Our **outbound course** is **190º**, and there exists a zone of flexibility of **5°** on either side of the sector boundaries, so it can be a **parallel or offset entry**

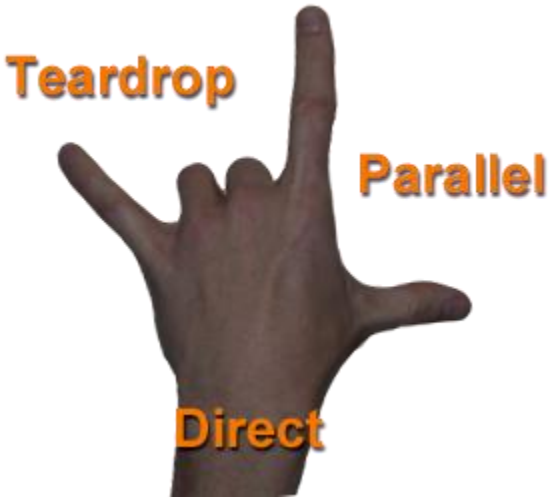
ANAC example:

All turns to the left, 1 minute outbound, inbound Magnetic Track 190º

You are approaching the fix on **Magnetic Track 270º (no wind this means track is equal heading)**

We need to use Outbound course! So, Outbound = 190º + 180º = 010º

Left turns, so left hand!



Steps:

1. Our **heading is 270º**
2. From heading (**270º** - 70º) to **270º** it is a teardrop/offset, from **270º** to (**270º** + 110º) it is a parallel, the rest is direct.

   So **200º to 270º = offset**, **270º to 020º = parallel**, **20º to 200º direct**.

3. Our **outbound course** is **010º**, so it is a **parallel entry**

Obstacle Clearance

The holding area includes the basic holding area and the entry area. The basic holding area is the airspace required for a holding pattern at a specific level, based on the allowances for aircraft speed, wind effect, timing errors, holding fix characteristics, etc. The entry area is the airspace required for the entry procedure.

Holding Area

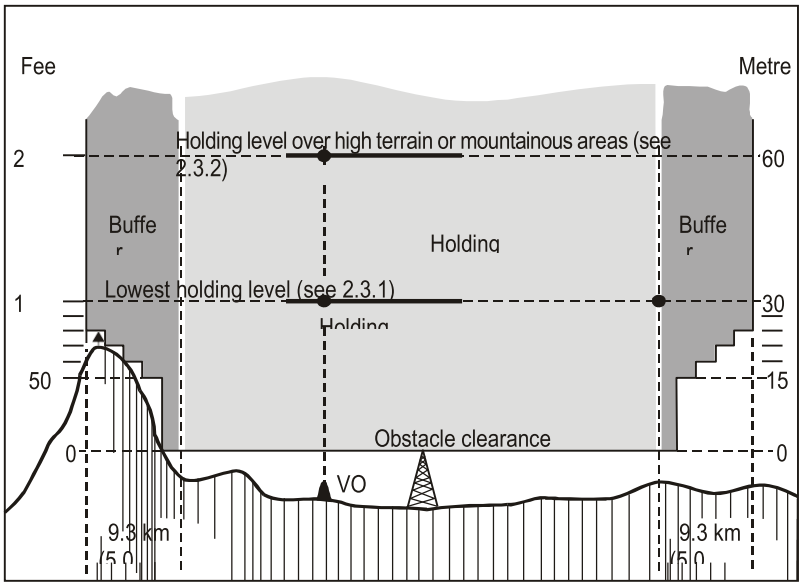
The minimum permissible holding level will provide a **MOC of atleast 300 m** or 600 m in mountainous terrain, is **applied throughout** the **holding area (asked in ANAC)**. This will include the holding pattern and any necessary adjacent airspace that would be used during a joining procedure.

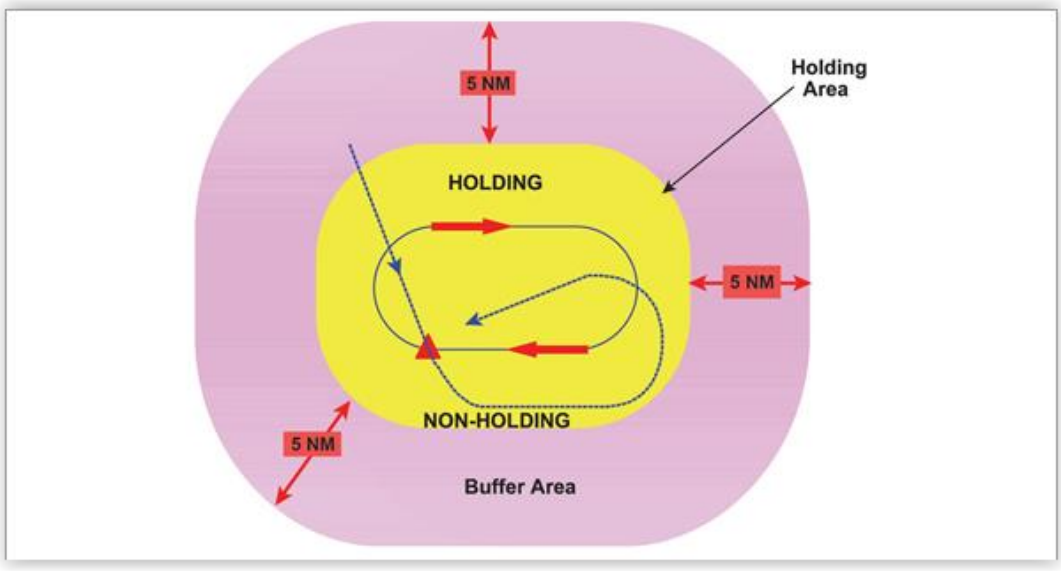
Buffer Area

An **additional buffer area** **extends** 9.3 km (**5.0 NM**) **beyond the boundary of the holding area (asked in ANAC)**. Significant obstacles in the buffer area are taken into consideration when determining the minimum holding level.

By 6.0 NM the clearance is 0m (asked in ANAC)

Distance beyond the boundary of the holding area	*Minimum obstacle clearance over low flat terrain*	
	Metres	*Feet*
0 to 1.9 km (0 to 1.0 NM)	300	984
1.9 to 3.7 km (1.0 to 2.0 NM)	150	492
3.7 to 5.6 km (2.0 to 3.0 NM)	120	394
5.6 to 7.4 km (3.0 to 4.0 NM)	90	295
7.4 to 9.3 km (4.0 to 5.0 NM)	60	197
Category H		
0 to 3.7 km (0 to 2.0 NM)	Linear 300 to 0	Linear 984 to 0





Altimeter Setting Procedures

These procedures describe the method for providing adequate **vertical separation between aircraft** and for providing **adequate terrain clearance during all phases of a flight (asked in ANAC)**. This method is based on the following basic principles:

- States may specify a fixed altitude known as the transition altitude. In flight, when an aircraft is **at or below the transition altitude**, its **vertical position is expressed in terms of altitude**, which is determined from an **altimeter set to sea level pressure (QNH)**. **(asked in ANAC)**
- In **flight** **above the transition altitude**, the **vertical position of an aircraft is expressed in terms of** **flight levels**, which are surfaces of **constant** atmospheric pressure based on an **altimeter setting of** **1 013.2 hPa**. **(asked in ANAC)**
- **(Asked in ANAC) The change in reference from altitude to flight levels, and vice versa, is made:**
  - **at the transition altitude, when climbing; and**
  - **at the transition level, when descending.**

General

Flight Levels

Flight level zero shall be located at the **atmospheric pressure level of 1 013.2 hPa**. **(asked in ANAC)**

To **convert** standard atmosphere FL **to altitude in meters** **divide** **it** **by 3.28**. **(asked in ANAC, example: FL150 = 15000ft = 15000/3.28 = 4573m)**

Transition altitude

Definition - The **altitude at or below** which the **vertical position** of an aircraft is controlled by **reference to altitudes**. **(asked in ANAC)** A transition altitude shall normally be specified for each aerodrome by the State in which the aerodrome is located.

Where **two or more closely spaced aerodromes are located** so that coordinated procedures are required, **a common transition altitude shall be established**. This common transition altitude shall be the **highest transition altitude** **that would be required if the aerodromes were considered separately**. **(asked in ANAC)**

The height above the aerodrome of the transition altitude shall be **as low as possible** but normally **not less than** 900 m (**3 000 ft**) **AGL**. **(asked in ANAC)**

The calculated height of the transition altitude shall be **rounded up to the next full 300 m (1 000 ft)**. **(asked in ANAC)**

Altimeter settings shall be **rounded down** to **the nearest lower whole hectopascal**. **(asked in ANAC)**

Transition altitudes shall be published in **AIP** and shown on the **appropriate charts**. **(asked in ANAC)**

Vertical position of aircraft operating **at or below the transition altitude** shall be **expressed** in **terms of altitude**. **(asked in ANAC)**

Transition level

Definition - **The lowest flight level available for use above the transition altitude.**

Vertical position **at or above the transition level** shall be **expressed** in terms of **flight levels**. **(asked in ANAC)**

Transition layer

Definition - The **airspace** **between the transition altitude and the transition level**. **(asked in ANAC)**

While **passing through the transition layer**, vertical position shall be expressed in terms of:

- **flight levels** when **climbing**; and
- **altitude** when **descending**. **(asked in ANAC)**

Take-off and Climb

A QNH altimeter setting shall be made available to aircraft in **taxi clearances prior to take-off**. **(asked in ANAC)**

Approach and Landing

The QNH altimeter setting shall be made available to aircraft in approach clearances and in clearances to enter the traffic circuit.

You get a **number (QNH)** during descent/before commencing an approach **before passing the transition level**. **(asked in ANAC)**

Latest QNH for aerodrome shall be obtained **prior to descending below the transition level**. **(asked in ANAC)**

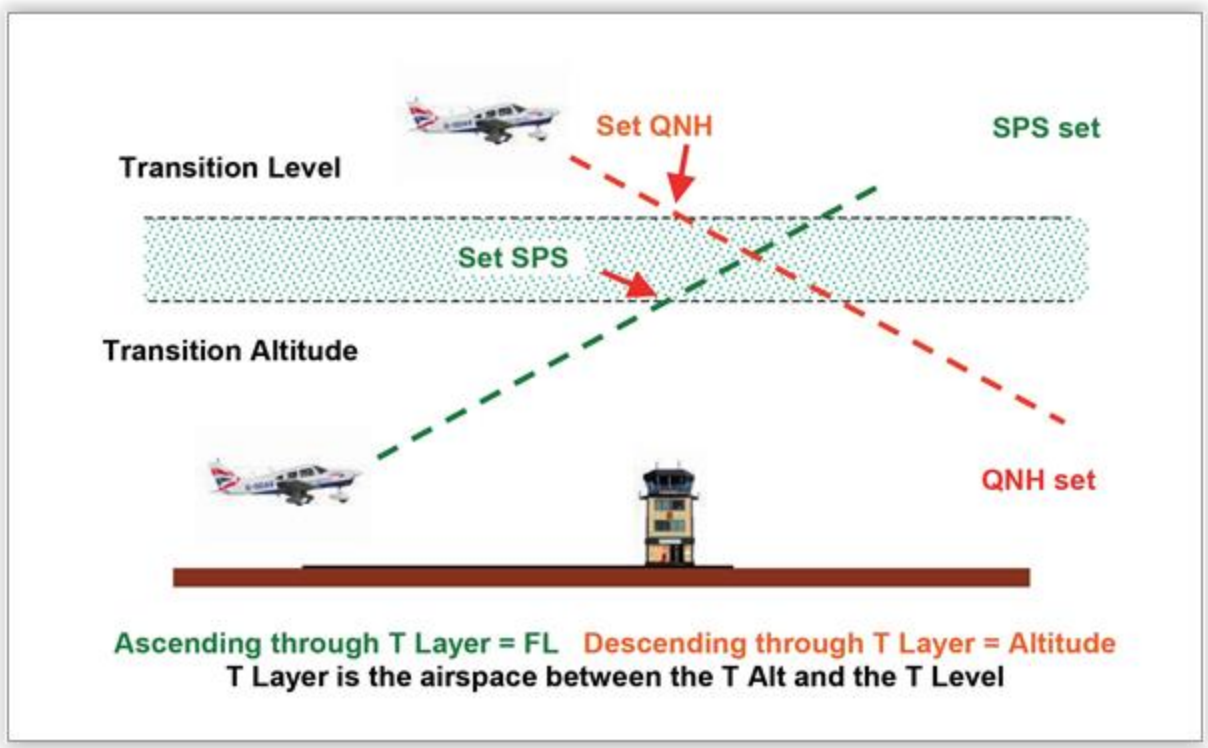
After approach clearance has been issued and the descent to land is begun, the **vertical positioning of an aircraft above the transition level may be by reference to altitudes (QNH)** provided that level flight above the transition altitude is not indicated or anticipated. **(asked in ANAC)**

Altimeter Tolerance

Preflight Altimeter check shall be done with the aircraft **at a known elevation on the aerodrome**. **(asked in ANAC)**

(Asked in ANAC) A serviceable altimeter indicates the elevation of the point selected, **plus the height of the altimeter above this point**, within a tolerance of:

- **±20 m or 60 ft** for altimeters with a test range of 0 to 9 000 m (**0 to 30 000 ft**); and
- **±25 m or 80 ft** for altimeters with a test range of 0 to 15 000 m (**0 to 50 000 ft**).



Parallel or Near-Parallel Instrument Runways Procedures

Modes of Operation

Modes One and Two — Simultaneous parallel instrument approaches

There are **two basic modes** of **operation** for **approaches made to parallel runways**:

Mode 1, Independent parallel approaches: In this mode, **radar separation minima** between aircraft using adjacent ILS and/or MLS are **not prescribed**.

Mode 2, Dependent parallel approaches: In this mode, **radar separation minima** between aircraft using adjacent ILS and/or MLS are **prescribed**. **(asked in ANAC)**

Mode 3 — Simultaneous instrument departures

In this mode, aircraft are departing in the same direction from parallel runways simultaneously. *Note.— When the minimum distance between two parallel runway centre lines is less than the specified value dictated by wake turbulence considerations, the parallel runways are considered as a single runway in regard to separation between departing aircraft. A simultaneous dependent parallel departure mode of operation is therefore not used.*

Mode 4 — Segregated parallel approaches/departures

In this mode, one runway is used for approaches and one runway is used for departures.

Definitions

Normal operating zone (NOZ)

This is airspace of defined dimensions extending to either side of an ILS localizer course and/or MLS final approach track centre line.

The **NOZ extends** from the runway threshold to **the point where aircraft are established on the centre line**. **(asked in ANAC)**

Only the inner half of the normal operating zone is taken into account in independent parallel approaches.

The width of the normal operating zone (NOZ) is contingent upon the facilities present at a given airport.

No transgression zone (NTZ)

In the context of independent parallel approaches, this is **a corridor of airspace** at least 610 m (2 000 ft) **wide** located centrally between the two extended runway centre lines. **It extends from the** nearer runway threshold **to the point where 300 m (1 000 ft)** vertical separation is reduced. **(asked in ANAC)**

Penetration of the NTZ by an aircraft requires **controller intervention** to manoeuvre any threatened aircraft on the adjacent approach. **(asked in ANAC)**

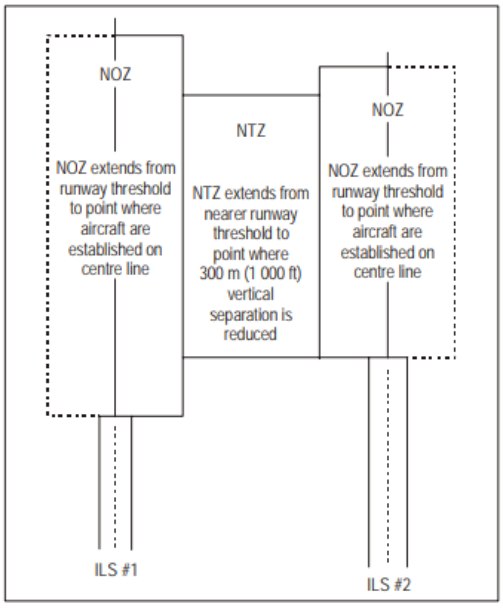


Figure III-2-1-1. Example of normal operating zones (NOZs) and no transgression zone (NTZ)

During the conduct of simultaneous independent parallel approaches it is vital that no aircraft enters the non-transgression zone (NTZ) which provides a safety buffer between the two approach paths. A small interception angle reduces the chances of such incursions and ICAO has decided upon the figure of **30 degrees**. **(asked in ANAC)**

Secondary Surveillance Radar – Transponder Operating Procedures

General

When an aircraft carries a serviceable transponder, the pilot **shall operate** the transponder **at all times during flight, regardless of whether the aircraft is within or outside airspace where secondary surveillance radar (SSR) is used for ATS purposes. (asked in ANAC)**

When the aircraft carries serviceable **Mode C** equipment, the pilot **shall continuously operate this mode, unless otherwise directed by ATC**. **(asked in ANAC)**

Pilots shall not SQUAWK IDENT unless requested by ATC. (asked in ANAC)

As studied before:

Mode A or C Code **7700**. The pilot of an aircraft in a **state of emergency** shall set the transponder to this code, unless ATC has previously directed the pilot to operate the transponder on a specified code.

Mode A or **C** Code **7600** - The pilot of an aircraft **losing two-way communications** shall set the transponder to this code.

Mode A or C Code **7500** - If there is **unlawful interference** with an aircraft in flight, the pilot-in-command shall attempt to set the transponder to this code in order to indicate the situation. If circumstances so warrant, Code 7700 should be used instead.

(Asked in ANAC. Mnemonic: 77 go to heaven, 76 radio fix, 75 man with knife)

Mode A or C Code **2000** - in the **absence of any ATC** directions or regional air navigation agreements where **radar service is available**, operate the transponder on this code. **(asked in ANAC)**

Mode C

All aeroplanes transponders shall be equipped with a data source that provides pressure-altitude information which is **accurate to** of 7.62 m (**25 ft**), or better. **(asked in ANAC)**

Mode C replies of transponders, always **report pressure altitude** in 30.50 m (**100 ft**) **increments (asked in ANAC)** irrespective of the resolution of the data source.

The pilot **does not need to transmit altitude information** in a position report when his **transponder** is **set** to "**Mode C**". **(asked in ANAC)**

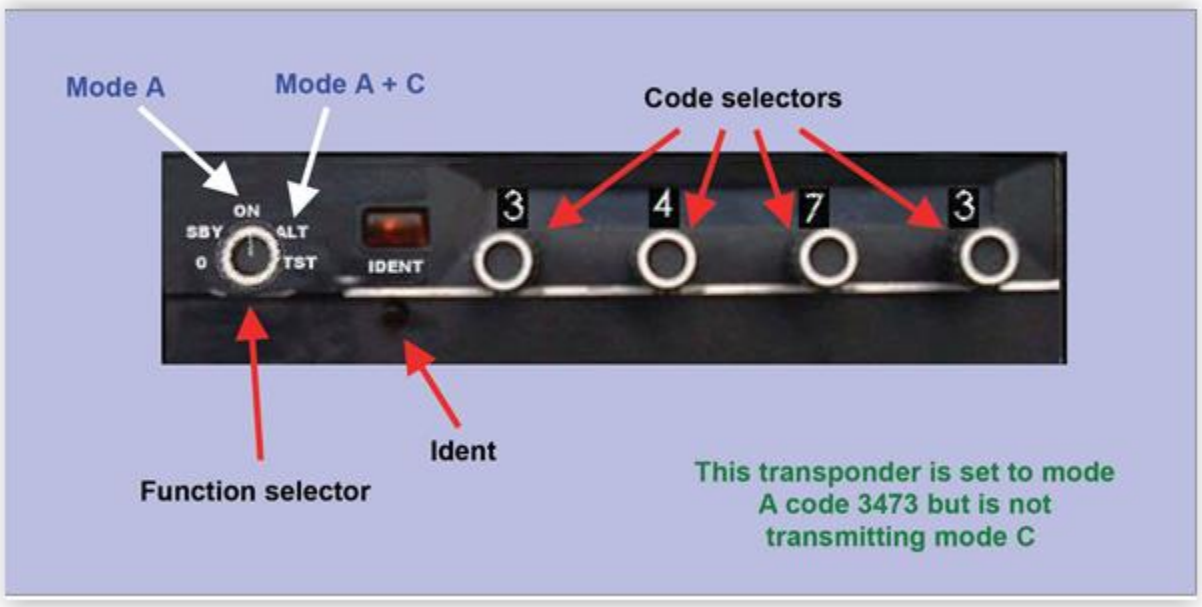
Transponder Failure

After Departure

ATC units **shall attempt** to **provide** for **continuation of the flight to the destination aerodrome** in accordance with the flight plan. **Pilots may, however, expect to comply with specific restrictions. (asked in ANAC)**

Before Departure

In the case of a transponder which has failed and cannot be restored **before departure**, pilots shall **indicate the transponder failure in the flight plan**, after that the **aircraft** concerned should be **permitted to proceed**, as directly as possible, to the **nearest suitable aerodrome where repair can be made**. **(asked in ANAC)**



Operation of Airborne Collision Avoidance System (ACAS)

The information provided by an ACAS is intended to assist pilots in the safe operation of aircraft by providing advice on appropriate action to reduce the risk of collision.

This is achieved through resolution advisories (RAs), which propose vertical manoeuvres that are predicted to increase or maintain separation from threatening aircraft, and through traffic advisories (TAs), which indicate the approximate positions of intruding aircraft that may later cause resolution advisories.

Pilots **shall not manoeuvre** their aircraft **in response to traffic advisories (TAs) only**, but **shall** use all available information to **prepare for appropriate action if an RA occurs**.

In the event of an RA, pilots shall:

- **respond immediately by following the RA as indicated**, **unless doing so would jeopardize the safety of the aeroplane (asked in ANAC)**; (Stall warning, wind shear, and ground proximity warning system alerts have precedence over ACAS.)
    - Note — **Visually acquired traffic may not be the same traffic causing an RA. Visual perception of an encounter may be misleading**, particularly at night.

- **follow the RA even if there is a conflict between the RA and an air traffic control (ATC)** instruction to manoeuvre; **(RA has priority over ATC!)**
- not manoeuvre in the opposite sense to an RA;
- **promptly comply with any modified RAs**; **(this is asked in ANAC, but you really should know: If it instructs you to descend and a few seconds later to climb you follow it, never doubt RA!)**

Air Traffic Services and Management

Abbreviations

ACC – Area Control Centre

ADA – Advisory Area

ADR – Advisory Route

AFIS - Aerodrome Flight Information Service

ATCRU - Air Traffic Control Radar Unit

All asked in ANAC

Definitions

Most of them, if not all, are asked in ANAC

Automatic Dependent Surveillance (ADS) – A surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position and additional data as appropriate.

Aerodrome Flight Information Service - ATSU responsible for FIS and alerting service to aerodrome traffic of a non-controlled aerodrome.

Aerodrome traffic - All traffic **on the manoeuvring area** of an aerodrome and all aircraft **flying in the vicinity of an aerodrome**.

AIRMET information - Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air traffic services unit - A generic term meaning variously, **air traffic control unit (area control centre, approach control centre, aerodrome control tower), flight information centre or air traffic services reporting office**.

Airway – A control area or portion thereof established in the form of a **corridor**.

Area control centre (ACC) - A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Clearance limit - The **point** to which an aircraft is granted an air traffic control clearance (**to which a specific clearance is valid**).

Control area - A controlled airspace extending upwards from a specified limit above the earth.

Controlled aerodrome - An aerodrome at which **air traffic control service is provided to aerodrome traffic** by an **aerodrome control tower**.

Controlled airspace - An airspace of defined dimensions (**within a FIR/UIR**) in which **air traffic control service is provided** in accordance with the airspace classification.

Controlled flight - Any flight which is **subject to an air traffic control clearance**.

Control zone - A controlled airspace extending upwards from the **surface** of the earth to a specified upper limit.

Current flight plan (CPL) - The flight plan, including changes, if any, brought about by subsequent clearances.

Estimated time of arrival - **For IFR flights**, the **time at which it is estimated** that the aircraft will **arrive overhead the initial approach fix (IAF)**, or, if no navigation aid is associated with the aerodrome, the time at which the aircraft will arrive over the aerodrome. For VFR flights, the time at which it is estimated that the aircraft will arrive over the aerodrome.

Flight information region - An airspace of defined dimensions within which **flight information service** and **alerting service** are provided.

Manoeuvring area - That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, **excluding aprons**.

Movement area - That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Procedural control - Term used to indicate that information derived from an ATS surveillance system is not required for the provision of air traffic control service.

Procedural separation - The separation used when providing procedural control.

Terminal control area (TMA) - A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Visual approach - An approach **by an IFR flight** when either part or all of an instrument approach procedure is not completed and the **approach is executed in visual reference to terrain**.

Airspace

Division of Airspace

All the airspace within a state must be contained within one or more **Flight Information Regions (FIR)**. As well as FIRs, the airspace of a state will be divided into Control Areas (CTAs) and Control Zones (CTRs) and may include restricted, prohibited and danger areas. The airspace in the vicinity of an aerodrome is known as an Aerodrome Traffic Zone (ATZ).

Upper Information Regions (UIRs)

In some cases, there is a vertical division of the FIR, in which case the lower portion remains named as FIR, whereas the airspace above is named **Upper Information Region or UIR**.

Such a division facilitates the application different rules and standards with those applicable in the underlying flight information region. (asked in ANAC).

Open FIR

Airspace within an FIR that is not defined as a CTA, CTR or other 'restricted' airspace is known as the open FIR. Within the open FIR the only air traffic services offered are a **Flight Information Service and the Alerting Service**.

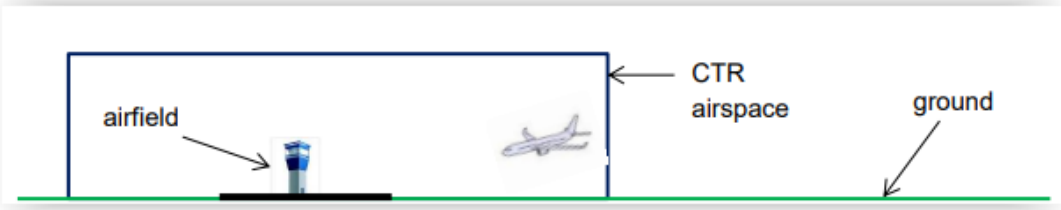
Air Traffic Control is only provided inside what is known as **controlled airspace (CAS)**. CAS comprises CTAs and CTRs. The primary function of CTAs/CTRs is to facilitate ATC to IFR traffic.

Control Zone (CTR)

A **control zone** named CTR or known as controlled traffic region is a **controlled airspace**, normally around an airport, **which extends from the surface to a specified upper limit**, established to protect air traffic operating to and from that airport.

The **minimum lateral limits of a control zone shall extend to at least 9.3 km (5 NM)** from the centre of the aerodrome or aerodromes concerned **in the directions from which approaches may be made**. **(asked in ANAC)**

If established within the lateral limits of a CTA, the CTR must extend upwards to the lower limit of the CTA.



Control Area (CTA)

Control areas shall be delineated so as to encompass sufficient airspace to contain the flight paths of those IFR flights or portions thereof to which it is desired to provide the applicable parts of the air traffic control service, taking into account the capabilities of the navigation aids normally used in that area. A control area named **CTA** is a controlled airspace that exists in the vicinity of an airport, which **extends from a lower level to a specified upper level**.

The **lower limit of a control area** shall be established at a **height above the ground or water of not less than 200 m (700 ft)**. **(asked in ANAC)**

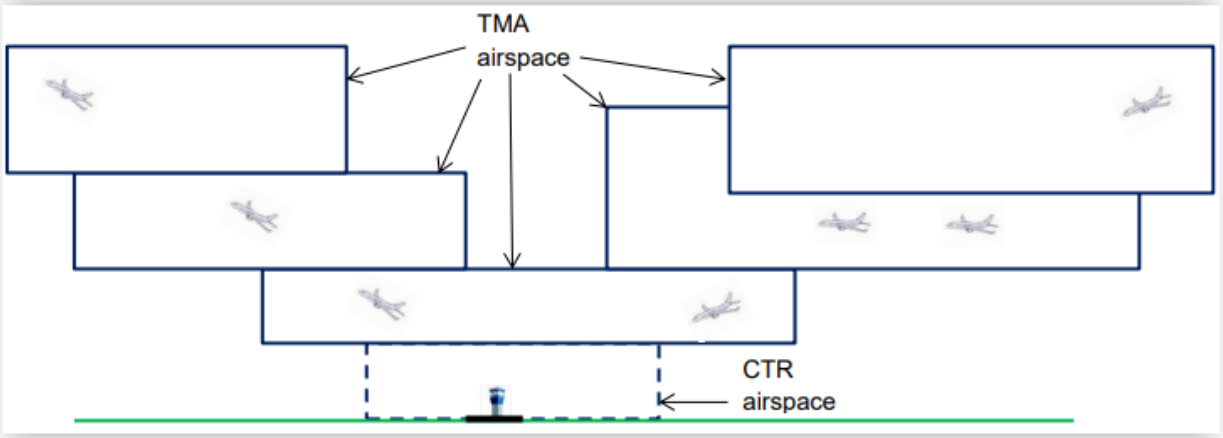
A CTA can be formed by:

- **Terminal control areas (TMA)** of sufficient size to contain the controlled traffic around the busier aerodrome
- Interconnecting **airways** (corridors linking to other CTAs)
- Area-type control areas which specific ATS routes have been defined for the purpose of flight planning and which provide for the organization of an orderly traffic flow.
- In the case of oceanic airspace, control areas may be achieved by the establishment of one or more route structures serving specific traffic flows.

Terminal Control area (TMA)

A terminal area named TMA or known as terminal manoeuvring area is a controlled airspace surrounding a major airport with a high volume of traffic.

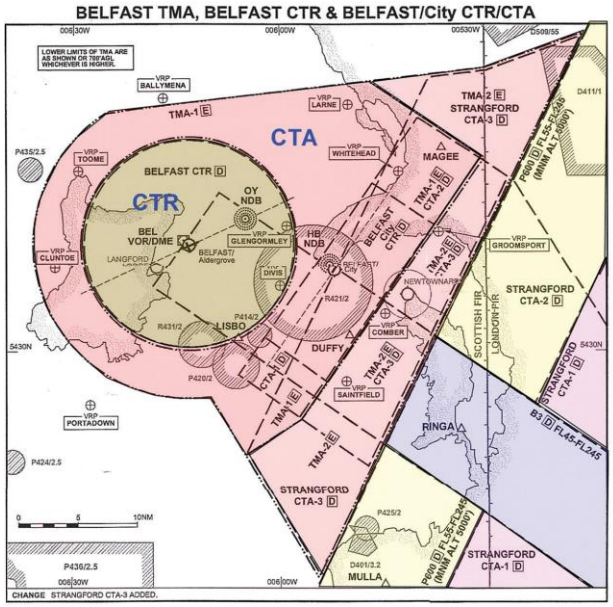
It differs from a control area or CTA in that it is divided in several levels of larger areas.



Oceanic Control Areas (OCAs)

Over large areas of the world's Oceans e.g. the North Atlantic, traffic control has special problems (i.e. relatively poor navigation and of necessity HF communications requiring the use of radio operators). To solve the problems, or at least to make them manageable, the airspace above FL55 over the Oceans is designated as OCAs where strict rules are enforced and special navigation procedures are applied.

CTR and CTA



Airspace restrictions

Each State can define parts of its airspace so that flights within such defined airspace are prohibited, restricted or performed with care. Airspace restrictions can take the following form:

- **Danger area**
- **Restricted area**
- **Prohibited area**

Each prohibited area, restricted area, or danger area established by a State shall, upon initial establishment, **be given an identification** and full details shall be promulgated.

(Asked in ANAC) The identification shall be composed of a group of letters and figures as follows:

- **nationality letters for location indicators** assigned to the State or territory which has established the airspace;
- **a letter P for prohibited area, R for restricted area and D for danger area as appropriate**; and
- **a number/figures**, unduplicated within the State or territory concerned.

To avoid confusion, **identification numbers shall not be reused for a period of at least one year after cancellation of the area to which they refer**. **(asked in ANAC)**

Classes of Airspace

(Asked in ANAC, sadly you really have to know these and there is no easy way :(, try to search on YouTube for explanation videos)

Class A - IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Class B - IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

Class C - IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. **VFR flights are separated from IFR flights** and receive traffic information in respect of other VFR flights.

Class D - IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

Class E - IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive **traffic information as far as is practical**. Class E shall not be used for control zones.

Class F - IFR and VFR flights are permitted, all participating IFR flights receive an **air traffic advisory service** and all flights receive **flight information service** if requested. **(only with air traffic advisory)**

Note.— Where air traffic advisory service is implemented, usually a temporary measure only until such time as it can be replaced by air traffic control.

Class G - IFR and VFR flights are permitted and receive flight information service **if requested**.

SVFR

All classes of airspace which **support the establishment of a CTR** permit flight under SVFR **(class E)**. Ground visibility needs to be 1500m. **(asked in ANAC)**

Speed Limit

250 kt IAS is applied to **VFR traffic in class C** and **all traffic in classes D - G below 10 000 ft**.

Flight Information Service

Shall be provided to aircraft in order to avoid collision hazards, to aircraft operating in airspace Classes **C, D, E, F and G**. **(asked in ANAC)**.

Class	*Type of flight*	*Separation provided*	*Service provided*	*Speed limitation**	*Radio communication requirement*	*Subject to an ATC clearance*
A	IFR only	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
B	IFR	All aircraft	Air traffic control service	**Not applicable**	Continuous two-way	Yes
	VFR	All aircraft	Air traffic control service	**Not applicable**	Continuous two-way	Yes
C	IFR	IFR from IFR IFR from VFR	Air traffic control service	**Not applicable**	Continuous two-way	Yes
	VFR	VFR from IFR	1) Air traffic control service for separation from IFR; 2) VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
D	IFR	IFR from IFR	Air traffic control service, traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	IFR/VFR and VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
E	IFR	IFR from IFR	Air traffic control service and, **as far as practical**, traffic information about VFR flights	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Traffic information **as far as practical**	250 kt IAS below 3 050 m (10 000 ft) AMSL	**No**	**No**
F	IFR	IFR from IFR as far as practical	Air traffic advisory service; flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	**No**	No
G	IFR	Nil	Flight information service, **if requested**	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service, **if requested**	250 kt IAS below 3 050 m (10 000 ft) AMSL	**No**	No

* When the height of the transition altitude is lower than 3 050 m (10 000 ft) AMSL, FL 100 should be used in lieu of 10 000 ft.

Required Navigation Performance (RNP)

RNP is a numerical representation of the navigational accuracy required within ATS airspace of a State. RNP is a statement of **navigation performance necessary** for **operation within a defined airspace**. **(asked in ANAC)**.

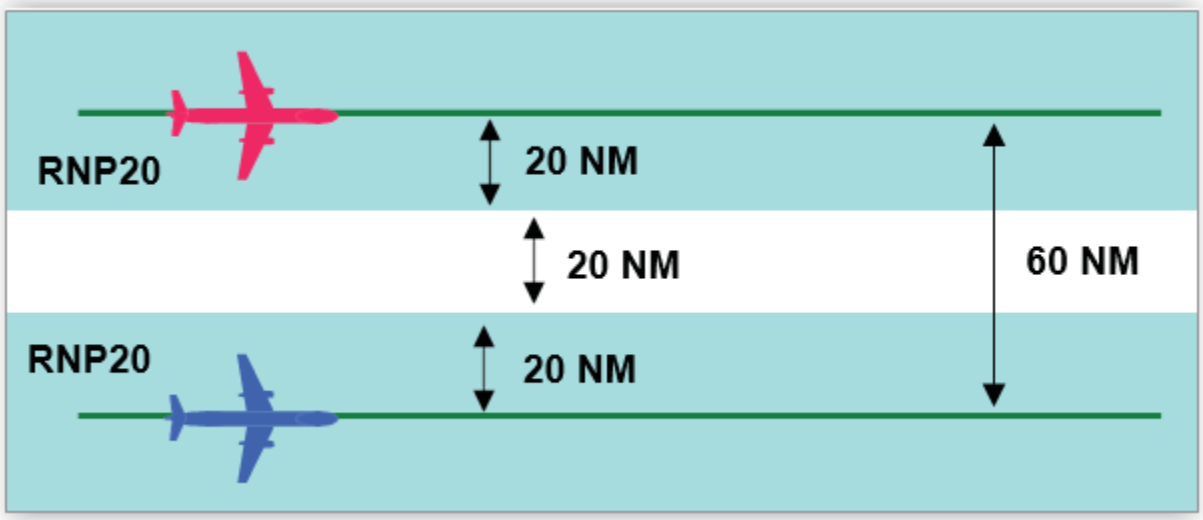
It is **based on a 95% containment factor expressed as a distance in nautical miles (asked in ANAC)**, implying that an aeroplane will be within the required RNP for a period of not less than 95% of the time the aircraft is within the airspace concerned. Alternatively, it can be implied that not less than 95% of the aircraft flying in a given airspace will be navigated within the stated RNP factor.

RNP types shall be prescribed by States. When applicable, the RNP type(s) for designated areas, tracks or ATS routes **shall be prescribed on the basis of regional air navigation agreements**. **(asked in ANAC)**

Required Navigation Performance **is determined by the level of communications, navigation and air traffic services provided in the airspace concerned**. **(asked in ANAC)**

Example:

A good example of how RNP is used is the track spacing used for the NAT tracks in the MNPSA of the North Atlantic Oceanic regions. The airspace is classified as RNP20 therefore the aircraft flying the routes will be within 20 NM of the plotted position for not less than 95% of the flight time. This means that the airspace reserved to a NAT track must be 20 NM either side of the specified route. The additional safety 'buffer' will be equal to the RNP so the track spacing will be 20 + 20 + 20 = 60 NM.



Airways and ATS Routes

Route Designators

Airways are given a 'designator' which defines the type of airway, gives it a unique number and provides additional information about the type of route. The specific route designator indicates what type of route is defined and, in addition, a unique number (1 - 999).

The number of characters required to compose the designator **shall not exceed six characters**. **(asked in ANAC)**

The number of characters required to compose the designator should, **whenever possible**, **be kept to a maximum of five characters**. **(asked in ANAC)**

A **prefix** can be added from the following list:

- **U = Upper air route (asked in ANAC)**
- S = Supersonic transport route
- **K = (KOPTER) Helicopter low level route (asked in ANAC)**

Additionally **suffixes** may be applied from the list:

- F = Advisory route (Class F airspace)
- G = FIS route (Class G airspace)
- **Y** = RNP1 route **at and above FL200** where turns between 30° and 90° are to be made within the allowable RNP tolerance of a tangential arc defined by **a radius of 22.5 NM**. **(asked in ANAC)**
- **Z** = RNP1 route **at and below FL190** where turns between 30° and 90° are to be made within the allowable RNP tolerance of a tangential arc defined by **a radius of 15 NM**. **(asked in ANAC)**

Mnemonic found in the comments:
wh**Y**, she looks **22.5** and actually she is **200**?
Zorro, 5 letters – **15** and **memorize 190**.

Air Traffic Services

General

Annex 11 to the Chicago Convention lays down the SARPs for the establishment of an Air Traffic Control services in each of the contracting states. Each state is required to establish an authoritative body responsible for setting up and regulating the operation of the ATS of the state.

Objectives of the air traffic services

(Asked in ANAC) The objectives of the air traffic services shall be to:

- **prevent collisions between aircraft**;
- **prevent collisions between aircraft on the maneuvering area and obstructions on that area**;
- **expedite and maintain an orderly flow of air traffic**;
- provide advice and information useful for the safe and efficient conduct of flights;
- notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Divisions of the air traffic services

(Asked in ANAC) ATS comprises **three divisions**:

- **Air Traffic Control Service (ATC)**
- **Flight Information Service (FIS)**
- **Alerting Service**

ATC Service

The ATC Service is divided into three sub-divisions:

- **Area Control Service**. The provision of ATC **for controlled flights within CTAs and en route in FIRs and UIRs**.
- **Approach Control Service**. The provision of ATC **for controlled flights associated with arrival and departure (asked in ANAC)**. Usually provided within CTRs.
- **Aerodrome Control Service**. The provision of ATC to **aerodrome traffic at controlled aerodromes**.

Needs for ATS

The need for the **provision of air traffic services** shall be determined by **consideration** of the following:

- the types of air traffic involved;
- the density of air traffic;
- the meteorological conditions;
- such other factors as may be relevant.

The carriage of **airborne collision avoidance systems (ACAS)** by aircraft in a given area **shall not be a factor** in determining the need for air traffic services in that area.

ATS units comprise Air Traffic Control Units (ATCUs) and **Flight Information Centres (FICs)**.

The ATS unit providing **ATC are ATCUs** and those providing **flight information are FICs**.

Air Traffic Control Service

Air traffic control service shall be provided:

- to all IFR flights in airspace Classes A, B, C, D and E;
- to all VFR flights in airspace Classes B, C and D;
- to all special VFR flights;
- to all aerodrome traffic at controlled aerodromes.

Provision of air traffic control service

1) The ATCU providing **area control** (ATC to en route traffic) is known as an **Area Control Centre (ACC)**. It is usual to prefix the unit with a geographical name e.g. London ACC.

2) The unit providing **approach control** is the **approach control office** usually located in a control tower at an aerodrome.
   - Combined approach control offices exist where approach control for multiple aerodromes/CTRs is provided
     e.g. London Terminal Control Centre (LTCC) which provides approach control for Heathrow, Gatwick, Stansted, Luton, London City, Biggin Hill and Northolt.

3) **Aerodrome Control** is provided by an **aerodrome control tower**.

4) The **ground movement of aircraft and vehicles** is the **responsibility** of the **aerodrome controller**. At major aerodromes, the movement of aeroplanes and vehicular traffic on the apron may be delegated to an **Apron Management Service**. In this case, ATC would commence once the aircraft moves onto the taxi-way and will cease when the pilot takes instructions from a marshaller.

Time

Air traffic services units shall use **Coordinated Universal Time (UTC)** and shall express the time in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.

Air traffic services unit clocks and other time-recording devices shall be checked as necessary to **ensure correct time to within plus or minus 30 seconds of UTC**. **(asked in ANAC)**

Aerodrome control towers shall, **prior to an aircraft taxiing for take-off**, **provide the pilot with the correct time (asked in ANAC)**, unless arrangements have been made for the pilot to obtain it from other sources. **Time checks shall be done before taxiing for take-off and be given to the nearest half minute**. **(asked in ANAC)**

Responsibility of Control

A controlled flight shall be under the control of **only one** air traffic control unit at any given time.

Transfer of Control

The responsibility for the control of an aircraft shall be transferred **from the ATC unit to the next unit** at the time of crossing the common control area boundary as determined by the unit having control of the aircraft or at such other point or time as has been agreed between the two units.

The transfer of an aircraft from one ATC unit to another shall only be done **by agreement with the receiving unit**. **(asked in ANAC)**

The responsibility for the control of an arriving aircraft shall be **transferred from the unit providing approach control service to the aerodrome control tower**, when the aircraft:

- **is in the vicinity of the aerodrome (asked in ANAC)**, and:
  1. it is considered that approach and landing will be completed in visual reference to the ground, or
  2. it has reached uninterrupted visual meteorological conditions, or
- is at a prescribed point or level, as specified in letters of agreement or ATS unit instructions; or
- has landed.

ATC Clearances

An ATC clearance is authorization for an aircraft to proceed under conditions specified by an ATCU. **Clearances are issued solely for expediting and separating controlled flights (asked in ANAC)** and are based on known traffic conditions. This includes traffic moving on the ground at an airport as well as airborne traffic.

Clearances issued by air traffic control units shall provide separation:

- between all flights in airspace Classes A and B;
- between IFR flights in airspace Classes C, D and E;
- between IFR flights and VFR flights in airspace Class C;
- between IFR flights and special VFR flights;
- between special VFR flights when so prescribed by the appropriate ATS authority,

If a clearance given to a pilot is unsuitable (or impossible to comply with), an **alternative clearance may be requested**. **(asked in ANAC)**

(Asked in ANAC) An air traffic control clearance shall indicate:

1. **aircraft identification as shown in the flight plan;**
2. **clearance limit;**
3. **route of flight;**
4. **level(s) of flight** for the entire route or part thereof and changes of levels if required;
5. any necessary instructions or information on other matters such as approach or departure manoeuvres, communications and the time of expiry of the clearance.

Change-over points should be established on ATS route segments defined by reference to very high frequency omnidirectional radio ranges where this will assist accurate navigation along the route segments. **The establishment of change-over points should be limited to route segments of** 110 km (**60 NM**) **or more**. **(asked in ANAC)**

Control of persons and vehicles at aerodromes

The **movement of persons or vehicles including towed aircraft on the manoeuvring area of an aerodrome shall be controlled by the aerodrome control tower as necessary** to avoid hazard to them or to aircraft landing, taxiing or taking off.

When **Low Visibility Operations** are in force (ground visibility below 800 m) persons and vehicles operating on the manoeuvring area will be kept to a minimum. Special procedures will be implemented to safeguard the ILS/MLS sensitive areas when CAT II and CAT III precision instrument operations are in progress (ground visibility less than 550 m).

Emergency vehicles proceeding to the assistance of an aircraft in distress shall be afforded **priority over all other surface movement traffic**.

The following **rules** cover the **movement of vehicles on the manoeuvring area of an aerodrome**:

- Vehicles and vehicles towing aircraft are to give way to aircraft that are landing, taxiing or taking off.
- Vehicles are to give way to vehicles towing aircraft.
- Vehicles will give way to other vehicles in accordance with ATS unit instructions.
- Notwithstanding the above, vehicles and vehicles towing aircraft are to comply with instructions issued by the aerodrome control tower.

Flight Information Service

As already stated, the basic unit of airspace within a state is the Flight Information Region (FIR). In theory, a FIR can exists without CAS, in which case the only services provided to air traffic would be a flight information service (FIS) and the alerting service.

(Asked in ANAC) Flight information service shall be provided to all aircraft which are likely to be affected by the information and which are:

- **provided with air traffic control service; or**
- **otherwise known to the relevant air traffic services units**

The information provided by the FIS is to include:

- **SIGMET and AIRMET**;
- Volcanic eruption activity;
- Release of radioactive or toxic material into the atmosphere;
- Information concerning change of serviceability of radio navigation aids;
- Information concerning change of conditions concerning aerodromes;
- Information concerning unmanned free balloons;
- Other information considered pertinent to safety.

Additionally, information is to be provided concerning:

- **Weather conditions reported or forecast** at departure, destination or alternate aerodromes;
- **Collision hazards to aircraft operating in classes C, D, E, F and G airspace**; **(asked in ANAC)**
- For flights over sea areas (when requested by pilots), details of surface vessels.

AIRMET

Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

SIGMET

Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations.

Severe turbulence, severe squall lines, heavy hail or severe icing would cause a **SIGMET** to be transmitted to aircraft flying at subsonic cruising levels. **(asked in ANAC)**

ATIS

Automatic Terminal Information Service (ATIS) (asked in ANAC) broadcasts consist of two types of broadcast: Voice ATIS and Data ATIS. The **preparation and dissemination of the ATIS message** shall be the **responsibility of the air traffic services** (**asked in ANAC)**. ATS is responsible for making sure that the service is available and up to date.

Voice ATIS is **continuous and repetitive**. ATIS information normally relates to a single aerodrome and the **broadcast should not last longer than 30 seconds (asked in ANAC)**.

When ATS receive **any official weather update, regardless of content change**, they **prepare and broadcast new ATIS**. (**asked in ANAC)**

ATIS is **also updated immediately any significant change occurs, for example when receiving a MET REPORT SPECIAL (SPECI)**. (**asked in ANAC)**

Each sequence of ATIS broadcasts will have a specific sequential broadcast designator letter. On initial contact with ATC, aircraft are to acknowledge receipt of the relevant ATIS with reference to the current information designator.

Transmission of ATIS

Voice ATIS is usually transmitted on a **discrete VHF frequency** (displayed on all aerodrome plates). It may be transmitted on the **voice channel of a relevant VOR** (e.g. departure ATIS on the VOR used as the primary VOR for a SID; or arrival ATIS on the VOR that serves as the IAF for a procedure).

ATIS shall not be transmitted on the voice channel of ILS. (asked in ANAC)

Cloud Information

The ATIS broadcast will **only include cloud cover when the cloud base is below 5000 ft or the highest MSA (whichever is higher), or when cumulonimbus cloud is present**. **(asked in ANAC)**

Alerting Service

The Alerting Service is the link between the aircraft needing assistance, and the services that can provide that assistance. Where necessary, the provision of a service to aircraft in need of assistance will have priority over all other air traffic services. Alerting Service is **provided by the ATS unit responsible for the aircraft at that moment**. **(asked in ANAC)**

(Asked in ANAC) Alerting service shall be provided:

- **for all aircraft provided with air traffic control service;**
- **in so far as practicable, to all other aircraft having filed a flight plan or otherwise known to the air traffic services; and**
- **to any aircraft known or believed to be the subject of unlawful interference.**

Flight information centres or area control centres (air traffic control centres) shall serve as the central point for collecting all information relevant to a state of emergency of an aircraft operating within the flight information region or control area concerned and for **forwarding such information to the appropriate rescue coordination centre**. This means that they are **responsible for triggering of the alert phase**. **(asked in ANAC, also calling them operational air traffic control centres)**

Within a FIR, the provision of **FIS and the Alerting service may be from the same ATS unit**. **(asked in ANAC)**

Stages of Emergency (Emergency Phase)

Uncertainty phase (code word: INCERFA)

This stage exists when **no communication has been received from an aircraft within a period of 30 minutes after a time at which normal communication should have been made**, or **the aircraft fails to arrive at the destination within 30 minutes of the estimated arrival time (asked in ANAC)**.

If pilot lands at different aerodrome than the specified in flight plan, he must ensure that ATS unit at the flight plan destination aerodrome is informed **30 minutes within his planned ETA**. **(asked in ANAC)**

Alert phase (codeword: ALERFA)

The alert phase would be declared following the uncertainty phase when:

- Subsequent attempts to make communication have failed and there is not further news of the aircraft; or
- The **aircraft fails to land within 5 minutes after the issuing of a landing clearance (asked in ANAC)**; or
- Information has been received that the operating efficiency of the aircraft is impaired (but not that a forced landing is likely); or
- It is known that an **aircraft has been subject to unlawful interference (asked in ANAC)**.

Alert phase is immediately activated when evidence **exists** that would allay **apprehension as to the safety of the aircraft or its occupants**. **(asked in ANAC)**

Distress phase (codeword: DETRESFA)

The distress phase would be declared following the alert phase (except where there is reasonable certainty that the aircraft and its occupants are not threatened by grave and imminent danger) when:

- Further attempts at communication are unsuccessful and widespread enquiries indicate the probability that the aircraft is in distress; or
- **The fuel on board is considered to be exhausted (asked in ANAC)**; or
- Information is received that the operating efficiency of the aircraft is impaired to the extent that a forced landing is likely; or
- Information is received that the aircraft is about to or has made a forced landing.

Distress: a condition of being threatened by **serious and/or imminent danger and of requiring immediate assistance**. **(asked in ANAC)**

Urgency: a condition concerning the safety of an aircraft or other vehicle, or of some person onboard or within sight, but which does not require immediate assistance.

Emergency Frequencies

- VHF **121.500 MHz** (Aeronautical mobile emergency VHF)
- UHF **243.000 MHz** (Aeronautical mobile emergency UHF)
- HF **2182 kHz** (International maritime distress and calling HF)

(Asked in ANAC, 2430 kHz and 123.45 MHz are NOT emergency frequencies)

The worst part of Air Law, good luck!

Air Traffic Management

Document 4444

Because the SARPs of Annex 11 are (by necessity) insufficiently detailed, **PANS-ATM (Air Traffic Management)** (Document 4444) is published by ICAO as the definitive reference for the establishment and management of an ATS.

General provisions for air traffic services

Air traffic control clearances

Scope and purpose

If an air traffic control clearance is not suitable to the pilot-in-command of an aircraft, the flight crew **may request and, if practicable, obtain an amended clearance**.

The issuance of air traffic control clearances by air traffic control units constitutes authority for an aircraft to proceed only in so far as known air traffic is concerned. ATC clearances do not constitute authority to violate any applicable regulations for promoting the safety of flight operations or for any other purpose; Also, clearances do **not relive pilots from their responsibility to comply with rules and regulations**. **(asked in ANAC)**

Description of air traffic control clearances

Clearance Limit

A clearance limit shall be described by specifying the **name of the appropriate significant point, or aerodrome, or controlled airspace boundary**. **(asked in ANAC)**

Readback of clearances

The flight crew **shall read back** to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items **shall always be read back**:

a) **ATC route clearances**; **(asked in ANAC, read back the entire clearance as required by regulation)**

b) clearances and instructions to enter, land on, take off from, hold short of, cross, taxi and backtrack on any runway; and

c) runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in automatic terminal information service (ATIS) broadcasts, transition levels.

Horizontal speed control instructions

In order to facilitate a safe and orderly flow of traffic, aircraft may, subject to conditions specified by the appropriate authority, be instructed to adjust speed in a specified manner. Flight crews should be given adequate notice of planned speed control.

Descending and arriving aircraft

Only minor speed adjustments not exceeding plus/minus 40 km/h (**20 kt**) IAS should be used for aircraft on **intermediate and final approach**. **(asked in ANAC)**

Speed control should not be applied to aircraft after passing a point 7 km **(4 NM) from the threshold on final approach**. **(asked in ANAC)**

Change from IFR to VFR flight

Change from instrument flight rules (IFR) flight to visual flight rules (VFR) flight is possible **if the commander so requests (asked in ANAC)**.

It is only acceptable when a message **initiated by the pilot-in-command containing the specific expression "CANCELLING MY IFR FLIGHT" (asked in ANAC)**, together with the changes, if any, to be made to the current flight plan, is received by an air traffic services unit. No invitation to change from IFR flight to VFR flight is to be made either directly or by inference.

The flight plan automatically becomes a VFR flight plan.

Altimeter setting procedures

Expression of vertical position of aircraft

Vertical position of aircraft operating **at or below the transition altitude** shall be **expressed** in **terms of altitude**.

Vertical position **at or above the transition level** shall be **expressed** in terms of **flight levels**.

While **passing through the transition layer**, vertical position shall be expressed in terms of:

- **flight levels** when **climbing**; and
- **altitude** when **descending**. **(asked in ANAC)**

Determination of the transition level **(asked in ANAC)**

Example: Transition altitude = 3000ft and local QNH = 990 hPa

Calculate the pressure difference between the standard pressure (1013 hPa) and the local QNH.

1013 hPa – 990 hPa = **23 hPa**

1 hPa is equal to 30ft, so **23 hPa** is (23x30) **690ft**

Add the difference to the Transition altitude (3000 ft + 690 ft = **3690 ft**) and select the next higher answer, for example **FL40 (4000 ft)**.

Provision of altimeter setting information

Appropriate ATS units shall at all times have available for transmission to aircraft in flight, on request, the information required to determine the lowest flight level which will ensure adequate terrain clearance on routes or segments of routes for which this information is required.

Transition level can be obtained by consulting **ATS Units**: **voice communications (ATC), ATIS broadcast or data link**. **(asked in ANAC)**

The flight crew shall be provided with the **transition level** in due time **prior to reaching it during descent**. The **transition level** shall be included in **approach clearances (before commencing an approach to an aerodrome)** when so prescribed by the appropriate authority or requested by the pilot. **(asked in ANAC)**

A **QNH altimeter setting** shall be included in the descent clearance when first cleared to an altitude below the transition level, in **approach clearances or clearances to enter the traffic circuit**, and in **taxi clearances for departing aircraft**, except when it is known that the aircraft has already received the information. **(asked in ANAC)**

Position reporting

Transmission of position reports

On routes defined by designated significant points, position reports shall be made by the aircraft when **over**, **or** as soon as possible **after passing**, **each designated compulsory reporting point (asked in ANAC)**, except as provided in ******. Additional reports over other points may be requested by the appropriate ATS unit.

Flight plan shows the route on the basis of designated significant points; therefore, **position reports shall be made when a flight plan must be submitted**. **(asked in ANAC)**

On routes not defined by designated significant points, position reports shall be made by the aircraft as soon as possible after the first half hour of flight and at hourly intervals thereafter, except as provided in ******. Additional reports at shorter intervals of time may be requested by the appropriate ATS unit.

******Under conditions specified by the appropriate ATS authority, flights may be exempted from the requirement to make position reports at each designated compulsory reporting point or interval. In applying this, account should be taken of the meteorological requirement for the making and reporting of routine aircraft observations.

Pilot must make position reports **when requested by the appropriate ATS unit** regardless of flight type and time of day. **(asked in ANAC)**

Contents of voice position reports

The position reports shall contain the following elements of information, except that elements d), e) and f) **may be omitted** from position reports transmitted by radiotelephony, when so prescribed on the basis of regional air navigation agreements: **(asked in ANAC)**

a) aircraft identification;
b) position;
c) time;
d) flight level or altitude, including passing level and cleared level if not maintaining the cleared level;
e) next position and time over; and
f) ensuing significant point.

Note.— Omission of element **flight level or altitude (d)** may be possible when **SSR Mode C is used**. **(asked in ANAC)**

Reporting of operational and meteorological information

Special aircraft observations shall be reported as special air-reports. All air-reports shall be reported **as soon as is practicable**.

Contents of routine air-reports

Routine air-reports transmitted by data link, when ADS-C is not being applied, shall give information relating to such of the following elements as are necessary:

Section 1.— Position information:

1) aircraft identification
2) position
3) time
4) flight level or altitude
5) next position and time over
6) ensuing significant point

Section 2.— Operational information: (asked in ANAC)

7) estimated time of arrival (ETA)
8) endurance

Mnemonic
Sections:
1) How am I doing?
2) How will I be doing later?
3) What is going on around me?

Section 3.— Meteorological information:

9) wind direction
10) wind speed
11) wind quality flag
12) air temperature
13) turbulence (if available)
14) humidity (if available)

Section 1 of the air-report is **obligatory**. Section 2 of the air-report, or a portion thereof, shall only be transmitted when so requested by the operator or a designated representative, or when deemed necessary by the pilot-in-command. Section 3 of the air-report shall be transmitted in accordance with Annex 3, Chapter 5.

Contents of special air-reports

(Asked in ANAC) Special air-reports shall be made by all aircraft whenever there is any condition that the PIC thinks may affect the safety of other aircraft or the following conditions are encountered or observed:

a) moderate or severe turbulence; or
b) moderate or severe icing; or
c) severe mountain wave; or
d) thunderstorms, without hail that are obscured, embedded, widespread or in squall lines; or
e) thunderstorms, with hail that are obscured, embedded, widespread or in squall lines; or
f) heavy duststorm or heavy sandstorm; or
g) volcanic ash cloud; or
h) pre-eruption volcanic activity or a volcanic eruption.
i) windshear

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

In addition, in the case of **transonic and supersonic flight**:

j) moderate turbulence; or
k) hail; or
l) cumulonimbus clouds.

Separation methods and minima

Separation can be either:

- **Vertical or**
- **Horizontal or**
- **Composite (a mixture of both)**

Minimum Separation

Clearance will not be given to execute any manoeuvre that would reduce the spacing between two aircraft to less than the separation minimum applicable.

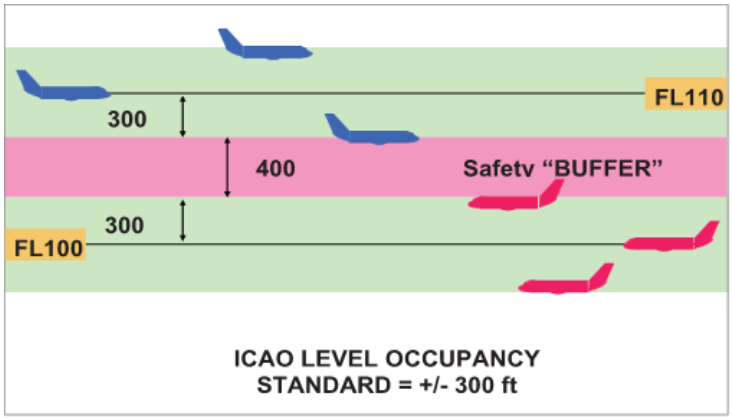
Composite Separation (asked in ANAC)

Consisting of a combination of vertical separation and one type of horizontal separation. **Separation minima may be reduced** till a **maximum of half** of the standard than when applied individually. Composite separation shall only be applied on the basis of regional air navigation agreements.

Vertical Separation

Wherever possible, ATC will arrange **vertical separation** to maximize the use of airspace and minimize horizontal use of airspace**. Vertical separation is obtained by requiring aircraft using the same altimeter setting to fly at different levels expressed in terms of flight levels or altitudes** dependent upon the **magnetic track** of the aircraft. **(asked in ANAC)**

The vertical separations were already studied before.



During climb or descent **(asked in ANAC)**

An aircraft may be cleared to a level previously occupied by another aircraft after the latter has **reported vacating it**, except when:

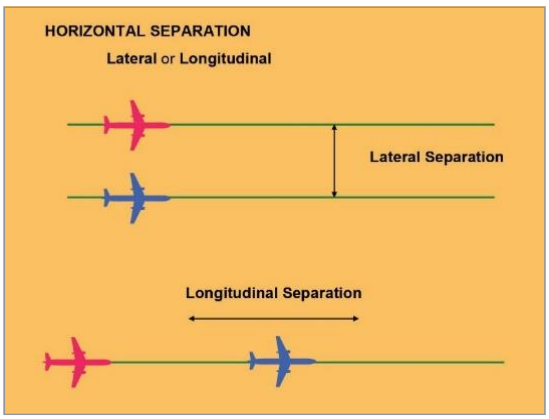
a. **severe turbulence** is known to exist;
b. the higher aircraft is effecting a cruise climb; or
c. the difference in aircraft performance is such that less than the applicable separation minimum may result;

In which case such clearance shall be withheld until the aircraft vacating the level has **reported at or passing another level separated by the required minimum**.

Horizontal Separation

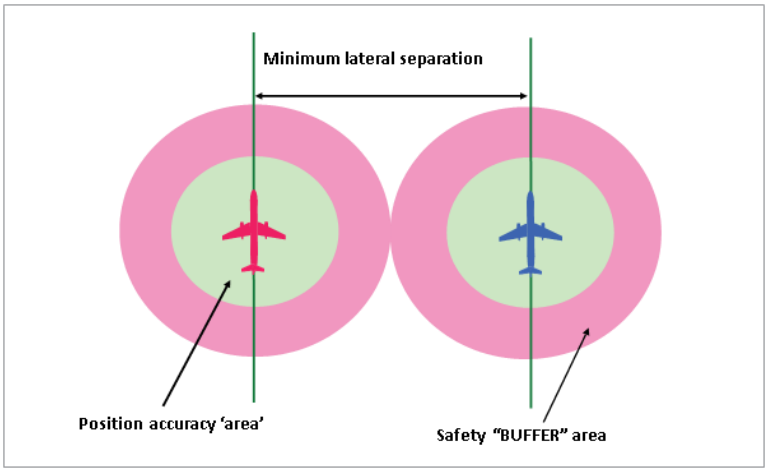
Horizontal separation relates to the distance between aircraft in the horizontal plane. This may be:

- Longitudinal (aircraft following the same route), where the separation standard is based on time (or distance) along track between aircraft, or
- Lateral.



Lateral

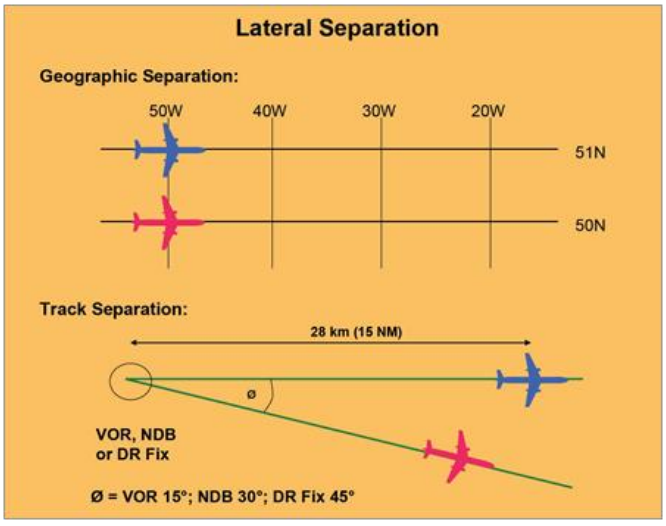
Lateral separation shall be applied so that the distance between those portions of the intended routes for which the aircraft are to be laterally separated is never less than an established distance to account for navigational inaccuracies plus a specified buffer. This buffer shall be determined by the appropriate authority and included in the lateral separation minima.



Means by which lateral separation may be applied include the following:

- **Geographical Separation**. Separation positively indicated by **position reports over different geographical locations** as **determined visually** or by **reference to a navigation aid**. **(asked in ANAC)**
- **Track Separation**. This can be achieved between aircraft using the same navigation aid or method. It is achieved by requiring aircraft to fly on specified tracks which are separated by a minimum amount (angle and distance) appropriate to the navigation aid or method employed as follows. For the three cases specified the **distance required is 15 NM** from the common position with track divergence as follows:
  - VOR: Track divergence **15°**
  - NDB: Track divergence **30°**
  - DR Fix: Track divergence **45°**

(values asked in ANAC)

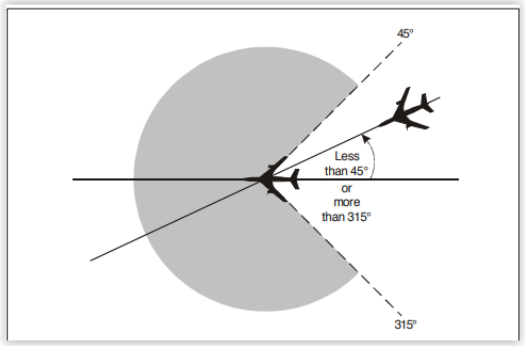


Longitudinal

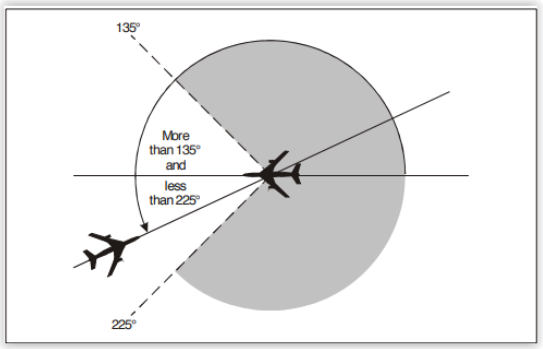
Longitudinal separation may be established by requiring aircraft to depart at a specified time, to arrive over a geographical location at a specified time, or to hold over a geographical location until a specified time.

For the purpose of application of longitudinal separation, the terms **same track**, **reciprocal tracks** and **crossing tracks** shall have the following meanings:

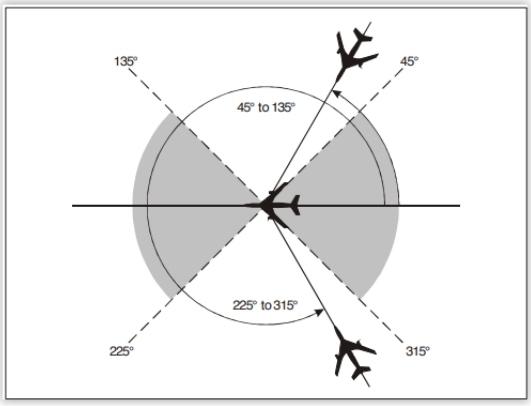
a) **Same track**: same direction tracks and intersecting tracks or portions thereof, the angular difference of which is less than 45 degrees or more than 315 degrees, and whose protected airspaces overlap.

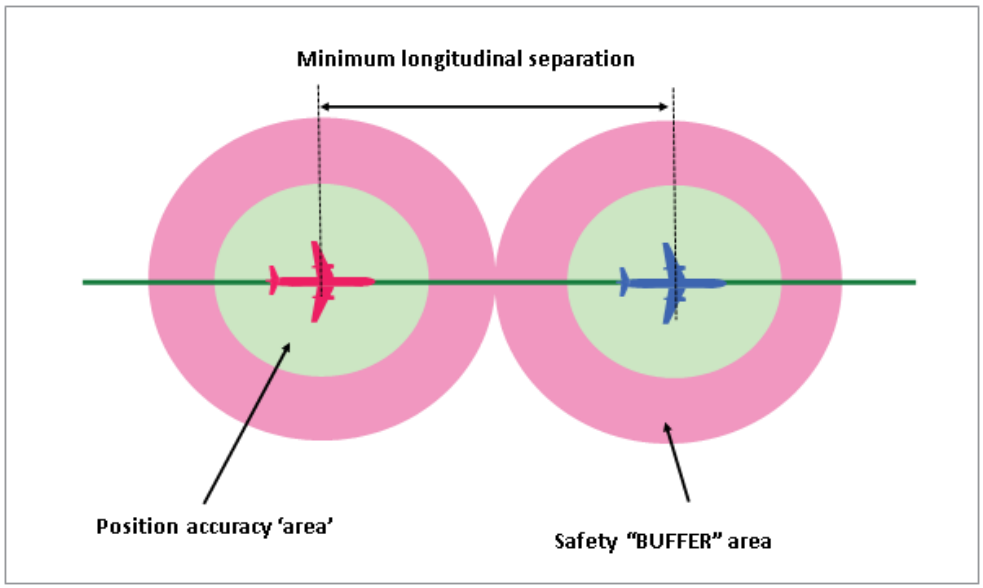


b) **Reciprocal tracks**: opposite tracks and intersecting tracks or portions thereof, the angular difference of which is more than 135 degrees but less than 225 degrees, and whose protected airspaces overlap.



c) **Crossing tracks**: intersecting tracks or portions thereof other than those specified in a) and b).



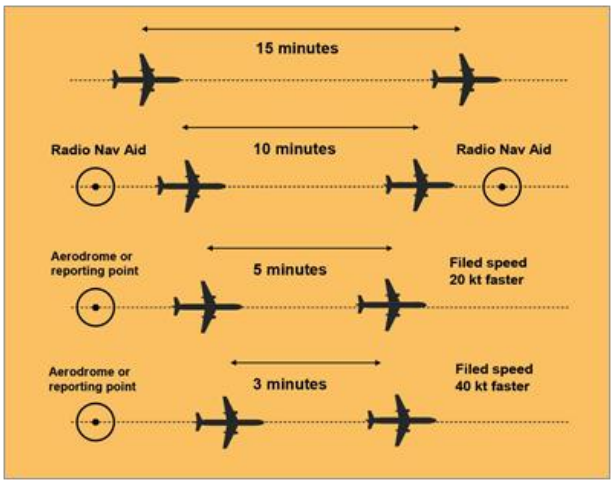


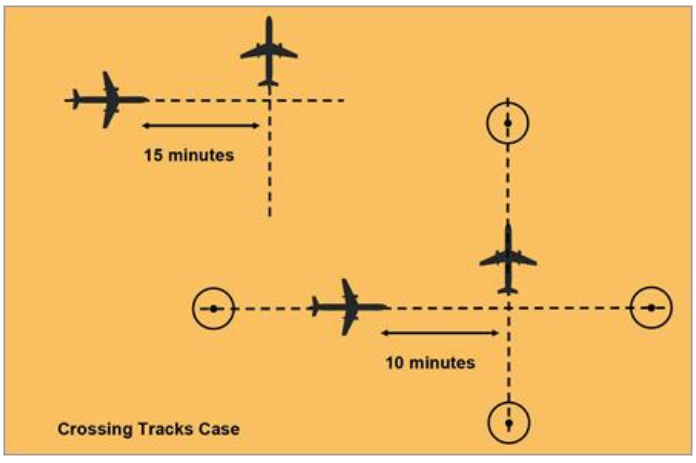
Separation Based on Time

Same level:

Notes: *1. Values in this **color**, are **asked in ANAC***

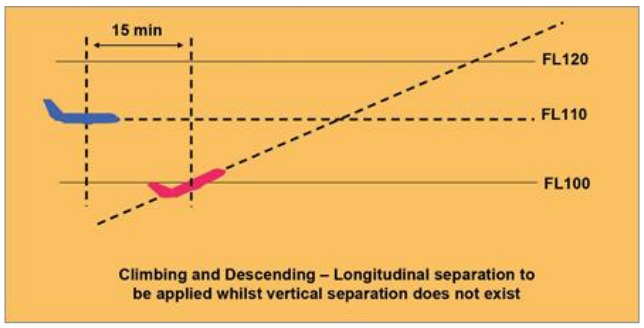
Aircraft flying on:	Normal	Navigation aids permit frequent determination of position and speed	Lead aircraft is 20kt (or more) faster	Lead aircraft is 40kt (or more) faster
Same Track	**15 minutes**	**10 minutes**	**5 minutes**	**3 minutes**
Crossing Tracks	15 minutes	10 minutes		

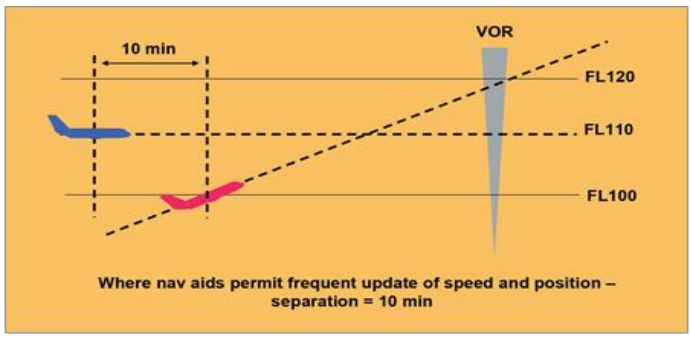


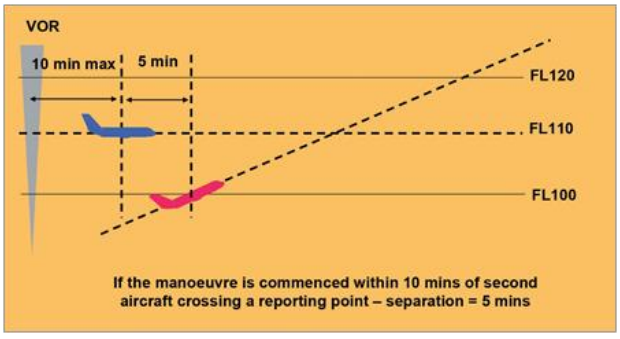


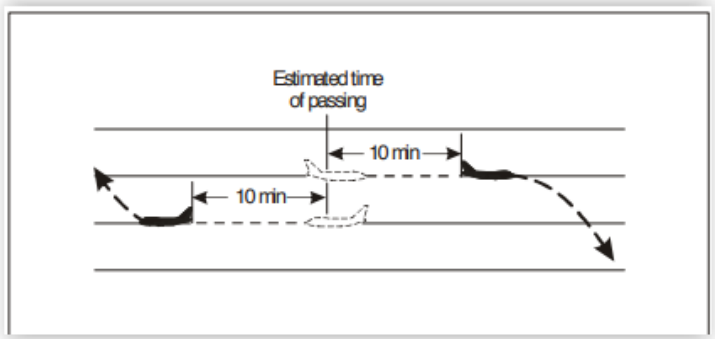
Climbing or descending:

Aircraft flying on:	No Vertical Separation	Navigation aids permit frequent determination of position and speed	Level change is commenced within 10 minutes of the time that the second aircraft has reported over a reporting point
Same Track	**15 minutes**	10 minutes	5 minutes
Crossing Tracks	15 minutes	10 minutes	
Reciprocal tracks	Where lateral separation is not provided, vertical separation shall be provided for at least 10 minutes prior to and after the time the aircraft are estimated to pass, or are estimated to have passed.		







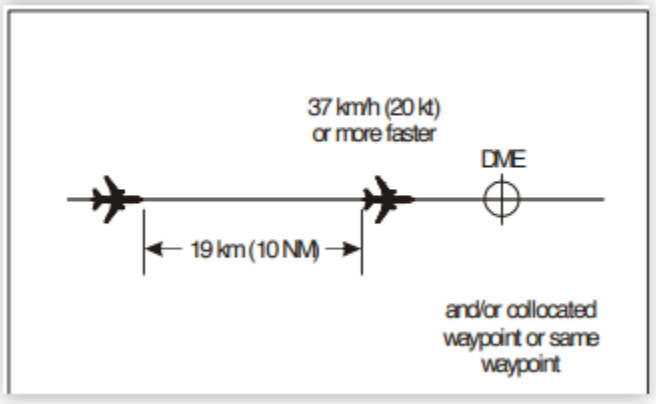


Separation Based on DME

Same level:

Aircraft flying on:	Normal	Leading aircraft is **20kt** (or more) **faster**
Same Track	**20 NM**	**10NM**
Crossing Tracks (provided that relative angle between the tracks is less than 90 degrees)	20 NM	10NM

Notes: *1. Values in this **color**, are **asked in ANAC***



Climbing or descending:

Same or Crossing tracks

The standard **separation is 10 NM** whilst vertical separation does not exist, providing each aircraft uses 'on-track' DME stations; one aircraft maintains a level whilst vertical separation does not exist, and separation is established by simultaneous DME readings from the aircraft.

Reciprocal tracks

Aircraft using on-track DME may be cleared to climb or descend to or through levels occupied by other aircraft using on-track DME, provided it has been positively established that the **aircraft have passed each other and are at least 10 NM apart**. **(asked in ANAC)**

Separation Based on Mach

When the Mach number technique is applied, minimum longitudinal separation between turbojet aircraft on the same track, whether in level, climbing or descending flight is:

Mach No. difference between leading and following	Longitudinal Separation standard
0	**10 minutes**
0.01	10 minutes
0.02	9 minutes
0.03	8 minutes
0.04	**7 minutes**
0.05	6 minutes
0.06	5 minutes

Notes: *1. Values in this **color**, are **asked in ANAC***

(Asked in ANAC, trick is "11 - Value of Mach difference" except for 0. Example: 11-4=7 minutes)

Separation Based on RNAV

This is applicable to RNAV aircraft operating along RNAV routes or ATS routes defined by VOR. In this case, separation is established by maintaining the specified distance between aircraft positions reported by reference to the RNAV equipment. It is a requirement that direct controller/pilot communications are maintained. It is also essential that the Mach number technique is applied.

A **150 km (80 NM) (asked in ANAC)** RNAV distance-based separation minimum with Mach number technique may be used on same-direction tracks in lieu/instead of a 10-minute longitudinal separation minimum with Mach number technique.

Same cruising level - **150 km (80 NM)**

Climbing or descending

Same track - **150 km (80 NM)** whilst vertical separation does not exist.

Reciprocal tracks - Aircraft may be cleared to climb or descend to or through the levels occupied by other aircraft provided it has been positively established that the aircraft have passed each other and are at least **150 km (80 NM)** apart.

Separation Based on RNAV where there is RNP

For aircraft cruising, climbing or descending on the same track in an RNP RNAV environment, the separation standards detailed in the table below may be used.

RNP Type	Communication Requirement	Surveillance Requirement	Distance Verification Requirement	Separation
20	Direct pilot/controller communications	Procedural Position Reports	At least every 60 minutes	80 NM
10	Direct pilot/controller communications	Procedural Position Reports	At least every 30 minutes	50 NM

During the application of the 50 NM minimum, if an aircraft fails to report its position, the controller is to take action within 3 minutes to establish communications. If communication has not been established within 8 minutes, alternative separation is to be applied.

Radar Separation

(Questions are tricky)

The standard minimum radar separation is 5 NM (asked in ANAC, standard!). This means that where two aircraft identified on radar are at the same level, they are not permitted to approach closer than 5 NM to each other on the radar display.

Reduced Radar Separation

When approved by the authority and in specific circumstances, the radar separation standard (5 NM) may be reduced.

- Radar capabilities - When radar capabilities so permit, **radar separation** standard **may be reduced to 3 NM (minimum)**. **(asked in ANAC)**

- ILS Localizer - Where aircraft are established on the same ILS localizer course and within 10 NM of the threshold of the landing runway, the **separation standard may be reduced to 2.5 NM (absolute minimum)**. **(asked in ANAC)**

- **(These will be studied later)** Simultaneous Parallel Approaches (Mode 2 - Dependent). During Mode 2 parallel runway operations radar separation is applied. Between **aircraft on adjacent localizer courses** the **separation standard may be reduced to 2 NM**.

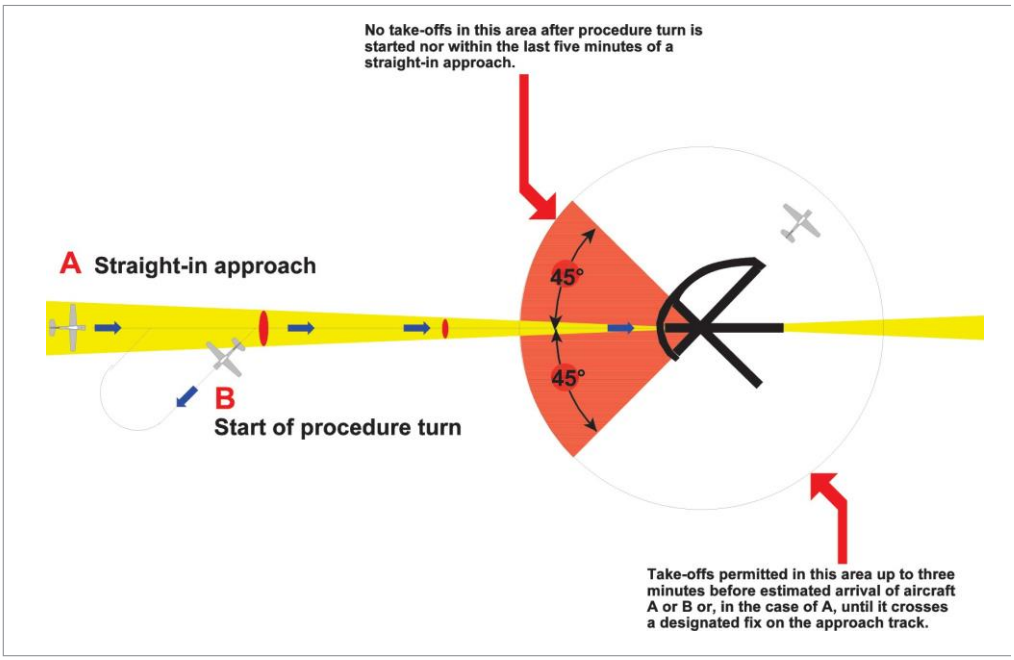
Separation of departing aircraft from arriving aircraft

If an arriving aircraft is making a **complete instrument approach**, a departing aircraft may take off:

a) in any direction until an arriving aircraft has started its procedure turn or base turn leading to final approach;
b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after the arriving aircraft has started procedure turn or base turn leading to final approach, provided that the take-off will be made at least 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway.

If an arriving aircraft is making a **straight-in approach**, a departing aircraft may take off:

a) in any direction **until 5 minutes before the arriving aircraft is estimated to be over the instrument runway**; **(asked in ANAC)**
b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach of the arriving aircraft:
    1. until 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway; or
    2. before the arriving aircraft crosses a designated fix on the approach track; the location of such fix to be determined by the appropriate ATS authority after consultation with the operators.



Wake Turbulence Separation

Wake turbulence separation minima shall be based on a grouping of **aircraft types into three categories** according to the **maximum certificated take-off mass** as follows:

a) **HEAVY (H)** — all aircraft types of **136 000 kg or more**; **(asked in ANAC)**

b) **MEDIUM (M)** — aircraft types between **136 000 kg** and **7 000 kg**; and **(asked in ANAC)**

c) **LIGHT (L)** — aircraft types of **7 000 kg or less**. **(asked in ANAC)**

Indication of Heavy Category - Pilots of heavy category aircraft are to indicate the aircraft's heavy category **only in the initial RTF contact (asked in ANAC)** with an ATCU by the **inclusion of the suffix "heavy" to the identifying call sign of the aircraft**.

e.g. "London Control this is Speedbird 216 heavy on 133.650"

Procedural Separation

The following procedural (non-radar) wake turbulence separation is applied. Note the criteria are only applicable where the **following aircraft is 'lighter' than the preceding aircraft**. **(Most of them are 2 minutes, if you choose 2 minutes in ANAC you will probably answer correctly)**

Arriving

Medium behind a **heavy** - 2 minutes **(asked in ANAC)**

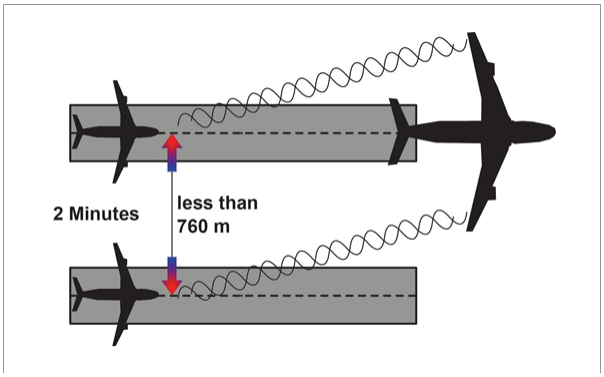
Light behind a **medium** or **heavy** - 3 minutes

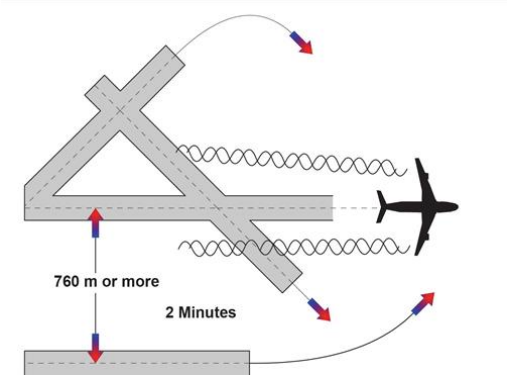
Departing

Same runway, or parallel runways separated by less than 760 m, or crossing runways if the projected flight paths cross at the same altitude or within 1000 ft below the heavier or parallel runways separated by 760 m or more if the projected flight paths cross at the same altitude or within 1000 ft below the heavier, separation is:

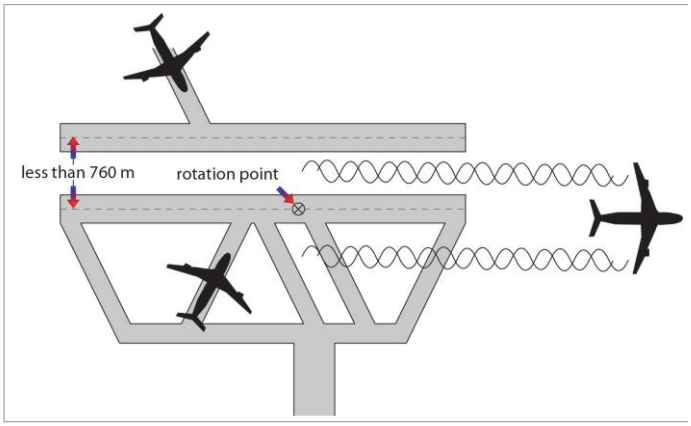
Medium behind a **heavy** - 2 minutes **(asked in ANAC)**

Light behind a **medium** or **heavy** - 2 minutes **(asked in ANAC)**





If using an intermediate part of the same runway or an intermediate part of a parallel runway separated by less than 760 m (2 500 ft) **separation changes** from 2 **to 3 minutes**.



Displaced Threshold

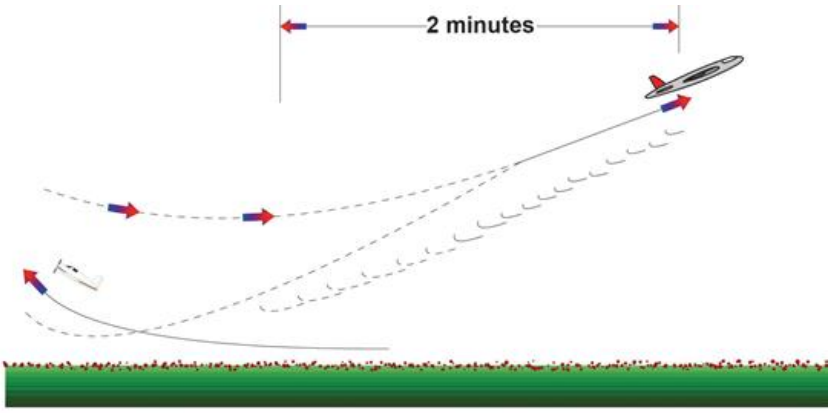
During departure or arrival of the heavier aircraft:

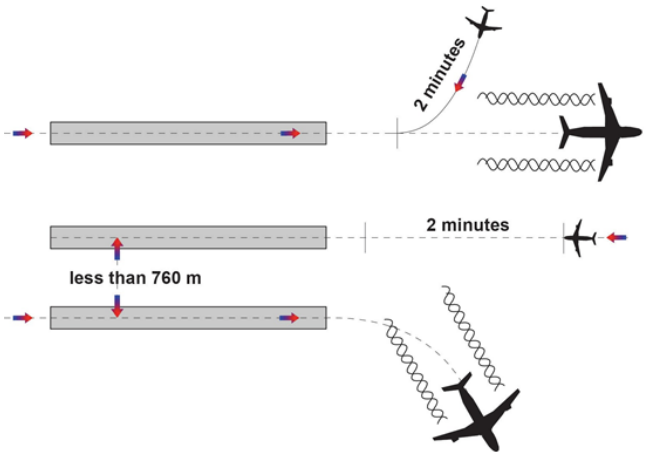
Medium behind a **heavy** - 2 minutes

Light behind a **medium** or **heavy** - 2 minutes

Opposite Direction

When the **heavier aircraft is making a low or missed approach** and the **lighter aircraft** is **using** an **opposite direction runway for take-off**, or is **landing on the same runway in the opposite direction**, or **on a parallel opposite direction runway separated by less than 760 m (value asked in ANAC)**, separation is **2 minutes (asked in ANAC)** between **lighter aircraft and heavier**.





Radar Separation

For all situations. Note that in this case the criteria apply where the category of the following aircraft is lighter than the leading aircraft, except for the heavy/heavy case.

Aircraft Wake Turbulence Category		
Leading Aircraft	**Following Aircraft**	**Separation**
Heavy	Heavy	4 NM
Heavy	Medium	**5 NM**
Heavy	Light	**6 NM**
Medium	Light	**5 NM**

Notes: *1. Values in this **color**, are **asked in ANAC***

Clearances to fly maintaining own separation while in visual meteorological conditions

(Asked in ANAC) When so requested by an aircraft and **provided it is agreed by the pilot of the other aircraft** and **so authorized by the appropriate ATS authority**, an ATC unit may clear a controlled flight, including departing and arriving flights, operating in **airspace Classes D and E** in **visual meteorological conditions (VMC) during the hours of daylight** to **fly subject to maintaining own separation** to one other aircraft and remaining in visual meteorological conditions.

When a controlled flight is so cleared **(VMC and own separation)**, the following shall apply:

a) the clearance shall be for a specified portion of the flight at or below 3 050 m (10 000 ft), during climb or descent and subject to further restrictions as and when prescribed on the **basis of regional air navigation agreements**;
b) if there is a possibility that flight under visual meteorological conditions may become impracticable, an IFR flight shall be provided with alternative instructions to be complied with in the event that flight in visual meteorological conditions (VMC) cannot be maintained for the term of the clearance;
c) the pilot of an IFR flight, on observing that conditions are deteriorating and considering that operation in VMC will become impossible, shall inform ATC before entering instrument meteorological conditions (IMC) and shall proceed in accordance with the alternative instructions given.

In **airspace class D**, **traffic avoidance**, for example in approach, is the **responsibility** of **pilot-in-command** because he is not separated from all flights (for example VFR). **(asked in ANAC)**

Essential Traffic Information

Essential traffic is **that controlled traffic** to which the provision of separation by ATC is applicable, but which, in relation to a particular controlled flight **is not, or will not be, separated from other controlled traffic by the appropriate separation minimum**. **(asked in ANAC)**

Note.— ATC is required to provide separation between IFR flights in airspace Classes A to E, and between IFR and VFR flights in Classes B and C. ATC is not required to provide separation between VFR flights, except within airspace Class B. Therefore:

- IFR or VFR flights may constitute essential traffic to IFR traffic, and IFR flights may constitute essential traffic to VFR traffic.
- A **VFR flight** only **constitutes essential traffic** to **other VFR flights within Class B airspace**. **(asked in ANAC)**

Essential traffic information shall be given to **controlled flights** concerned **whenever they constitute essential traffic to each other**. **(asked in ANAC)**

Separation in the vicinity of aerodromes

Reduction in separation minima

Separation may be reduced in the vicinity of aerodromes if:

a) adequate separation can be provided by the aerodrome controller when each aircraft is continuously visible to this controller; or
b) each aircraft is continuously visible to flight crews of the other aircraft concerned and the pilots thereof report that they can maintain their own separation; or
c) **in the case of one aircraft following another, the flight crew of the following aircraft reports that the other aircraft is in sight and separation can be maintained**. **(asked in ANAC)**

Essential Local Traffic

Consists of any aircraft, vehicle or personnel on or near the runway to be used, or traffic in the take-off and climb-out area or the **final approach area**, which may constitute a collision hazard to a **departing or arriving aircraft**. **(asked in ANAC)**

Information on essential local traffic known to the controller shall be transmitted without delay to departing and arriving aircraft concerned.

Procedures for departing aircraft

Under IFR, departing aircraft will normally be separated from each other by requiring the aircraft to follow a SID.

ATCUs will co-ordinate the issuing of clearances, and where possible, standard clearances will be used. Such clearances will normally be specified by the approach controller and passed to the aircraft by the aerodrome control tower.

For departures in VMC, the aerodrome controller will clear an aircraft for take-off once the preceding aircraft has either:

- Passed the upwind end of the runway, or
- Has made a turn away from the runway.

Minimum Separation Between Departing Aircraft

Where wake turbulence separation is applied, departures will be sequenced to minimize delays and maximize runway utilization.

	Normal	Leading aircraft is **40kt** (or more) faster	Tracks diverging by at least **45 degrees** immediately after take-off
Separation	5 minutes	**2 minutes**	**1 minute**

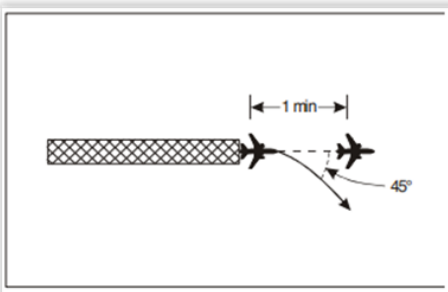


Figure 5-37. One-minute separation between departing aircraft following tracks diverging by at least 45 degrees (see 5.6.1)

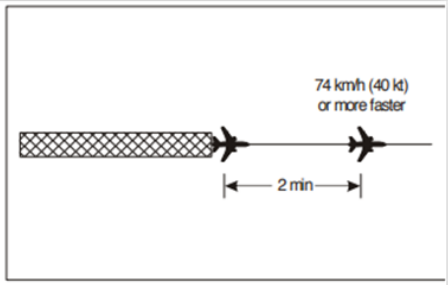


Figure 5-38. Two-minute separation between aircraft following same track (see 5.6.2)

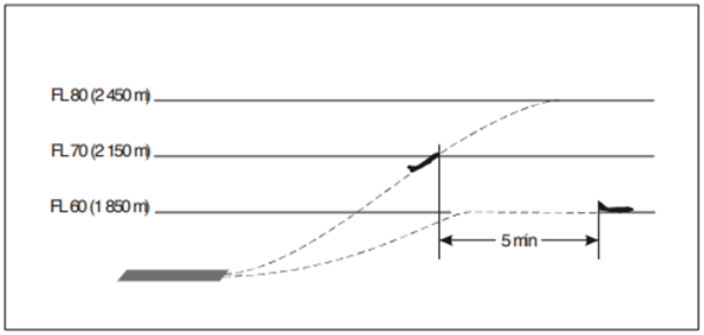


Figure 5-39. Five-minute separation of departing aircraft following same track (see 5.6.3)

Departure sequence

In Europe slots were implemented by Eurocontrol to maintain an orderly flow of traffic. The **period of validity** of for take-off slots is **15 minutes (asked in ANAC)**, ranging from -5 to +10 minutes after the Calculated Take-Off Time (CTOT).

At busy aerodromes, the ground movement of aircraft will be planned to ensure that the stated Off Blocks Time can be translated into the necessary slot time for the aircraft.

Departing aircraft may be expedited by suggesting a take-off direction which is not into the wind. It is the responsibility of the pilot-in-command of an aircraft to decide between making such a take-off or waiting for take-off in a preferred direction.

If departures are delayed, the delayed flights shall normally be cleared in an order based on their estimated time of departure.

Air traffic control units should, when practicable, advise aircraft operators or their designated representatives when anticipated delays are expected to exceed 30 minutes.

Procedures for arriving aircraft

(Asked in ANAC) An IFR flight shall not be cleared for an initial approach **below the appropriate minimum altitude** as specified by the State concerned nor to descend below that altitude unless:

a) the **aircraft is following a published instrument approach procedure** and pilot has reported passing an appropriate point **defined by a navigation aid or as a waypoint** (**trap in ANAC, can't be defined by a geographical location);** or

b) the **pilot reports that the aerodrome is and can be maintained in sight**; or

c) the aircraft is conducting a visual approach; or

d) the **aircraft is being radar vectored by ATC**.

If a pilot requests it, or it is apparent to ATC that the pilot of an aircraft is not familiar with the procedures for an instrument approach, information will be passed to enable the approach to be flown. If the aircraft has been cleared for a straight-in approach, only details of the final approach track need be passed.

For arriving IFR traffic (in IMC) the Approach Controller will transfer control of the aircraft to the Aerodrome Controller at a point during the approach so that separation from departing traffic can be achieved and sufficient time is available to issue a landing clearance.

Visual Approach

An IFR flight may be cleared to execute a visual approach provided the **pilot can maintain visual reference to the terrain** and:

a) the reported ceiling is at or above the level of the beginning of the initial approach segment for the aircraft so cleared; or
b) the pilot reports at the level of the beginning of the initial approach segment or at any time during the instrument approach procedure that the meteorological conditions are such that with reasonable assurance a visual approach and landing can be completed.

ATC will provide separation between **aircraft making a visual approach and all other arriving or departing traffic**. **(asked in ANAC)**

Approach sequence

The approach sequence shall be established in a manner which will facilitate arrival of the maximum number of aircraft with the least average delay. Priority shall be given to:

a) **an aircraft in an emergency landing**; **(asked in ANAC)**
b) hospital aircraft or aircraft carrying any sick or seriously injured person requiring urgent medical attention;
c) aircraft engaged in search and rescue operations; and
d) other aircraft as may be determined by the appropriate authority.

Timed Approach Procedures

Subject to approval by the appropriate ATS authority, the following procedure should be utilized as necessary to **expedite the approaches** of a number of arriving aircraft:

a) a suitable point on the approach path, which shall be capable of being accurately determined by the pilot, shall be specified, to serve as a checkpoint in timing successive approaches;
b) **aircraft shall be given a time at which to pass the specified point inbound (asked in ANAC)**, which time shall be determined with the aim of **achieving the desired interval between successive landings** on the runway while respecting the applicable separation minima at all times, including the period of runway occupancy.

Stacking

It is normal for ‘stacks’ to be established on the radio navigation beacons serving as the IAF for the instrument procedures to be used. The vertical size of the stack may be limited by airspace considerations and when full, ‘overspill’ stacks would be established on remote beacons. Arriving aircraft will be cleared into the stack at the lowest available level. Normal holding pattern joining procedures are used. Aircraft will be cleared to commence the instrument procedure from the lowest holding altitude (the bottom of the stack) using timed arrival procedures. If a pilot states his/her intention to continue holding awaiting a weather improvement when other pilots wish to make an instrument approach, the holding pilot will be instructed to take up another holding pattern or directed to rejoin the hold at the top. If a pilot elects to attempt an instrument approach when others remain in the hold, an unsuccessful approach would result in the aircraft being directed back into the stack at the top.

Expected approach time (EAT)

The time at which **ATC expects** that an arriving aircraft, **following a delay**, **will leave the holding fix to complete its approach for a landing**. **(asked in ANAC)**

The holding fix to which an expected approach time relates shall be identified together with the expected approach time whenever circumstances are such that this would not otherwise be evident to the pilot.

An **expected approach time** shall be determined for an arriving aircraft that will be subjected to a **delay** of **10 minutes or more**. **(asked in ANAC)**

The expected approach time shall be transmitted to the aircraft as soon as practicable and preferably not later than at the commencement of its initial descent from cruising level.

A **revised expected approach time** shall be transmitted to the aircraft without **delay whenever it differs from that previously transmitted by 5 minutes or more**. **(asked in ANAC)**

An **expected approach time** shall be transmitted to the aircraft by the **most expeditious means whenever it is anticipated that the aircraft will be required to hold for 30 minutes or more**. **(asked in ANAC)**

En-Route Holding

Where delays are known to exist and aircraft are held en-route, **credit will be given for time spent holding en-route** by inserting the aircraft into the approach sequence ahead of other aircraft so that the aircraft that has held en-route is not penalized.

An aircraft which has been authorized to absorb a specified period of notified terminal delay by cruising at a reduced speed en-route, should also, in so far as practicable, **be credited with the time absorbed en-route**.

Information for arriving aircraft

If it becomes necessary or operationally desirable that an arriving aircraft follow an instrument approach procedure or use a runway other than that initially stated, the flight crew shall be advised without delay.

At the commencement of final approach, the following information shall be transmitted to aircraft:

a) **significant changes in the mean surface wind direction and speed**; If the controller possesses wind information in the form of components, the significant changes are:

   i. Mean **headwind** component: 19 km/h (**10 kt**)
   ii. Mean **tailwind** component: 4 km/h (**2 kt**)
   iii. Mean **crosswind** component: 9 km/h (**5 kt**)

(Asked in ANAC)
10/5=2
Visualize it as an airplane: the "/" is the wings, the "=" is the tail.

b) the latest information, if any, on wind shear and/or turbulence in the final approach area;
c) the current visibility representative of the direction of approach and landing or, when provided, the current runway visual range value(s) and the trend.

Operations on parallel or near-parallel runways

Where parallel or near-parallel runways are used for simultaneous operations, the requirements and procedures below shall apply.

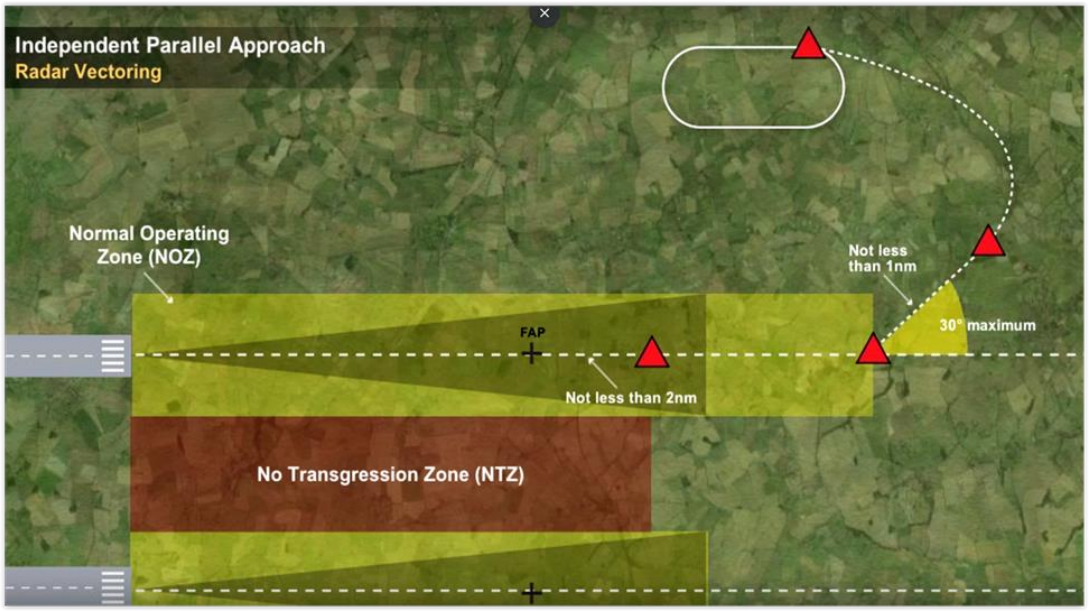
Arriving aircraft

Requirements and procedures for Independent parallel approaches (Mode 1)

Independent parallel approaches may be conducted to parallel runways provided that:

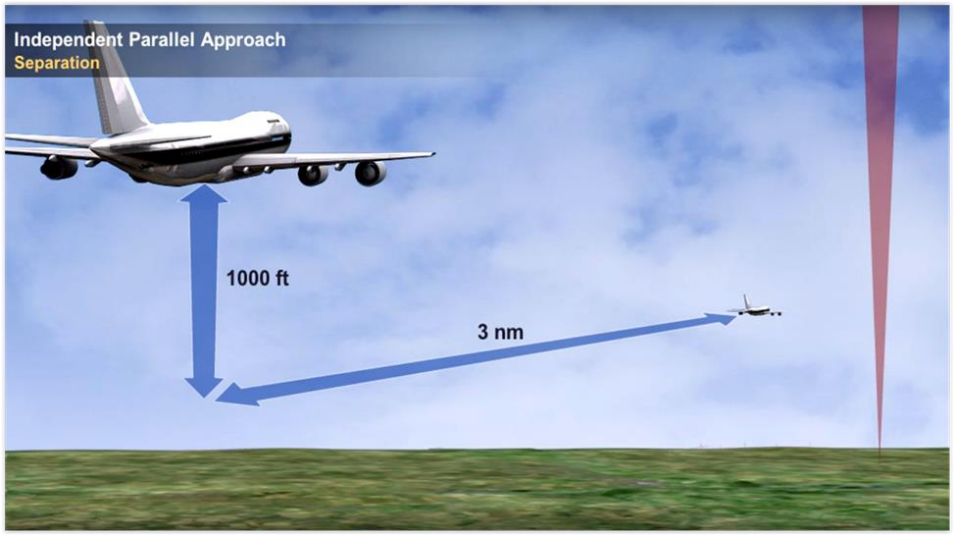
a) **Missed approach track** for one approach **diverges by at least 30 degrees** **from the missed approach track of the adjacent approach**. **(asked in ANAC)**
b) A **no transgression zone (NTZ)** **at least 610 m** (2 000 ft) **wide** is established equidistant between extended runway centre lines and is depicted on the situation display; **(asked in ANAC)**
c) There are lots of requirements, they are listed in ICAO DOC 4444

When vectoring to intercept the ILS localizer course or MLS final approach track, the **final vector shall enable the aircraft to intercept the ILS localizer course** or MLS final approach track at an **angle not greater than 30 degrees** **(asked in ANAC)** and to provide at least 2 km (1.0 NM) straight and level flight prior to ILS localizer course or MLS final approach track intercept. The vector shall also enable the **aircraft to be established on the ILS localizer course** or MLS final approach track **in level flight** for at least 3.7 km (**2.0 NM**) **prior to intercepting the ILS glide path** or specified MLS elevation angle. **(asked in ANAC)**



A **minimum of 300 m (1 000 ft) vertical separation (asked in ANAC)** or, subject to radar system and situation display capabilities, a **minimum of** 5.6 km (**3.0 NM**) **radar separation (asked in ANAC)** shall be provided **until aircraft are established**:

a) **inbound on the ILS localizer** course and/or MLS final approach track; and
b) within the normal operating zone (NOZ).



Subject to radar system and situation display capabilities, a **minimum of 5.6 km (3.0 NM) radar separation** shall be provided between **aircraft on the same ILS localizer** course or MLS final approach track unless increased longitudinal separation is required due to wake turbulence or for other reasons.

When an **aircraft is observed penetrating the NTZ**, the **(threatened aircraft) aircraft on the adjacent ILS localizer** course or MLS final approach track shall **be instructed to immediately climb and turn to the assigned** altitude/height and heading **in order to avoid the deviating aircraft**. **(asked in ANAC)**

Requirements and procedures for Dependent parallel approaches (Mode 2)

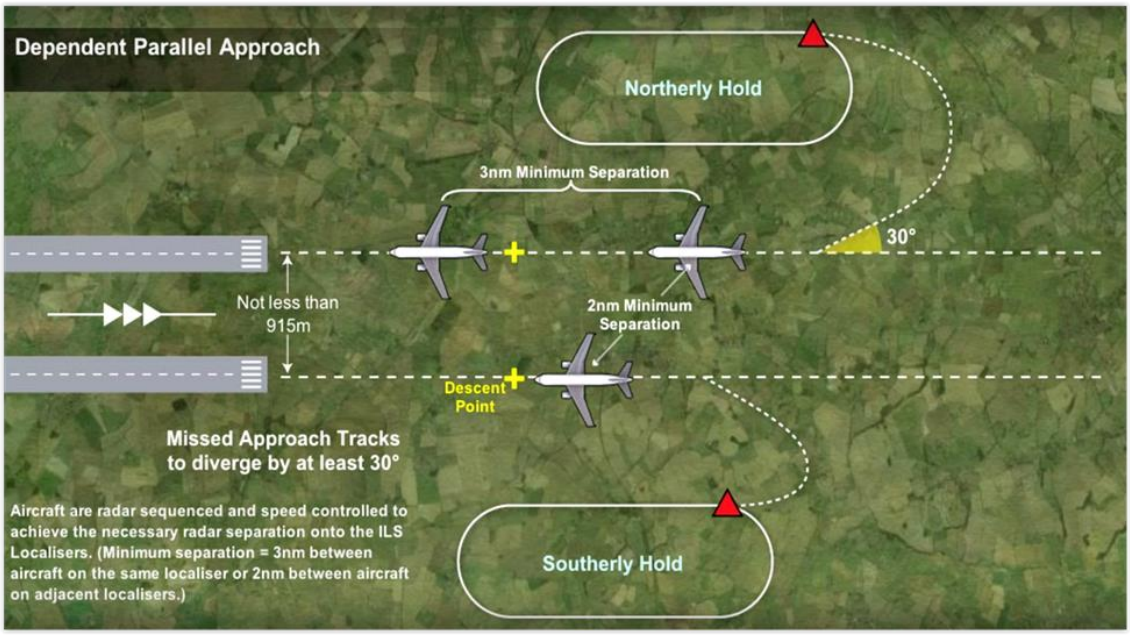
Dependent parallel approaches may be conducted to parallel runways provided:

a) **Missed approach track** for one approach **diverges by at least 30 degrees from the missed approach track of the adjacent approach**. **(asked in ANAC)**
b) There are lots of requirements, they are listed in ICAO DOC 4444

A minimum of 300 m (1 000 ft) vertical separation or a minimum of 5.6 km (3.0 NM) radar separation shall be provided between aircraft during turn-on to parallel ILS localizer courses and/or MLS final approach tracks.

The minimum radar separation to be provided between aircraft established on the ILS localizer course and/or MLS final approach track shall be:

a) 5.6 km (**3.0 NM**) between aircraft on the **same ILS localizer course (asked in ANAC)** or MLS final approach track unless increased longitudinal separation is required due to wake turbulence; and
b) 3.7 km (**2.0 NM**) between successive aircraft on **adjacent ILS localizer courses** or MLS final approach tracks. **(asked in ANAC)**



Procedures for aerodrome control service

Functions of aerodrome control towers

Aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring area. Watch shall be maintained by visual observation, augmented in low visibility conditions by an ATS surveillance system when available. Traffic shall be controlled in accordance with the procedures set forth herein and all applicable traffic rules specified by the appropriate ATS authority. If there are other aerodromes within a control zone, traffic at all aerodromes within such a zone shall be coordinated so that traffic circuits do not conflict.

Where parallel or near-parallel runways are used for simultaneous operations, individual aerodrome controllers should be responsible for operations on each of the runways.

Control of aerodrome traffic

Taxiing aircraft

On airports with more than one runway, it is quite common that aircraft taxiing to the far runway for take-off, as well as aircraft having landed on the far runway, have to cross the proximate runway on their taxi routing. In this case, the **runway must never be crossed without explicit clearance** to do so. A taxi instruction should always contain one of the following:

"Hold short of runway XXX" or "Cross runway XXX" **(asked in ANAC)**. When a pilot receives a taxi clearance which does not explicitly clear him to cross the runway, he has to assume that he has to stop, and obtain a clearance to cross (which he will normally try to clarify already while on the way to the runway).

In addition, the stop bar has to be observed, and it officially takes priority over verbal clearance. When a pilot receives a clearance to cross the runway, but the stop bar remains lighted, he has to ask the controller via radio to confirm the crossing clearance and **switch off the stop bar**.

Control of traffic in the traffic circuit

Priority for landing

If an aircraft enters an aerodrome traffic circuit **without proper authorization**, it **shall be permitted to land if its actions indicate that it so desires** **(asked in ANAC)**. If circumstances warrant, aircraft which are in contact with the controller may be instructed by the controller to give way so as to remove as soon as possible the hazard introduced by such unauthorized operation. In no case shall permission to land be withheld indefinitely.

In cases of emergency it may be necessary, in the interests of safety, for an aircraft to enter a traffic circuit and effect a landing without proper authorization. Controllers should recognize the possibilities of emergency action and render all assistance possible.

Order of priority for arriving and departing aircraft

An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway.

Suspension of visual flight rules operations

Any or all VFR operations on and in the vicinity of an aerodrome **may be suspended** by any of the following units, persons or authorities whenever safety requires such action:

a) the approach control unit or the **appropriate ACC**; **(asked in ANAC)**
b) the **aerodrome control tower**;
c) the appropriate **ATS authority**.

All such suspensions of VFR operations shall be accomplished through or notified to the aerodrome control tower.

Authorization of special VFR flights

When traffic conditions permit, special VFR flights may be authorized subject to the approval of the unit providing approach control service.

When the ground visibility is **not less than 1 500 m**, **special VFR flights may be authorized** to: enter a control zone for the purpose of landing, take off and depart from a control zone, cross a control zone or operate locally within a control zone.

ATS surveillance services

Use of SSR transponders and ADS-B transmitters

To ensure the safe and efficient use of ATS surveillance services, pilots and controllers shall strictly adhere to published operating procedures and standard radiotelephony phraseology shall be used. The correct setting of transponder codes and/or aircraft identification shall be ensured at all times.

Level information based on the use of pressure-altitude information

Determination of level occupancy

Aircraft maintaining a level - An aircraft is considered to be maintaining its assigned level as long as the pressure-altitude-derived level information indicates that it is within the **appropriate tolerances of the assigned level:**

- **RVSM airspace**: ±60 m **(±200 ft) (asked in ANAC)**
- **Non-RVSM airspace**: ±90 m **(±300 ft) (asked in ANAC)**
  Exception: **Non-RVSM airspace**: less than ±90 m (±300 ft) but **not less than** ±60 m (**±200 ft**), **when specified by ATS authority**. **(asked in ANAC, minimum value in Non-RVSM including exceptions)**

Aircraft vacating a level - An aircraft cleared to leave a level is considered to have commenced its manoeuvre and vacated the previously occupied level when the pressure-altitude-derived level information indicates a change of more than 90 m (300 ft) in the anticipated direction from its previously assigned level.

Aircraft passing a level in climb or descent - An aircraft in climb or descent is considered to have **crossed a level** when the pressure-altitude-derived level information indicates that it has **passed this level** in the required direction **by more than 90 m (300 ft)**. **(asked in ANAC)**

Radar Control

The **primary use of radar** in ATC is to enhance the provision of **separation**. **(asked in ANAC)**

The system that provides a radar return displayed on a display system is called Primary Surveillance Radar (PSR). All radar systems can be augmented with Secondary Surveillance Radar (SSR) to provide flight specific identification and altitude information. **Radar can also be used to conduct surveillance and precision radar approaches**. **(asked in ANAC)**

Radar Identification

Before a radar controller can provide any service to an aircraft, the radar identity of the aircraft must be established and the **pilot informed prior to issue of any instructions**. **(asked in ANAC)**

Where **SSR** and/or MLAT is used for identification, aircraft may be identified by one or more of the following procedures:

- recognition of the aircraft identification in an SSR and/or MLAT label;
- recognition of an assigned discrete code, the setting of which has been verified, in an SSR and/or MLAT label; and
- direct recognition of the aircraft identification of a Mode S-equipped aircraft in an SSR and/or MLAT label;
- by transfer of identification;
- observation of compliance with an instruction to set a specific code;
- observation of compliance with an instruction to **squawk IDENT**.
- observation of compliance with an instruction to **operate transponder** from **"ON" to "STBY" and back to "ON"**. **(asked in ANAC)**

Where **PSR** is used for identification, aircraft may be identified by the following procedures:

- Geographic location e.g. '2 NM west of Woodstock'
- Relative to a radio navigation aid - "On the 230 radial from the Daventry VOR DME 5 NM"
- Latitude and longitude
- Correlating an observed radar position indication with an **aircraft which is known to have just departed**, provided that the identification is established within 2 km **(1 NM) from the end of the runway used (value asked in ANAC)**.
- Instructing the pilot to execute **one or more changes of heading of 30 degrees or more (asked in ANAC)**
- Positive handover from a radar controller who had previously identified the aircraft

"Radar contact" - The controller will use this phrase **to indicate that the aircraft has been identified (radar identity of aircraft has been established) and a service will be provided until radar identification is terminated**. **(asked in ANAC)**

Radar Services

The types of radar service are:

- Radar Control for controlled en-route aircraft
- Approach Radar Control for arriving and departing controlled traffic
- Radar vectoring: the provision of navigation instructions to an aircraft to achieve a specific aim e.g. positioning to intercept the ILS localizer.
- Radar Controlled Approach (PAR and SRA)

As with all ATC procedures, a radar service is only provided inside CAS. ICAO does however permit the use of radar to obtain information to enable the provision of an FIS outside of CAS. Radar may also be used to assist the provision of information as part of the Advisory ATC service provided in class F airspace.

"Radar Service Terminated" - You will no longer be provided with radar control. **(asked in ANAC)**

Radar Vectoring

Radar vectoring is the passing of navigation information to a pilot by a radar controller to achieve the aircraft flying a required track.

When vectoring an IFR flight and when giving an IFR flight a direct routing which takes the aircraft off an ATS route, the controller shall issue clearances such that the prescribed obstacle clearance will exist at all times until the aircraft reaches the point where the pilot will resume own navigation.

Objectives of the air traffic control services **do not include prevention of collision with terrain**; therefore, **pilots are responsible for preventing collisions with terrain**, **except when an IFR flight is vectored by radar**. **(asked in ANAC)**

Vectoring shall be achieved by **issuing** to the pilot specific **magnetic headings** which will enable the aircraft to maintain the desired track. **(asked in ANAC)**

Turns are to be made at a **standard rate**, unless otherwise instructed by ATC. **(asked in ANAC)**

Except when prescribed in procedures or made possible by agreements, **aircraft under radar control shall not be vectored closer than 2.5 NM** to the **boundary of controlled airspace**. **(asked in ANAC)**

Aircraft should be **vectored for final approach**. The final vector shall enable the aircraft to be established on the final approach track prior to intercepting the specified or nominal glide path of the approach procedure from below, and should provide an intercept angle with the final approach track **not exceeding 45 degrees**. **(asked in ANAC)**

Once the aim of the vectoring has been achieved, the pilot will be told to **"Resume own navigation"** giving the pilot the aircraft's position and any appropriate instructions. This implies that the radar vectoring has ended and **you are to resume responsibility for your own navigation**. **(asked in ANAC, one of them being "you should maintain that airway by use of your navigation equipment")**

Radar Approaches

Radar may be used to provide a precision (PAR) or non-precision (SRA) approach to a runway. In both cases, the radar controller provides radar derived information to the pilot to permit the aircraft to be flown along a predefined track and, in the case of PAR, a defined glide path.

If **radar contact** is **lost for any significant period during the last 2 NM of a radar approach**, the **pilot will be advised to carry out a missed approach procedure**. **(asked in ANAC)**

a. The radar controller will be responsible for obtaining a landing clearance from the aerodrome controller and passing it to the pilot. The **radar controller should notify the aerodrome controller** when an **aircraft making a radar approach** is approximately 15 km **(8 NM) from touchdown (asked in ANAC)**.
b. If landing clearance is not received at this time, a subsequent notification should be made at approximately 8 km (4 NM) from touchdown and landing clearance requested.
c. Clearance to land should normally be passed to the aircraft before it reaches a distance of 4 km **(2 NM) from touchdown (asked in ANAC)**. **If not issued by then, (2 NM) from touchdown, the radar controller shall give a missed approach instruction**. **(asked in ANAC)**

PAR

The distance from touchdown should be transmitted at intervals of 2 km (1 NM) until the aircraft reaches a distance of 8 km (4 NM) from touchdown. Thereafter distance information should be transmitted at more frequent intervals, priority being given, however, to the provision of azimuth and elevation information and guidance.

SRA

Distance information is passed (with advisory height information) **every 1 NM**.

The **surveillance radar approach** shall be **terminated** at a **distance of** 4 km **(2 NM) from touchdown**. **(asked in ANAC)**

When the accuracy of the radar equipment permits, surveillance radar approaches may be continued to the threshold of the runway, or to a prescribed point less than 4 km (2 NM) from touchdown, in which case:

- **distance and level information shall be given at each 0.5 NM**; **(asked in ANAC)**
- **transmission should not be interrupted** for **intervals of more than 5 seconds** while the **aircraft is within a distance of 8 km (4 NM) from touchdown**; **(asked in ANAC)**
- the controller should not be responsible for any duties other than those directly connected with a particular approach.

Flight information service and alerting service

Flight information service

Aerodrome flight information service (AFIS)

At some non-controlled aerodromes AFIS is provided to give information for the safe and efficient conduct of flights. The AFIS units issue instructions and information to aircraft moving on the manoeuvring area or apron to assist pilots in preventing collision between aircraft and vehicles and obstructions. The movements of vehicles or pedestrians on the manoeuvring area are subject to authorization by the AFIS unit. To give meteorological information and information about aerodrome conditions are also included in the duties. The AFIS units also relay Air Traffic Control clearances issued by ATC unit. It can only supply **limited services** to the users and **under no circumstances may it supply ATC services (forbidden!)**. **(asked in ANAC)**

Air traffic advisory service

Air traffic advisory service does not afford the degree of safety and cannot assume the same responsibilities as air traffic control service in respect of the avoidance of collisions, since **information regarding** the disposition of **traffic in the area concerned** available to the unit providing air traffic advisory service **may be incomplete (asked in ANAC)**. To make this quite clear, **air traffic advisory service** does not deliver "clearances" but only "advisory information" and it uses the word **"advise" or "suggest" when a course of action is proposed to an aircraft**. **(asked in ANAC)**

Air traffic services messages

Clearance messages

Clearances shall contain the following in the order listed:

a) aircraft identification;
b) clearance limit;
c) route of flight;
d) level(s) of flight for the entire route or part thereof and changes of levels if required;
e) any necessary instructions or information on other matters such as SSR transponder operation, approach or departure manoeuvres, communications and the **time of expiry of the clearance**.

Note.— The **time of expiry of the clearance** indicates the time after which the clearance will be **automatically cancelled if the flight has not been started**. **(asked in ANAC, a new clearance has to be issued)**

ATC Wind Velocity Reports

Wind reports shall be given by ATC to pilots during **final approach or just prior to or during the take-off roll**. **(asked in ANAC)**

Information on surface wind direction provided to ATS units by the associated meteorological office is referenced to degrees true North. Information on surface wind direction obtained from the ATS surface wind indicator and **passed to pilots by ATS units** is **given in degrees magnetic**.

If you see it, it's true (METAR). If you hear it, it's magnetic (ATC, except VOLMET).

Runway Visual Range (RVR)

The Runway Visual Range (RVR) shall be **reported in metres** throughout periods when either the visibility or the runway visual range is **less than 1500 m**. **(asked in ANAC)**

Procedures related to emergencies, communication failure and contingencies

Emergency procedures

An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given priority over other aircraft.

Unlawful interference and aircraft bomb threat

Air traffic services personnel shall be prepared to recognize any indication of the occurrence of unlawful interference with an aircraft.

Whenever unlawful interference with an aircraft is suspected, and where **automatic distinct display** of SSR Mode A Code 7500 and Code 7700 is not provided, the controller shall attempt to verify any suspicion by **setting the SSR decoder to Mode A Code 7500 and thereafter to Code 7700**. **(asked in ANAC, use the same sequence as in the question, first 7500 then 7700)**

An aircraft equipped with an SSR transponder is expected to operate the transponder on **Mode A Code 7500 (asked in ANAC)** to indicate specifically that it is the **subject of unlawful interference**.

Emergency descent

If an aircraft suffers a pressurization failure at altitude, the rules require the aircraft to be descended to an altitude where oxygen in the air supports life. In the event, ATC will broadcast a warning to aircraft in the vicinity of a descending aircraft. The pilot of the descending aircraft should attempt to broadcast the aircraft altitude at intervals to assist other aircraft to avoid a collision.

Other in-flight contingencies

Strayed or unidentified aircraft

Strayed aircraft - An aircraft which has deviated significantly from its intended track or which reports that it is **lost**. **(asked in ANAC)**

Unidentified aircraft - An aircraft which has been observed or reported to be operating in a given area but whose identity has not been established.

Interception of civil aircraft

As soon as an air traffic services unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

a) attempt to establish two-way communication with the intercepted aircraft via any means available, including the emergency frequency 121.5 MHz, unless such communication already exists;

b) inform the pilot of the intercepted aircraft of the interception;

c) establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;

d) relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;

e) in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft; and

f) inform ATS units serving adjacent FIRs if it appears that the aircraft has strayed from such adjacent FIRs.

Fuel dumping/jettison

An aircraft in an emergency or other urgent situations may need to dump fuel so as to reduce to maximum landing mass in order to effect a safe landing.

All aircraft which have a maximum take-off mass greater than the maximum landing mass are required to have a fuel jettison system, with some exceptions. If the aircraft is flying in CAS, before commencing fuel jettison, the controlling ATCU is to be informed.

The route over which the fuel is to be jettisoned should be clear of towns, preferably over water and clear of areas where thunderstorm activity has been reported or is expected.

Other ATC contingency procedures

Change of radiotelephony call sign for aircraft

An ATC unit **may instruct** **an aircraft to change its type of RTF call sign**, in the **interests of safety**, when similarity between two or more aircraft RTF call signs are such that confusion is likely to occur. **(asked in ANAC)**

Any such change to the type of call sign shall be temporary and shall be applicable only within the airspace(s) where the confusion is likely to occur.

Air traffic incident report

AIRPROX - The code word used in an air traffic incident report to designate aircraft proximity. **(asked in ANAC)**

An air traffic incident report shall be submitted, normally **to the air traffic services unit concerned** **(asked in ANAC)**, for incidents specifically related to the provision of air traffic services involving such occurrences as **aircraft proximity (AIRPROX)**, or other serious difficulty resulting in a hazard to aircraft, caused by, among others, faulty procedures, non-compliance with procedures, or failure of ground facilities.

Procedures should be established for the reporting of aircraft proximity incidents and their investigation to **promote the safety of aircraft**. **(asked in ANAC)**

Aeronautical Information Service

Definitions

Most of them, if not all, are asked in ANAC

Aeronautical Information Circular (AIC) - A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

Aeronautical Information Publication (AIP) - A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

Aeronautical information service (AIS) - A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

AIRAC - An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification, based on common effective dates, of circumstances that necessitate significant changes in operating practices.

ASHTAM - A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

SNOWTAM - A special series NOTAM notifying the presence or removal of hazardous conditions due to snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format.

General

The purpose of AIS is to ensure the flow of info necessary for the safety, regularity and efficiency of international air navigation. **(asked in ANAC)**

Functions

Each Contracting State is required to provide an aeronautical information service; or agree with one or more other Contracting State(s) for the provision of a joint service; or delegate the authority for the service to a non-governmental agency, provided the Standards and Recommended Practices of Annex 15 are adequately met.

Responsibilities

The State concerned shall remain responsible for the information published. Aeronautical information published for and on behalf of a State shall clearly indicate that it is published under the authority of that State. Each Contracting State shall take all necessary measures to ensure that aeronautical information/data it provides relating to its own territory, as well as areas in which the State is responsible for air traffic services outside its territory, is adequate, of required quality and timely.

The AIS is to receive and/or **originate**, collate or assemble, edit, format, publish/store and distribute aeronautical information/data concerning the entire territory of the State as well as areas in which the State is responsible for ATS outside its territory. Aeronautical information is published in the form of an **Integrated Aeronautical Information Package (IAIP)**. **(asked in ANAC)**

World Geodetic System – 1984

WGS-84 shall be used as the horizontal geodetic reference system for international Air Navigation. Published aeronautical **geographical co-ordinates indicating latitude and longitude shall be expressed** in terms of **WGS-84** geodetic reference datum. **(asked in ANAC)**

Integrated Aeronautical Information Package

(Asked in ANAC) The Integrated Aeronautical Information Package is a system of dissemination of information essential to aviation operations and safety. It consists of the following elements:

- Aeronautical Information Publication (AIP - including amendment service)
- Supplements to the AIP
- NOTAM and pre-flight information bulletins (PIBs)
- Aeronautical Information Circulars (AICs)
- Checklists and Summaries

Aeronautical information products and services

Aeronautical Information Publication (AIP)

The AIP is intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation. The AIP constitutes the basic information source for permanent information and long duration temporary changes. This means that aircrew and operators can rely on the information published to be accurate and up to date.

AIP Contents:

(Asked in ANAC) The AIP consists of **three parts**:

- Part 1 - General (**GEN**)
- Part 2 - En-route (**ENR**)
- Part 3 - Aerodrome Data (**AD**)

General (GEN):

- National regulations and requirements;
- Tables and codes;
- Services:
  - Aeronautical Information Services
  - Aeronautical charts
  - Air traffic services
  - Communication services
  - Meteorological services
  - Search and rescue
- Charges for aerodrome/ heliports and air navigation services.

(Asked in ANAC) Includes:
-Location indicators;
-SIGMET;
-Routes for which meteorological services are provided;
-Description of services responsible for SAR;
-Charges for the use of aerodromes/heliports;
-Differences from ICAO SARPS.

En-Route (ENR):

- General rules and procedures
- ATS Airspace
- ATS routes
- Radio navigation aids/systes
- Navigation warnings
- En-route charts

(Asked in ANAC) Includes:
-Special lights during landing;
-Holding, approach and departure procedures;
-Prohibited, restricted and danger areas;
-Lower ATS routes.

Aerodromes (AD):

- Aerodromes / heliports introduction
- Passenger facilities

(Asked in ANAC) Includes:
-Meteorological information provided at an aerodrome;
-Refueling facilities and fuel grades available;
-Runway lighting.

Any addition to minima when the aerodrome is used as alternate are not included in the AIP. **(asked in ANAC)**

Visual approach and landing charts do not contain **visibility minima**. **(asked in ANAC)**

Identification numbers given to each **prohibited, restricted or danger areas** shall not be reused for a period of **at least one year** after cancellation of the area to which they refer. **(asked in ANAC)**

AIP Amendments

All changes to the AIP, or new information on a reprinted page, is identified by a distinctive symbol or annotation. The AIP is amended or reissued at regular intervals as are necessary to keep the data up to date. The normal method of amendment is by replacement pages. Permanent changes to the AIP are published as AIP amendments. Each AIP amendment is allocated a consecutive serial number and each amended page, including the cover sheet, shows the publication date.

AIP Supplement

Temporary changes of long duration, **3 months or longer (asked in ANAC)**, and information of short duration which contains extensive text and/or graphics shall be published as **AIP Supplements**. **(asked in ANAC)**

A checklist of valid AIP Supplements shall be issued at intervals of **not more than one month**. **(asked in ANAC)**

Aeronautical Information Circulars

AICs are a method whereby information that does not qualify for inclusion in the AIP or is not suitable for NOTAM is disseminated to all interested parties. An AIC is originated whenever it is desirable to promulgate: a long-term forecast of any major change in legislation, regulations, procedures or facilities; information of a purely explanatory or advisory nature liable to affect flight safety; or information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

(Asked in ANAC) Colour codes:

- White – Administrative
- **Yellow** – ATC
- **Pink** – Safety
- **Mauve (purple)** – Danger area map
- **Green** – Maps / charts

NOTAM - Notice to Air Men

A NOTAM shall be originated and issued promptly:

- Whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes are made at short notice; or
- When temporary changes of long duration are made at short notice.

Distributed by **AFTN** **(Aeronautical Fixed Telecommunication Network)**. **(asked in ANAC)**

A **checklist of current NOTAM** is issued at intervals of **not more than one month (asked in ANAC)**.

ALL runway closures require a NOTAM.

SNOWTAM
Special info notifying presence or removal of hazardous conditions due to snow, ice, slush or standing water on aerodrome pavement areas.

Friction Coefficient	Estimated surface friction	Code
0.4 and above	Good	5
0.39 – 0.36	Medium to good	4
0.35 – 0.3	Medium	3
0.29 – 0.26	Medium to poor	2
0.25 and below	Poor	1
Reading unreliable	Unreliable	9

ASHTAM
Special series NOTAM notifying activity of a volcano, volcanic eruption and/or volcanic ash cloud. This info is provided using a **colour code (asked in ANAC)**:

- **Red Alert**: Volcanic eruption in progress. Ash plume/cloud reported above FL 250; or Volcano dangerous, eruption likely with ash cloud expected to rise above FL250.
- **Orange alert**: Volcanic eruption in progress but ash cloud not reaching nor expecting to reach FL250; or Volcano dangerous, eruption likely but ash cloud not reaching nor expecting to reach FL250.
- **Yellow alert**: Volcano known to be active from time to time and volcanic activity has recently increased significantly, volcano not currently considered dangerous but caution should be exercised; or after an eruption (change from red or orange to yellow) volcanic activity has recently decreased significantly, volcano not currently considered dangerous but caution should be exercised.
- **Green alert**: Volcanic activity ceased and volcano reverted to normal state.

Pre-flight Information Bulletins (PIBs)

Presentation of current NOTAM information of operational significance prepared prior to flight. It contains a recapitulation of current NOTAM and other information of an urgent character and is made available to flight crews in plain language.

Aeronautical information provided for pre-flight planning purposes at aerodromes **must include** relevant elements of the Integrated Aeronautical Information Package, **maps and charts (asked in ANAC)**.

Additional current information relating to the departure aerodrome must be provided. **(for example: Failure of the secondary power supply)**

Post Flight Information

States must provide facilities at aerodromes to receive information from aircrews about the state and operation of air navigation facilities.

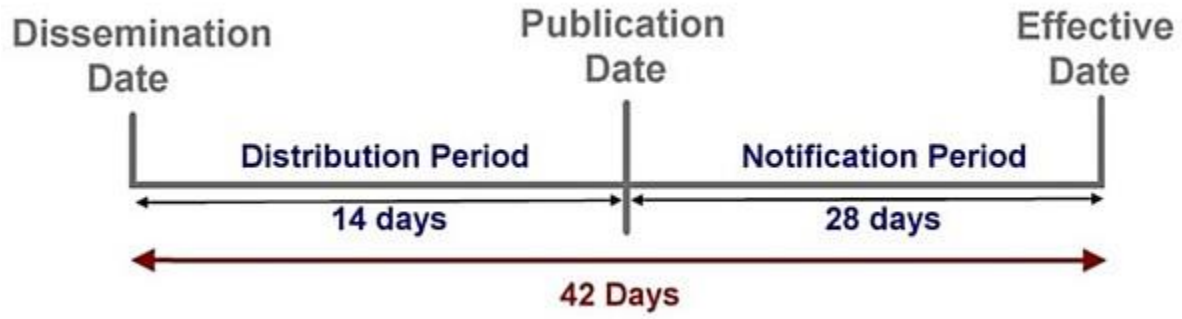
This information must be passed on to the relevant AIS.

Aeronautical information regulation and control (AIRAC)

Operationally significant changes to the AIP are published in accordance with Aeronautical Information Regulation and Control procedures, and shall be clearly identified by the **acronym** - AIRAC. **(asked in ANAC, if question says "operationally" or "acronym" most likely it refers to AIRAC)**

AIRAC information is distributed by the AIS unit **at least 42 days in advance (asked in ANAC)** of the AIRAC effective dates with the **objective of reaching recipients at least 28 days in advance of the effective date**.

Provides information on Rules of the Air, Air Traffic Services and Air Navigation Procedures.



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Aerodromes

Abbreviations

MEHT - Minimum eye height over threshold **(asked in ANAC)**

PAPI - Precision approach path indicator **(asked in ANAC)**

Definitions

(All of them are asked in ANAC)

Aerodrome - A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome elevation - The elevation of the highest point of the landing area.

Apron - A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Barrette - Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

Instrument runway - One of the following types of runways intended for the operation of aircraft using instrument approach procedures: **Non-precision approach runways, precision approach runways Category I,II and III**.

Manoeuvring area - That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Movement area - That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Non-instrument runway - A runway intended for the operation of aircraft using visual approach procedures or an instrument approach procedure to a point beyond which the approach may continue in visual meteorological conditions.

Obstacle free zone (OFZ) - A volume of airspace extending upwards and outwards from an inner portion of the strip to specified upper limits which is kept clear of all obstructions except low-mass and frangibly mounted obstacles required for air navigation purposes.

General

Aerodrome Reference Code

Aerodrome Reference Code				
Code Element 1		**Code Element 2**		
Code Number	**Aeroplane Reference Field Length**	**Code Letter**	**Wing Span**	**Outer Main Gear Wheel Span**
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m or more, but less than 1200 m	B	15 m or more, but less than 24 m	4.5 m up to but not including 6 m
3	1200 m or more, but less than 1800 m	C	24 m or more, but less than 36 m	6 m up to but not including 9 m
4	**1800 m or more**	D	36 m or more, but less than 52 m	9 m up to but not including 14 m
		E	**52 m or more, but less than 65 m**	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

Notes:** 1. Values in this **color**, are **asked in ANAC

Aeroplane reference field length (Code Element 1) - The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

Trick:

Code Element 1

1-800

2 * 4 = 800 to 1200

3 * 4 = 1200 to 1800

4 - more than 1800

Code Element 2

A is first letter of alphabet, B is second, C is third etc...

A, 1st letter, number starts with 1. Answer is 15

B, 2nd letter, last number starts with 2. Answer is 15-24

C, 3rd letter, last number starts with 3. Answer is 24-36

D, 4th only exception, 4 is between the answer values. Answer is 36-52

E, 5th letter, first number starts with 5. Answer is 52-65

F, 6th letter, first number starts with 6. Answer is 65-80

Aerodrome Data

Aerodrome Reference Point (ARP)

The designated geographical location of an aerodrome (asked in ANAC). An aerodrome reference point shall be established for an aerodrome. The aerodrome reference point shall be **located near the initial or planned geometric centre of the aerodrome** and shall normally remain where first established.

The position of the aerodrome reference point shall be **measured and reported to the aeronautical information services authority in degrees, minutes and seconds**. **(asked in ANAC)**

Strength of pavements

Where paved areas (runways, taxiways, aprons) are used by aircraft with **maximum take-off mass greater than 5700 kg**, the strength of the pavement is reported by the aircraft classification number - pavement classification number (**ACN-PCN**) system. An **aircraft can safely use a paved area** if the **PCN is equal to or greater than the ACN**.

> **Aircraft classification number (ACN) (asked in ANAC)** - A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.
>
> **Pavement classification number (PCN) (asked in ANAC)** - A number expressing the bearing strength of a pavement for unrestricted operations.

The strength of the pavement for use by aircraft with **maximum mass equal to and less than 5700 kg** is calculated from the **maximum allowable mass** or the **maximum tyre pressure**. **(asked in ANAC)**

Pre-flight altimeter check location

One or more pre-flight altimeter check locations shall be established for an aerodrome.

A pre-flight check location should be located on an apron. Locating a pre-flight altimeter check location on an apron enables an altimeter check to be made prior to obtaining taxi clearance and eliminates the need for stopping for that purpose after leaving the apron.

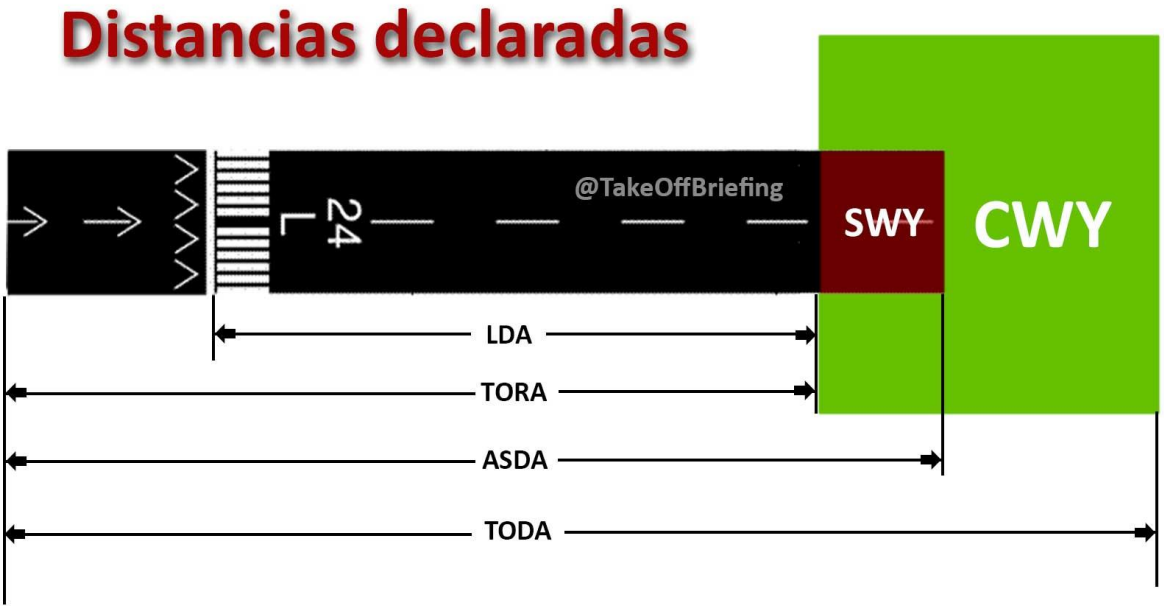
Declared distances

Take-off run available (TORA) - **The length of runway declared available and suitable for the ground run of an aeroplane taking off**. The **length of the TODA less clearway, if provided**. **(asked in ANAC)**

Take-off distance available (TODA) - The length of the **take-off run available plus the length of the clearway, if provided**. **(asked in ANAC, in Portuguese "toda a distância")**

Accelerate-stop distance available (ASDA) - The **length of the take-off run available plus the length of the stopway, if provided**. **(asked in ANAC)**

Landing distance available (LDA) - The length of runway which is declared available and suitable for the ground run of an aeroplane landing.



Condition of the movement area and related facilities

Water on a runway

Whenever water is present on a runway, a description of the runway surface conditions should be made available using the following terms:

DAMP — the surface shows a change of colour due to moisture. **(asked in ANAC)**

WET — the surface is soaked but there is no standing water. **(asked in ANAC)**

WATER PATCHES – patches of standing water are visible.

FLOODED – extensive standing water is visible. **(asked in ANAC)**

Frozen Water

Whenever an operational runway is contaminated by **snow, slush, ice or frost (four states of frozen water, asked in ANAC)**, the runway surface condition shall be assessed and reported.

Snow (on the ground)

- **Dry snow** - Snow which can be blown if loose or, **if compacted by hand, will fall apart again upon release**; specific gravity: up to but not including 0.35. **(asked in ANAC)**
- **Wet snow** - Snow which, **if compacted by hand, will stick together and tend to or form a snowball**; specific gravity: 0.35 up to but not including 0.5.
- **Compacted snow** - Snow which has been compressed into a solid mass that resists further compression and will hold together or break up into lumps if picked up; specific gravity: 0.5 and over.

Friction Coefficient

Friction Coefficient	Estimated surface friction	Code
0.40 and above	**Good**	5
0.39 – **0.36**	**Medium to good**	4
0.35 – **0.30**	**Medium**	3
0.29 – 0.26	Medium to poor	2
0.25 and below	**Poor**	1
Reading unreliable	Unreliable	9

Notes: *1. Values in this **color**, are **asked in ANAC***

Physical Characteristics

Runways

Many factors affect the determination of the orientation, siting and number of runways. One important factor is the usability factor, as determined by the wind distribution, which is specified hereunder. Another important factor is the alignment of the runway to facilitate the provision of approaches conforming to the approach surface specifications.

Location of threshold

A threshold should normally be located **at the extremity of a runway** **unless operational considerations justify the choice of another location**. **(asked in ANAC)**

Length of runways

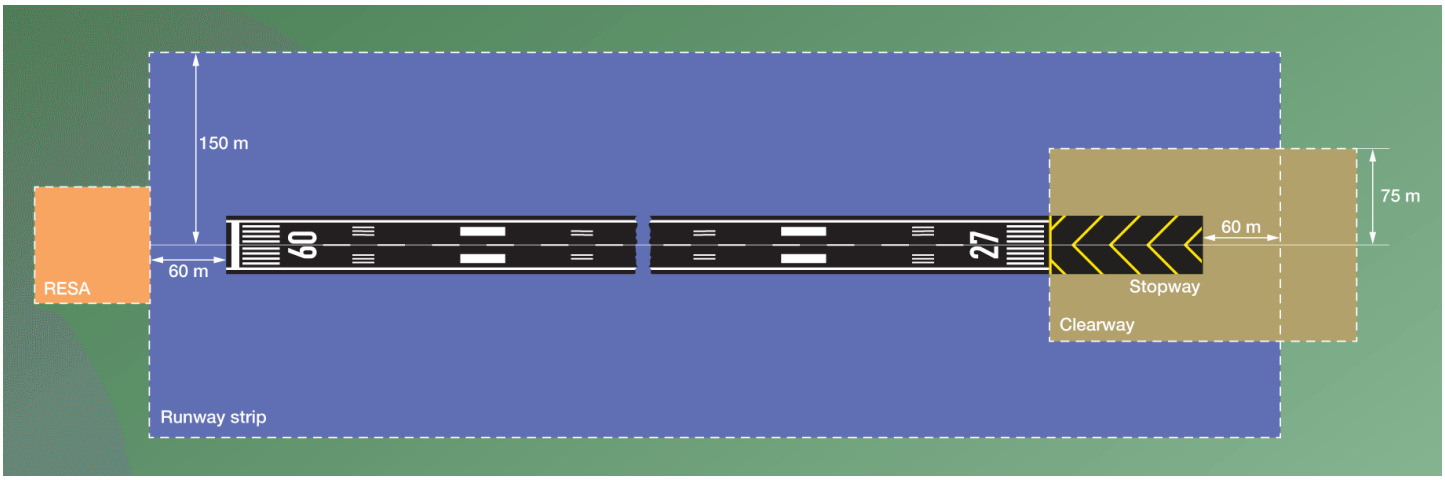
The actual length of a runway should be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length calculated to correct for local conditions (elevation, temperature, runway slope, humidity and surface characteristics). There is no requirement to cater for the worst case aeroplane at critical mass. Where a secondary runway is constructed, the length criteria are applied in order to obtain a usability factor of 95%. Runway length is reported in metres, however, fixed distance markers (distance to go signs) along the edge of runways are in 1000s of ft but are defined in terms of 300 m starting 300 m from the threshold. For a 'concrete strip' to accommodate instrument approaches from either end it must be at least 1800 m between thresholds.

Width of runways

Specified in ICAO Annex 14, Volume 1, Chapter 3 - **Physical characteristics** **(asked in ANAC)**

Width of Runways						
Code number	Code letter					
	A	B	C	D	E	F
1(a)	18 m	18 m	23 m	-	-	-
2(a)	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	**45 m**	45 m	45 m	60 m
Note:(a): For a precision runway, w = 30 m where code is 1 and 2						

Notes: *1. Values in this **color**, are **asked in ANAC***



Strip - An area of specified dimensions enclosing a runway or taxiway to provide for the safety of aircraft operations. **(asked in ANAC)**

Runway strip

A **defined area including the runway and stopway (asked in ANAC)**, if provided, intended:

a) to **reduce the risk of damage to aircraft running off a runway**; **(asked in ANAC)**

b) to **protect aircraft flying over it during take-off or landing operations**. **(asked in ANAC)**

Runway end safety area (RESA)

An **area symmetrical about the extended runway centre line and adjacent to the end of the runway strip** primarily **intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway**. **(asked in ANAC)**

A runway end safety area shall **extend from the end of a runway strip** to a **distance of at least 90 m**. **(asked in ANAC)**

Clearway

A defined **rectangular area on the ground or water** under the control of the appropriate authority, selected or prepared as a suitable area over which an **aeroplane may make a portion of its initial climb to a specified height**. **(asked in ANAC)**

The length of a clearway should not exceed half the length of the take-off run available (TORA). **(asked in ANAC)**

Stopway

A defined rectangular area on the ground **at the end of take-off run available (TORA)** prepared as a suitable area in which an **aircraft can be stopped in the case of an abandoned take-off**. **(asked in ANAC)**

A stopway shall have the **same width as the runway with which it is associated**. **(asked in ANAC)**

Radio altimeter operating area

A **radio altimeter operating area** should be **established in the pre-threshold area of a precision approach runway (asked in ANAC)**, in order to **accommodate aeroplanes making auto-coupled approaches and automatic landings** (irrespective of weather conditions) **(asked in ANAC)**

Length of the area

A radio altimeter operating area should extend before the threshold for a **distance of at least 300 m**. **(asked in ANAC)**

Width of the area

Minimum dimensions are **300 x 60 m**. **(asked in ANAC)**

A radio altimeter operating area should extend laterally, on each side of the extended centre line of the runway, to a **distance of 60 m**, except that, when special circumstances so warrant, the **distance may be reduced to no less than 30 m** if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft. **(asked in ANAC)**

Longitudinal slope changes

On a radio altimeter operating area, slope changes should be avoided or kept to a minimum. Where slope changes cannot be avoided, the slope changes should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided. The rate of change between two consecutive slopes **should not exceed 2 per cent per 30 m**. **(asked in ANAC)**

Taxiways

The design of a taxiway shall be such that, the **cockpit** of the aeroplane for which the taxiway is intended **remains overhead the taxiway centre line** markings **(asked in ANAC)**, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway shall be not less than that given by the following tabulation:

Wheel to Taxiway Edge Clearance	
Code Letter	**Clearance**
A	1.5 m
B	2.25 m
C	3 m if the taxiway is intended to be used by aeroplanes with wheel base less than 18 m; otherwise 4.5 m
D	4.5 m
E	4.5 m
F	4.5 m

Width of taxiways

Taxiway Width	
Code Letter	
A	7.5 m
B	10.5 m
C	**15 m** if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; otherwise 18 m
D	**18 m** if the taxiway is intended to be used by aeroplanes with an **outer main gear span of less than 9 m**; otherwise 23 m
E	23 m
F	25 m
Wheel base means the distance from the nose gear to the geometric centre of the main gear.	

Notes: *1. Values in this **color**, are **asked in ANAC***

Trick:

7x1 = 7 (**7.5**)
7x1,5= 10.5 (**10.5**)
7x2= 14 (**15**)
7x2,5= 17.5 (**18**)
7x3= 21 (**23**)

Or:

Divide the TWY widths (the answer options) by 4,5 and then go by 1-A 2-B 3-C 4-D....

23/4,5=5 = E,

18/4,5=4 = D,

15/4,5=3 = C,

25/4,5=6(5,555) = F

Rapid exit taxiway

A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to **turn off at higher speeds** than are achieved on other exit taxiways thereby minimizing runway occupancy times. **(asked in ANAC)**

Taxiway strip

An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

Holding bays, runway-holding positions, intermediate holding positions and road-holding positions

Holding bay(s) should be provided when the **traffic density is medium or heavy**. **(asked in ANAC)**

An **intermediate holding position** should be established on a taxiway **at any point other than a runway-holding position** where it is **desirable to define a specific holding limit**. **(asked in ANAC)**

Location

There is a **specified distance between a holding bay**, runway-holding position established at a taxiway/runway intersection or road-holding position and the **centre line of a runway (asked in ANAC)**. In the case of a precision approach runway, such that a holding aircraft or vehicle will not interfere with the operation of radio navigation aids.

Aprons

Aprons should be provided where necessary to permit the on- and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

Size of aprons

The total apron area should be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density.

Aircraft parking areas on aprons (stands) are to be marked and are required to provide a minimum distance between parked aircraft. For code A the distance is 3 m, and for code D and above 7.5 m.

Isolated aircraft parking position

An isolated aircraft parking position shall be designated or the aerodrome control tower shall be advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities.

The isolated aircraft parking position should be located at the maximum distance practicable and in any case **never less than 100 m from other parking positions**, buildings or public areas, etc. Care should be taken to ensure that the position is not located over underground utilities such as gas and aviation fuel and, to the extent feasible, electrical or communication cables.

Visual Aids for Navigation

Wind direction indicator

An aerodrome shall be equipped with at least one wind direction indicator. Provision should be made for illuminating at least one wind indicator at an aerodrome intended for use at night.

A wind direction indicator shall be located so as **to be visible from aircraft in flight or on the movement area (asked in ANAC)** and in such a way as to be free from the effects of air disturbances caused by nearby objects.

Landing direction indicator

Where provided, a landing direction indicator shall be located in a conspicuous place on the aerodrome.

If a signal square is provided, a landing "T" will always be included in the signs in the square. The **landing direction indicator** should be **in the form of a "T" (asked in ANAC)**. Where required for use at night the landing "T" shall either be illuminated or outlined by white lights.

Signalling lamp

A signalling lamp shall be provided at a controlled aerodrome in the aerodrome control tower for the purpose of showing the light signals to aircraft either in the air or on the ground.

Signal panels and signal area

The provision of a signals area ('signals square') at an aerodrome implies that non-radio traffic is accepted. A signals area is not required if an aerodrome authority has prohibited routine non-radio traffic (the aerodrome would still be required to provide a service to an aircraft suffering a communications failure that has indicated the intention to land).

The signal area should be located so as to be visible for all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300 m. This means **it must be clearly visible from the air**. **(asked in ANAC)**.

The signal area shall be an even horizontal surface at least 9 m square.

As previously studied in Rules of the Air:

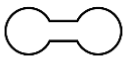
Visual ground signals (aerodrome signal area)

Prohibition of landing

When displayed in a signal area indicates that landings are prohibited and that the prohibition is liable to be prolonged.

Need for special precautions while approaching or landing

Wwhen displayed in a signal area indicates that owing to the bad state of the manoeuvring area, or for any other reason, special precautions must be observed in approaching to land or in landing.



Use of runways and taxiways

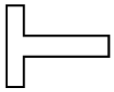
When displayed in a signal area indicates that aircraft are required to land, take off and taxi on runways and taxiways only.

Use of runways and taxiways

When displayed in a signal area indicates that aircraft are required to land and take off on runways only, but other manoeuvres need not be confined to runways and taxiways.

Closed runways or taxiways

Crosses of a single contrasting colour, yellow or white, displayed horizontally on runways and taxiways or parts thereof indicate an area unfit for movement of aircraft.



Directions for landing or take-off

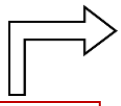
A horizontal white or orange landing T indicates the direction to be used by aircraft for landing and take-off, which shall be in a direction parallel to the shaft of the T towards the cross arm.

Source ICAO Annex 2 - Appendix 1

Visual ground signals (aerodrome signal area)

Directions for landing or take-off

A set of two digits displayed vertically at or near the aerodrome control tower indicates to aircraft on the manoeuvring area the direction for take-off, expressed in units of 10 degrees to the nearest 10 degrees of the magnetic compass.

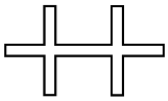


Right-hand traffic

When displayed in a signal area, or horizontally at the end of the runway or strip in use, a right-hand arrow of conspicuous colour indicates that turns are to be made to the right before landing and after take-off.

Air traffic services reporting office

The letter C displayed vertically in black against a yellow background indicates the location of the air traffic services reporting office.



Glider flights in operation

A double white cross displayed horizontally in the signal area indicates that the aerodrome is being used by gliders and that glider flights are being performed.

Source ICAO Annex 2 - Appendix 1

Notes: *1. Values in this **color**, are **asked in ANAC***

Diogo Raposo

Markings

Runway markings shall be white. **(asked in ANAC)**

Taxiway markings, runway turn pad markings and **aircraft stand markings** shall be **yellow (asked in ANAC)**.

Apron safety lines shall be of a **conspicuous colour which shall contrast with that used for aircraft stand markings**. **(asked in ANAC)**

Runway Markings

Runway designation marking

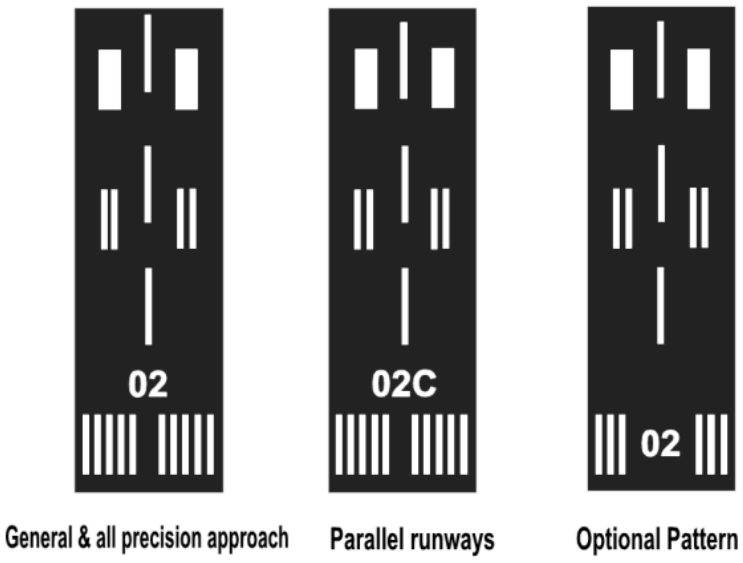
A runway designation marking shall be provided at the thresholds of a paved runway.

A runway designation marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

A runway designation marking should consist of a two digit number. This will be a whole number rounded **to the nearest 10º of Magnetic North (asked in ANAC)** when viewed from the direction of approach (094 ÷ 10 = 09.4 rounded down to 09). When the above rule would give a single digit number, it shall be preceded by a zero. In some states the '0' is omitted.

In the case of **parallel runways**, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

- **for two parallel runways: "L" "R"; (asked in ANAC)**
- **for three parallel runways: "L" "C" "R"; (asked in ANAC)**
- for four parallel runways: "L" "R" "L" "R";
- for five parallel runways: "L" "C" "R" "L" "R" or "L" "R" "L" "C" "R"; and
- for six parallel runways: "L" "C" "R" "L" "C" "R".



Runway centre line marking

A **runway centre line marking** shall be **provided** on a **paved runway (asked in ANAC)**. A runway centre line marking shall be located along the centre line of the runway between the runway designation markings.

Threshold marking

A threshold marking shall be provided at the threshold of a paved instrument runway, and of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by international commercial air transport. A threshold marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

The stripes of the threshold marking shall commence 6 m from the threshold.

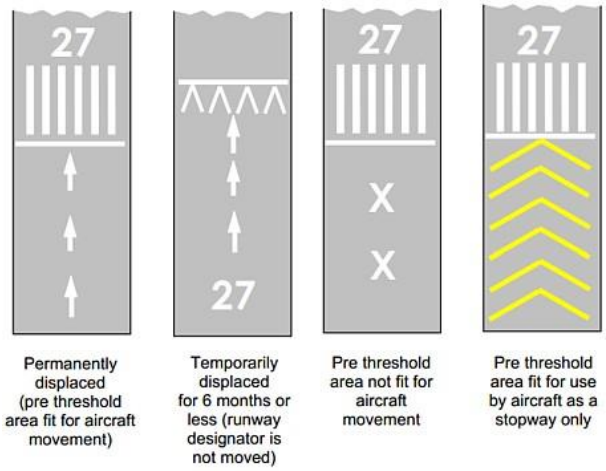
Runway Threshold Markings	
Runway Width	**Number of Stripes**
18 m	4
23 m	6
30 m	8
45 m	**12**
60 m or more	16

Trick:

15 (**18**) = **4**
15 * 2 (**30**) = 4 * 2 (**8**)
15 * 3 (**45**) = 4 * 3 (**12**)
15 * 4 (**60**) = 4 * 4 (**16**)

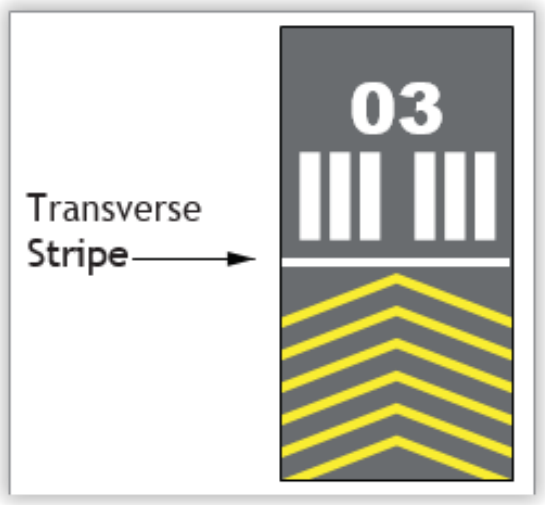
Notes:** 1. Values in this **color**, are **asked in ANAC

Displaced threshold markings



Transverse stripe

Where a **threshold is displaced** from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe should be added to the threshold marking. **(asked in ANAC, white line drawn across a runway = displaced threshold)**



Aiming point marking

An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or 4, this means **if the runway length is greater than 800 m (asked in ANAC)**.

An aiming point marking shall consist of **two conspicuous stripes**.

Aiming Point Marking Location	
Landing Distance Available (LDA)	**Threshold to Beginning of Marking**
Less than 800 m	150 m
800 m up to but not including 1200 m	250 m
1200 m up to but not including 2400 m	**300 m**
2400 m or more	**400 m**

Notes: *1. Values in this **color**, are **asked in ANAC***

Touchdown zone marking

A touchdown zone marking shall be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3 or 4.

A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Landing distance available or the distance between thresholds	Pair(s) of markings
Less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	**4**
2 400 m or more	6

Trick:
Dividing by 400

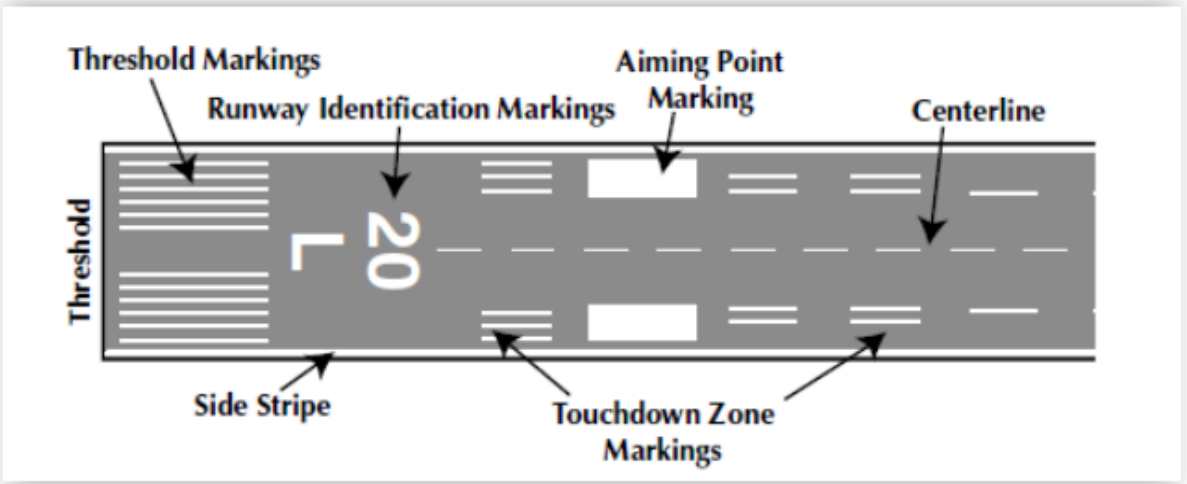
900 / 400 = 2.5
1200 / 400 = 3
1500 / 400 = 3.75
2400 / 400 = 6

The **pairs of markings** shall be provided at longitudinal spacings of **150 m beginning from the threshold**. **(asked in ANAC)**

Runway side stripe marking

A runway side stripe marking shall be provided between the thresholds of a paved runway where there is a **lack of contrast** **between the runway edges and the shoulders or the surrounding terrain**.

It is recommended that side stripes are marked on all precision runways regardless of the contrast with the surrounding ground.



Taxiway Markings

Taxiway centre line marking

Taxiway centre line markings are to be provided on a paved taxiway, de/anti-icing facility and the apron areas where the code number is 3 or 4 (and recommended for code 1 and 2). Centre line markings are to give guidance from the runway centre line, to the point on the apron where aircraft stand markings commence. Taxiway centre line markings are also provided on a paved runway when the runway is part of a standard taxi-route and there is no runway centre line marking; or where the taxiway centre line is not coincident with the runway centre line.

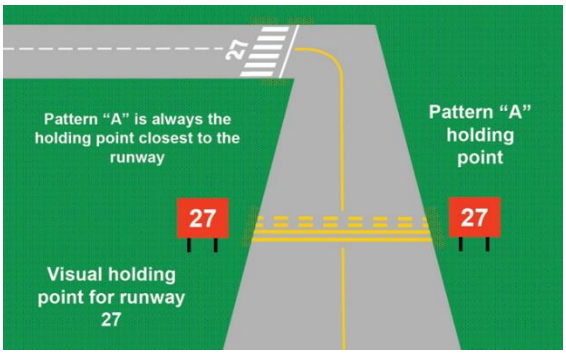
Taxiway centre line marking is a **continuous yellow line**. Should there be yellow side stripes, these mark non-load-bearing surfaces.

Holding position marking

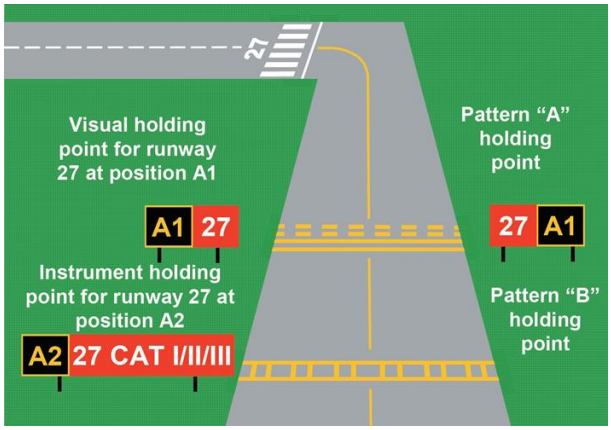
Runway-holding position marking

A runway-holding position marking shall be displayed along a runway-holding position.

At an **intersection of a taxiway and a non-instrument, non-precision approach or take-off runway**, the runway holding position marking shall be **pattern A**. **(asked in ANAC)**



Where two or three taxi-holding positions are provided at such an intersection, the taxi-holding position marking closer (closest) to the runway shall be as shown in pattern A and the markings further from the runway shall be **pattern B**. Any other holding point associated with a runway required on a taxiway will also be Pattern B.



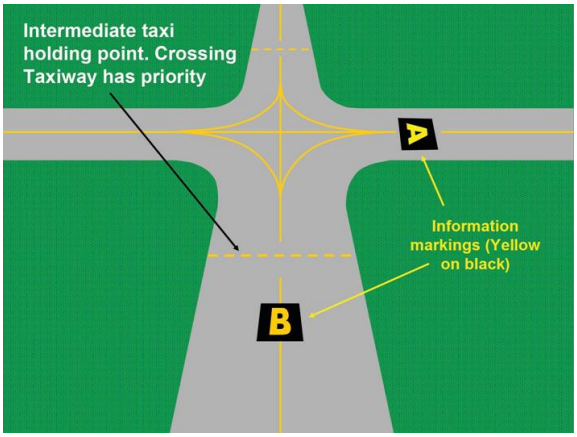
Aircraft should hold at the designated runway (taxiway)-holding position or:

1) **50 m** from runway edge where runway **length is 900m or more**; **(asked in ANAC)**
2) **30 m** from runway edge where runway length is **less than 900m**.

Intermediate holding position marking

An intermediate holding position marking should be displayed along an intermediate holding position. It shall be coincident with a stop bar or intermediate holding position lights, where provided.

An intermediate holding position marking shall consist of a single broken line.



Other markings

Aircraft stand marking

Aircraft stand markings should be provided for designated **parking positions** on a **paved apron and on a de-icing/anti-icing facility**. **(asked in ANAC)**

Aircraft stand markings should include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration and to complement other parking aids.

A stop line should be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop.

Road-holding position marking

Road holding position markings are to be provided at all road entrances to a runway. The markings are to be located across the road at the holding position, and will be marked in accordance with the local road traffic regulations.

Mandatory instruction marking

Where it is impracticable to install a mandatory sign, a mandatory instruction marking is to be marked on the surface of the taxiway pavement. Mandatory markings are holding point signs (runway designator in white on a red background) and no entry signs. Pilots are not to pass any mandatory marking unless specifically cleared by ATC.

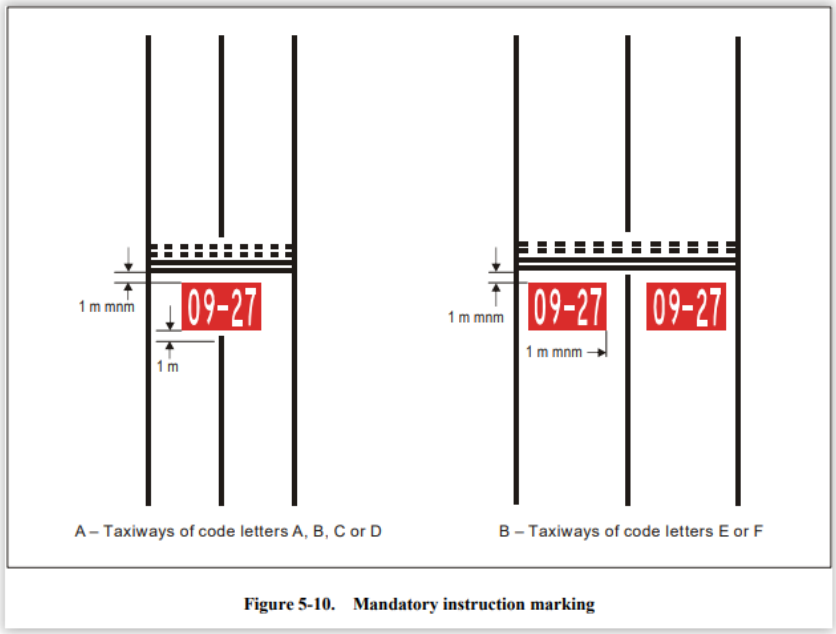


Figure 5-10. Mandatory instruction marking

A **RUNWAY AHEAD** marking is a warning, used **before reaching an ILS hold short marking** and is **painted on the taxiway** using white letters and a red background. **(asked in ANAC)**

Information marking

Where an information sign would normally be installed but it is physically impracticable, the information is to be displayed on the surface of the pavement.

Where operationally required, an information sign should be supplemented by information markings. The information markings should be displayed across the surface of the taxiway or apron where necessary and positioned so as to be legible from the cockpit of an approaching aircraft.

Information markings shall consist of an inscription in yellow, when it replaces or supplements a location sign; and an inscription in black, when it replaces or supplements a direction or destination sign. Where there is insufficient contrast between the marking and the pavement surface, the marking shall include a black background where the inscriptions are in yellow; and a yellow background where the inscriptions are in black. Markings will be combinations of characters and symbols. Markings containing numbers only are only used for runways and runway designators.

Signs

Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information.

Signs shall be **frangible**. Those **located near a runway or taxiway shall be sufficiently low** to **preserve clearance** for **propellers and the engine pods of jet aircraft**. **(asked in ANAC)**

Signs must be illuminated when intended for use:

- in RVR conditions less than 800 metres
- at night in association with instrument runways
- at night in association with non-instrument runways where the code number is 3 or 4

Mandatory instruction signs

A mandatory instruction sign shall be provided to **identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorized by the aerodrome control tower**.

Mandatory instruction signs shall include **runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs**. **(asked in ANAC, which is not mandatory)**

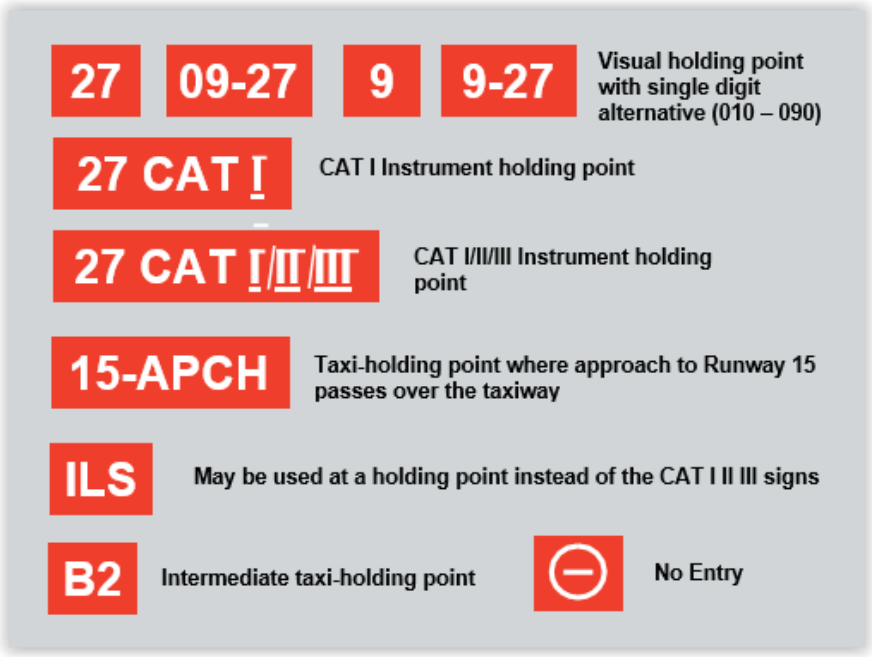
A **mandatory instruction sign** shall consist of **an inscription in white on a red background**. **(asked in ANAC)**

A **pattern "A" runway-holding position marking** shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a **runway designation sign**. **(asked in ANAC)**

A **pattern "B" runway-holding position marking** shall be supplemented **with a category I, II or III holding position sign**. **(asked in ANAC)**

A **category I, II or III holding position sign (red marker board)** shall be **located on each side** of the **runway(taxiway)-holding position marking** facing the direction of the approach to the critical area. **(asked in ANAC)**

A **NO ENTRY** sign shall be provided when entry into an area is prohibited. It shall **be located at the beginning (immediately before) of the area to which entrance is prohibited** on **both sides of the taxiway** as viewed by the pilot. **(asked in ANAC)**



Road-holding position sign (asked in ANAC)

A road-holding position sign shall be provided at all road entrances to a runway. A road-holding position sign shall consist of an inscription in white on a red background.

Information signs

An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

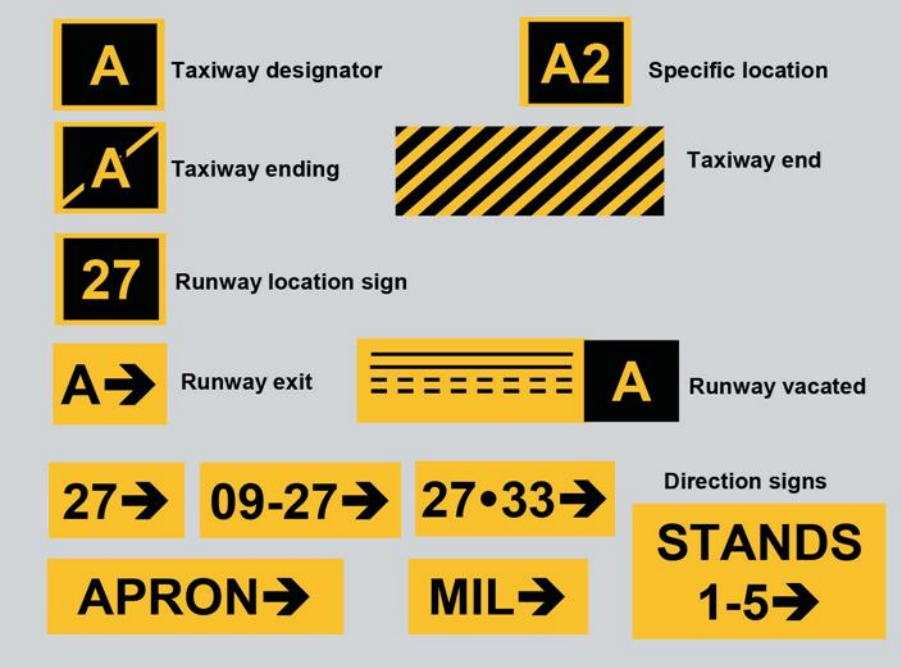
Information signs shall include: **direction signs**, **location signs**, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

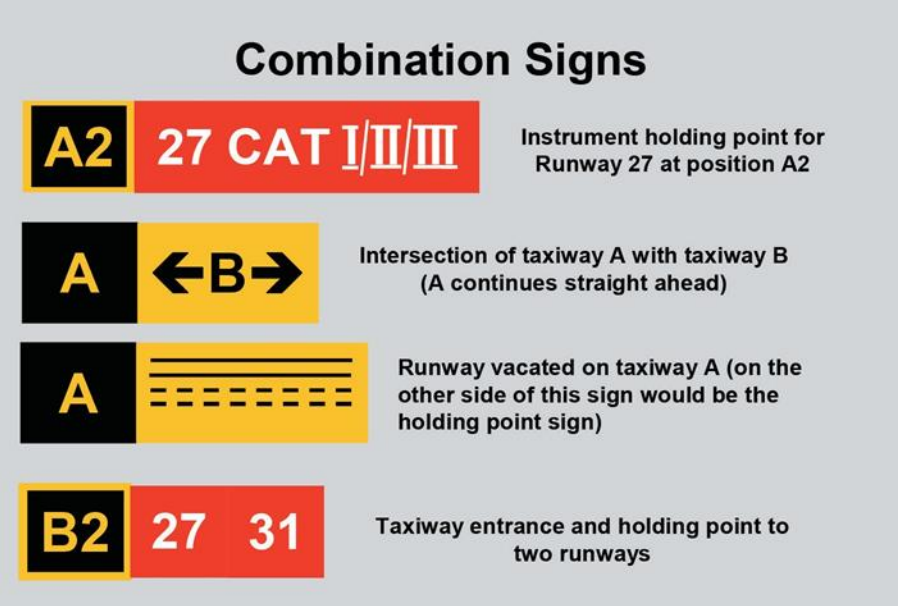
A runway exit sign shall be provided where there is an operational need to identify a runway exit.

A **runway vacated sign** shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot **leaving** a runway **the perimeter of the ILS/MLS critical/sensitive area (asked in ANAC)** or the lower edge of the inner transitional surface, whichever is farther from the runway centre line.

An **information sign** (except location sign) shall consist of an **inscription in black on a yellow background**. **(asked in ANAC)**

A **location sign** shall consist of an **inscription in yellow on a black background** and where it is a stand-alone sign shall have a yellow border. **(asked in ANAC, trick: taxiway centerline is yellow, location sign tells you in which taxiway you are, so letters are yellow)**





Aircraft stand identification signs (asked in ANAC)

An aircraft stand identification marking should be supplemented with an **aircraft stand identification sign** where feasible. Should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

An aircraft stand identification sign should consist of an inscription in **black on a yellow background**. Alternatively in Europe this may be white on a blue background.

Markers

A marker is an object which is displayed above ground level in order to indicate an obstacle or delineate a boundary. **Markers** are **used where lights are not provided or where lighting (or ground markings) does not serve the purpose**.

Markers shall be **frangible**. Those **located near a runway or taxiway** shall be sufficiently low to **preserve clearance for propellers and for the engine pods of jet aircraft**. **(asked in ANAC)**

Unpaved runway edge markers

Markers should be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

Where runway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape should be placed so as to delimit the runway clearly.

The markers should be placed with their long dimension parallel to the runway centre line.

Stopway edge markers

Stopway edge markers should be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

The stopway edge markers shall be sufficiently different from any runway edge markers used to **ensure that the two types of markers cannot be confused**.

Taxiway edge markers

Taxiway edge markers should be provided on a taxiway where centre line or edge lights or taxiway centre line markers are not provided. The markers should be installed at least at the same locations as would the taxiway edge lights had they been used.

A **taxiway edge marker** shall be **retroreflective blue**. **(asked in ANAC)**

Taxiway centre line markers

Taxiway centre line markers should be provided on a taxiway where edge lights or taxiway edge markers are not provided. The markers should be installed at least at the same location as would taxiway centre line lights had they been used.

Taxiway centre line markers shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

A **taxiway centre line marker** shall be **retroreflective green**.

Unpaved taxiway edge markers

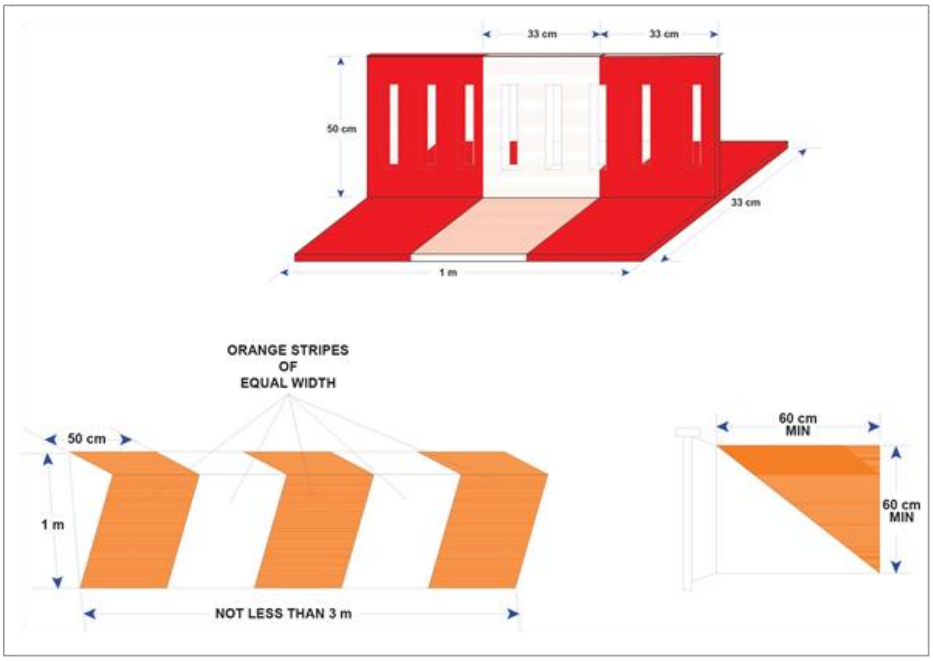
Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers should be provided.

Where taxiway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of conical shape should be placed so as to delimit the taxiway clearly

Boundary Markers

Boundary markers shall be provided at an aerodrome where the landing area has no runway.

The markers should be coloured to contrast with the background against which they will be seen. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white, should be used, except where such colours merge with the background.



Lights

Aerodrome lights

Lights may be turned off providing that they **can be turned on again within a period of 1 hour**. **(asked in ANAC)**

Aircraft Safety

A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

Elevated lights

Elevated runway, stopway and taxiway lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Light intensity and control

In poor visibility conditions by day, lights can be more effective than markings. For lights to be effective in such conditions or in poor visibility by night, they must be of adequate intensity. To obtain the required intensity, it will usually be necessary to make the light directional, in which case the arcs over which the light show will have to be adequate and so orientated as to meet the operational requirements.

Where a high-intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

- approach lighting system;
- runway edge lights;
- runway threshold lights;
- runway end lights;
- runway centre line lights
- runway touchdown zone lights; and
- taxiway centre line lights.

Emergency Lights

Normally, an aerodrome will have an alternate power supply to cope with general power failures. Where no such back-up supply exists, emergency lights are to be available for at least the primary runway.

Aeronautical beacons

Where operationally necessary an aerodrome beacon or an identification beacon shall be provided at each aerodrome intended for use at night.

Aerodrome beacon

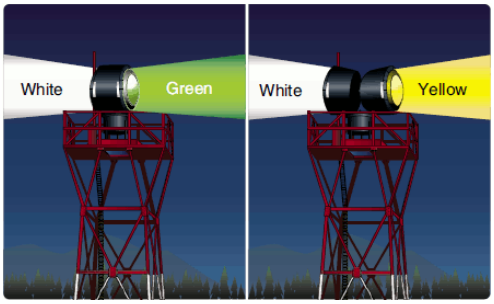
An aerodrome beacon shows ‘flashes’ of light. For **land aerodromes the colours are white or white and green (asked in ANAC)** and for **water aerodromes, white or white and yellow**. **(asked in ANAC, usually show a white flashing strobe light)**

An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exist:

a) aircraft navigate predominantly by visual means;

b) reduced visibilities are frequent; or

c) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.



Identification beacon

An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

An identification beacon will show **Morse code** identification of the aerodrome in **flashing green at a land aerodrome (asked in ANAC, trick: grass is green)** and flashing yellow at a water aerodrome.

Approach lighting systems

Calvert

Generally used in the UK and occasionally in other parts of the world, Calvert systems (named after the inventor) consist of 5 bars and a distance coded centre line. A NATO system is similar but does not have the distance coding of the centre line.

Barrettes

The individual lights that make up the lighting systems may be arranged either as single light units (as in the Calvert method) or in the form of groups of three or more lights arranged as a bar (the ICAO method). For instance the centre line of a system may consist of either single point source lights or a bar of 5 lights close together. The arrangement of 3 lights or more close together is called a 'barrette' (pronounced barre - et meaning small bar). They are called barrettes so that they are not confused with the bar constituent parts of any approach lighting system.

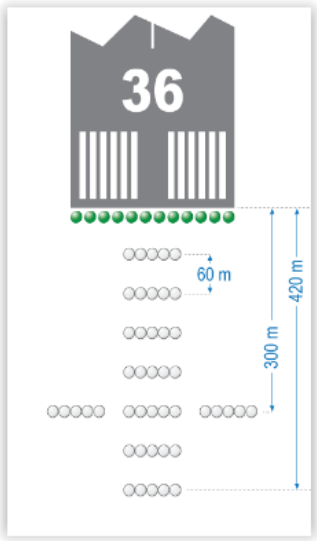
(Asked in ANAC) ICAO Annex 14 describes **two categories of approach lighting systems**:

- **Simple approach lighting system**
- **Precision approach lighting system** (precision approach category I lighting system and precision approach category II and III lighting system)

Simple approach lighting system

A **simple approach lighting system** shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of **not less than 420 m** from the threshold with a **row of lights forming a crossbar** 18 m or 30 m in length **at a distance of 300 m** from the threshold. The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. **(asked in ANAC)**

This type of system is used on a non-instrument runway and may be used on a non-precision instrument runway.



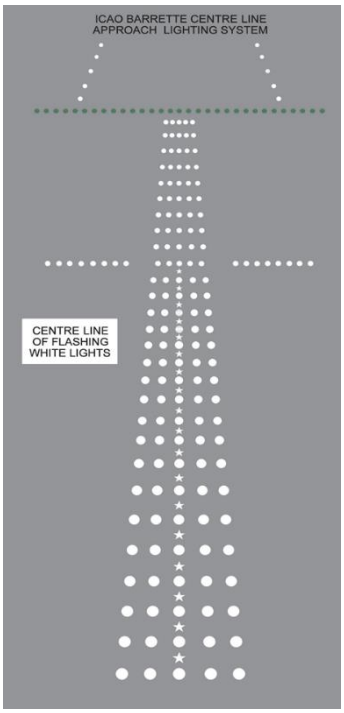
Precision approach category I lighting system

A **precision approach category I lighting system** shall consist of a **row of lights** on the extended centre line of the runway extending, wherever possible, over a **distance of 900 m from the runway threshold** with a **row of lights forming a crossbar** 30 m in length at a **distance of 300 m** from the runway threshold. **(asked in ANAC, length 900 m and crossbar at 300 m)**

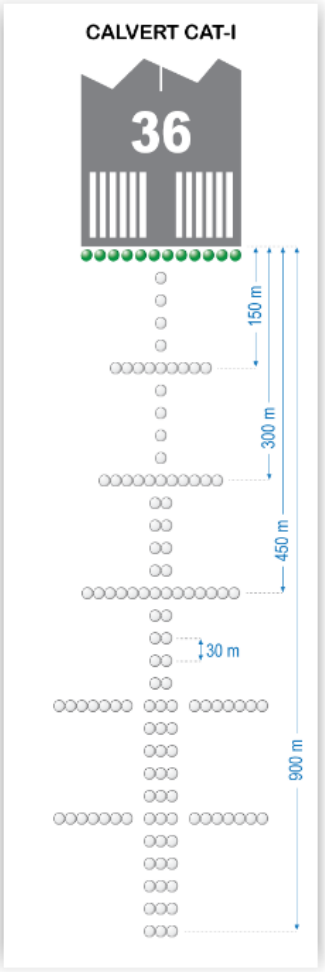
The **centre line and crossbar lights** of a **precision approach category I lighting system** shall be **fixed lights showing variable white (asked in ANAC)**.

If the centre line consists of barrettes (ICAO):

No distance coding, single centre line.



If the centre line consists of single light source (Calvert System / Full or Complete CAT I approach light system) instead of barrettes:



The **centre line** should be **distance coded (asked in ANAC)**. Single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line. Each light source segment on the centre line has a **length of 300 m (asked in ANAC)**, as you can see.

Additional crossbars of lights to the crossbar provided at 300 m from the threshold shall be provided at 150 m, 450 m, 600 m and 750 m from the threshold making a **total of 5 crossbars (asked in ANAC)**. The distance between the **crossbars is 150 m (asked in ANAC)** and form three segments: the inner segment (0 - 300 m); the middle segment (300 - 600 m); and the outer segment (600 - 900 m).

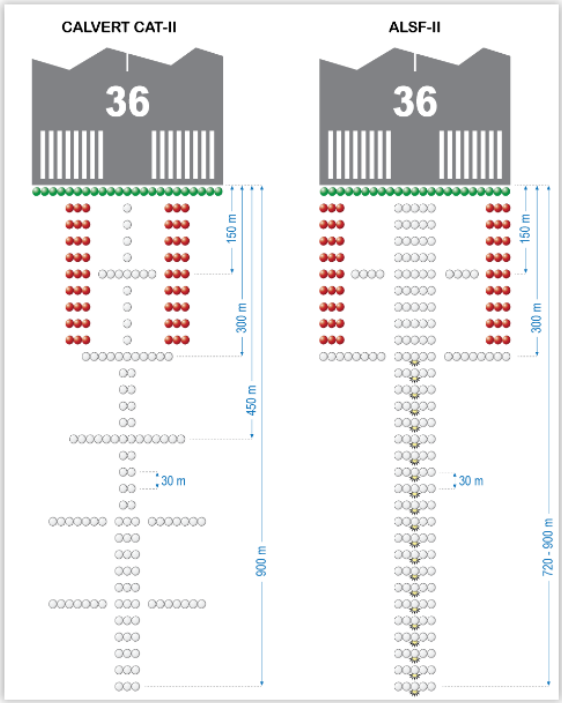
The lights forming each crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

Precision approach category II and III lighting system

At those aerodromes where Cat II and III approaches are conducted more complex approach lighting system are installed to enhance the possibility of the pilot achieving the visual criteria at DH to complete the landing.

The systems used are various but all are based on either the Calvert 5 bar and centre line system, or the ICAO barrette system. Both systems should be **900 m long** and provide some element of attitude information.

In both the Calvert and the ICAO systems the **inner segment (0 - 300 m from the threshold) is augmented by the supplementary approach lighting**. This consists of replacing the centre line of the Calvert system with barrettes and **adding red wing barrettes** to both systems. The effect is to enhance the visibility and conspicuity of the inner segment. DH for Cat II is not lower than 100 ft which equates to 300 m from the threshold (assuming the pilot crosses the threshold at 50 ft).



Visual approach slope guidance

Minimum Eye Height over threshold (MEHT) (asked in ANAC)

The minimum height of the aircraft cockpit over the threshold when the aircraft glideslope indicator is showing an on-slope indication.

Eye height over threshold: The standard dimension of 15 m may be varied by a maximum of +1 or –3 m, giving an allowable range of 12 m to **16 m (asked in ANAC, height not exceeding this maximum)**. A variation outside these limits should be referred to the competent authority for consideration.

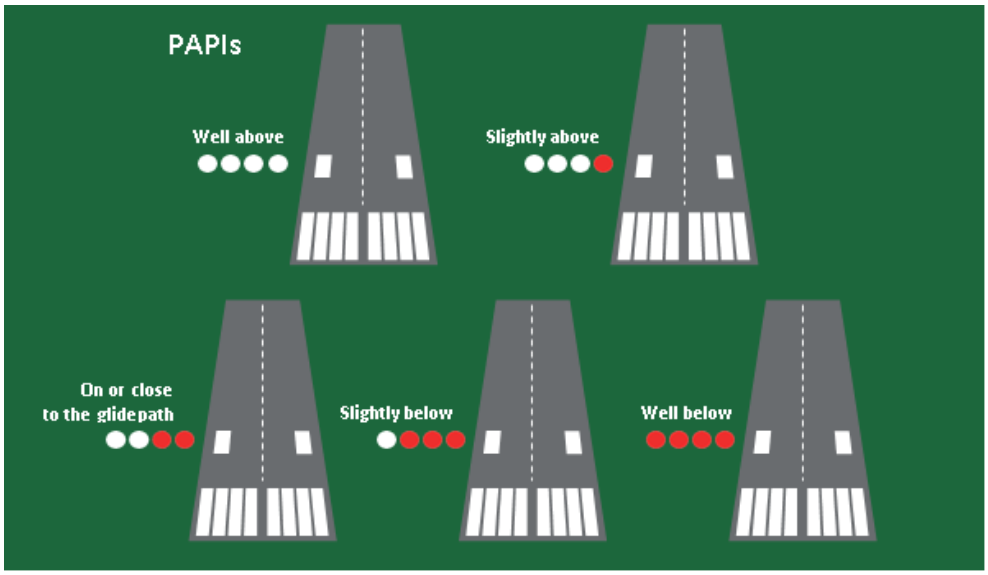
Precision Approach Path Indicator (PAPI)

The **PAPI system** shall consist of **a (one) wing bar of four sharp transition multi-lamp (or paired single lamp) units equally spaced (asked in ANAC)**. The system shall be located on the left side of the runway unless it is physically impracticable to do so.

Each light unit is set to a different mid angle and the colour is depending on the vertical angle, below that angle shows red and above shows white.

The overall effect is to give a reference to the median angle which is set to the required glide path (e.g. 3°).

PAPI Indications (asked in ANAC, you should really know these not just for Air Law!)



The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

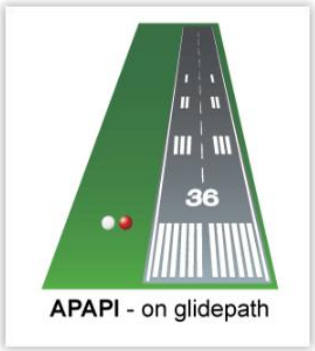
a) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

b) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

c) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

APAPI

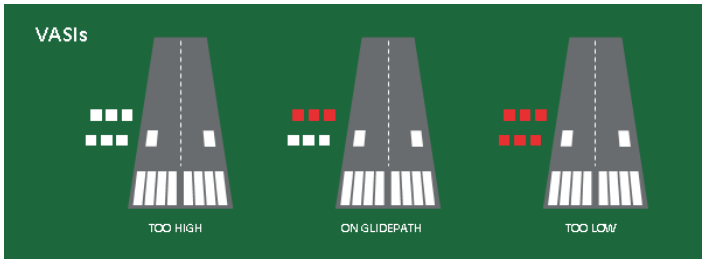
Abbreviated PAPI (APAPI) may be installed. The **APAPI system** shall consist of a wing bar of **two sharp transition multi-lamp (or paired single lamp) units (asked in ANAC)**. The system shall be located on the left side of the runway unless it is physically impracticable to do so.



Visual Approach Slope Indicator (VASI)

This consists of 2 sets of **3 lights positioned as wing bars (asked in ANAC)**. Each set of lights is designed so that the lights appear as either white or red, depending on the angle at which the lights are viewed.

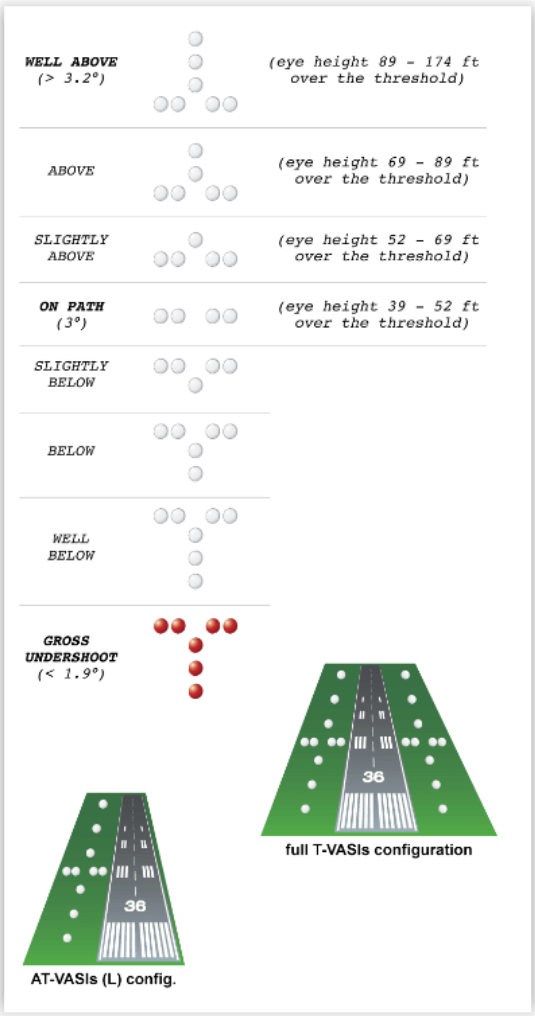
When the pilot is approaching the lights on the glide slope the first set of lights appears white and the second set appears red. When both sets appear white, the pilot is flying too high, and when both appear red the approach is too low.



T-VASI

The **T-VASIS** shall consist of twenty light units symmetrically disposed about the runway centre line in the form of **two wing bars** of **four light units each (asked in ANAC)**, with bisecting longitudinal lines of six lights.

The **AT-VASIS** shall consist of ten light units arranged on **one side of the runway** in the form of a **single wing bar** of **four light units (asked in ANAC)** with a bisecting longitudinal line of six lights.



Runway lights

Circling guidance lights

Circling guidance lights are provided when existing approach and runway lighting do not permit identification of the runway to an aircraft undertaking a circling approach to land. They may be fixed or flashing white.

Runway lead-in lighting systems

A runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

The system may be curved, straight or a combination of both. They **consist of groups of at least 3 flashing white lights** and, where practical, each group should **flash in sequence towards the runway**. **(asked in ANAC)**

Runway threshold identification lights

Used at the threshold of a non-precision runway when additional threshold conspicuity is necessary or where the threshold is permanently displaced.

Runway threshold identification lights are **flashing white lights unidirectional (asked in ANAC)** in the direction of the approach to the runway.

Note: ICAO refers to REILs as Runway Threshold Identification Lights

Runway edge lights

Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

Runway edge lights should be provided on a **runway intended for take-off** with an **operating minimum below an RVR of the order of 800 m by day**. **(asked in ANAC)**

Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.

Runway edge lights shall be **fixed lights showing variable white (*or yellow) (asked in ANAC)**, except that:

a) in the case of a **displaced threshold**, the **lights between the beginning of the runway and the displaced threshold** shall **show red** in the approach direction **(asked in ANAC)**; and

b) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show ***yellow**.

When the **runway edge lights** are intended to **provide guidance during circling**, they **shall show at all angles in azimuth (omni-directional)**. **(asked in ANAC)**

Runway threshold and wing bar lights

Runway threshold lights shall be provided for a runway equipped with runway edge lights, except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

When the threshold is at the extremity of a runway, the threshold lights are placed in a row at right angles to the runway axis as near to the extremity of the runway as possible. When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

Runway threshold and wing bar lights are to be **fixed, unidirectional lights showing green in the direction of approach to the runway**. **(asked in ANAC)**

Runway end lights

Runway end lights shall be provided for a runway equipped with runway edge lights.

Runway end lights shall be **fixed unidirectional lights showing red in the direction of the runway**. **(asked in ANAC)**

Runway centre line lights

Runway centre line lights shall be provided on a **precision approach runway category II or III (asked in ANAC)**.

Runway centre line lights shall be provided on a **runway intended to be used for take-off** with an **operating minimum below an RVR of the order of 400 m**. **(asked in ANAC)**

Runway centre line lights are **fixed, variable intensity white**. Over the last 900 m from the runway end, the lights show alternate **red and white** from **900 m to 300 m** from the runway end; and all **red from 300 m to the runway end**. **(asked in ANAC)**

Runway touchdown zone lights

Touchdown zone (TDZ) lights shall be provided in the touchdown zone of a precision approach runway category II or III.

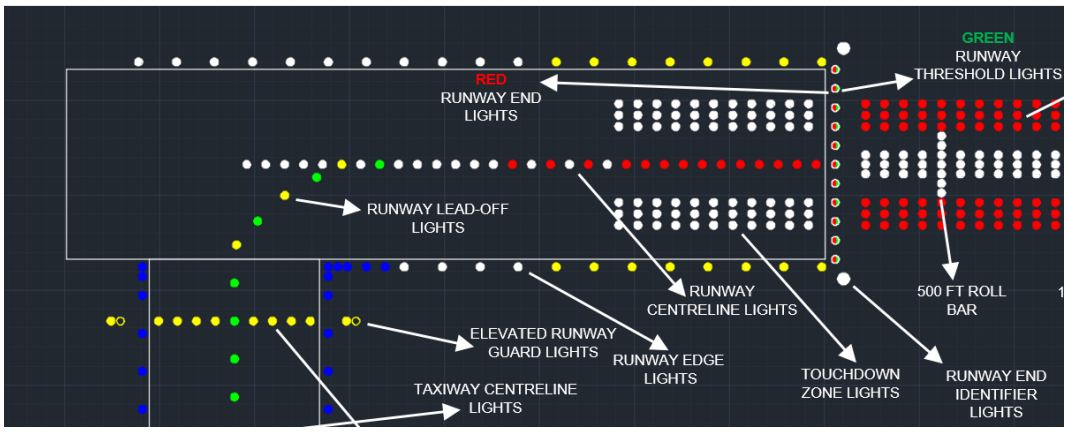
Touchdown zone lights extend from the threshold for a distance of 900 m where the runway is 1800 m or more in length. The lights are arranged in the form of strips either side of the centre line, the width of the strips is to be the same width as the touchdown zone markings.

Touchdown zone lights shall be **fixed unidirectional lights showing variable white**.

Stopway lights

Stopway lights shall be provided for a stopway intended for use at night with the lights placed along the full length of the stopway.

Stopway lights shall be **fixed unidirectional lights showing red in the direction of the runway**.



Taxiway lights

Taxiway lighting provides pilots with guidance and information during the taxi to and from the runway. It consists of centre line lights, edge lights, guard lights, and stop lights at holding points.

Taxiway centre line lights

Taxiway centre line lights shall be provided on an exit taxiway, taxiway, de-icing/anti-icing facility and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Taxiway centre line lights are **fixed, variable intensity showing green (asked in ANAC)** such that the light is visible only from the aeroplanes on or in the vicinity of the taxiway.

Alternate taxiway centre line lights shall show **green and yellow** from their **beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area (asked in ANAC)**.

Rapid exit taxiway indicator lights shall be fixed unidirectional yellow lights.

Taxiway edge lights

Taxiway edge lighting is provided along the edges of holding bays, de/anti-icing facilities, aprons etc. It is intended for use at night on taxiways not provided with taxiway centre line lighting. If, however, sufficient alternative illumination is available (e.g. stadium lighting) then the edge lights may be dispensed with. Where a runway forms part of a standard taxi route intended for use at night and no taxiway centre line lighting exists, edge lights are to be provided.

Taxiway edge lights are **fixed, variable intensity omni-directional blue**. **(asked in ANAC)**

Stop bars

Stop bars are a **row of red lights** showing in the direction of taxiing aircraft and when illuminated require the aircraft to stop.

An aircraft taxiing on the manoeuvring area shall **stop and hold** at all lighted stop bars **and may only proceed further when the lights are switched off**. **(asked in ANAC)**

A stop bar shall be provided at **every runway-holding position** serving a runway when it is intended that the runway will be used in **runway visual range conditions less than a value of 350 m (asked in ANAC)** or **between 350 m and 550 m**, **except** where:

a) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or

b) **(asked in ANAC) operational procedures exist to limit**, in runway visual range conditions **less than a value of 550 m**, the number of:

1) **aircraft on the manoeuvring area to one at a time**; and

2) **vehicles on the manoeuvring area to the essential minimum**.

Intermediate holding position lights

Intermediate Holding Position lights consist of 3 fixed unidirectional lights showing yellow in the direction of approach and at right angles to the taxiway.

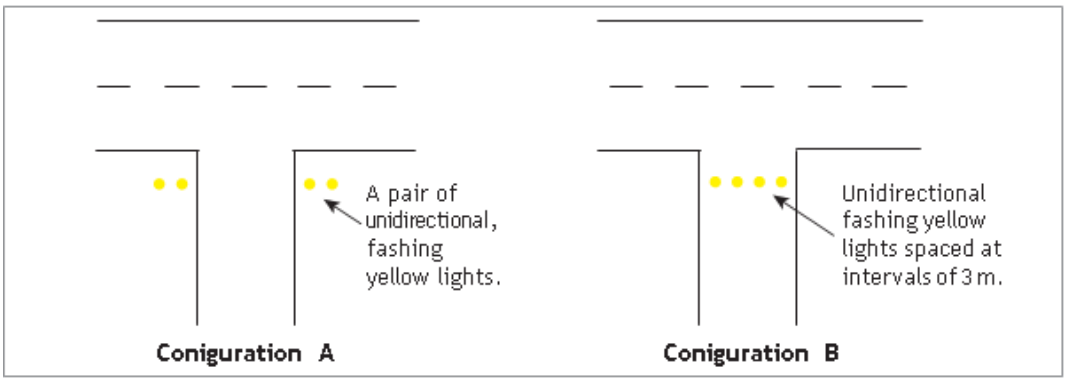
Runway guard lights

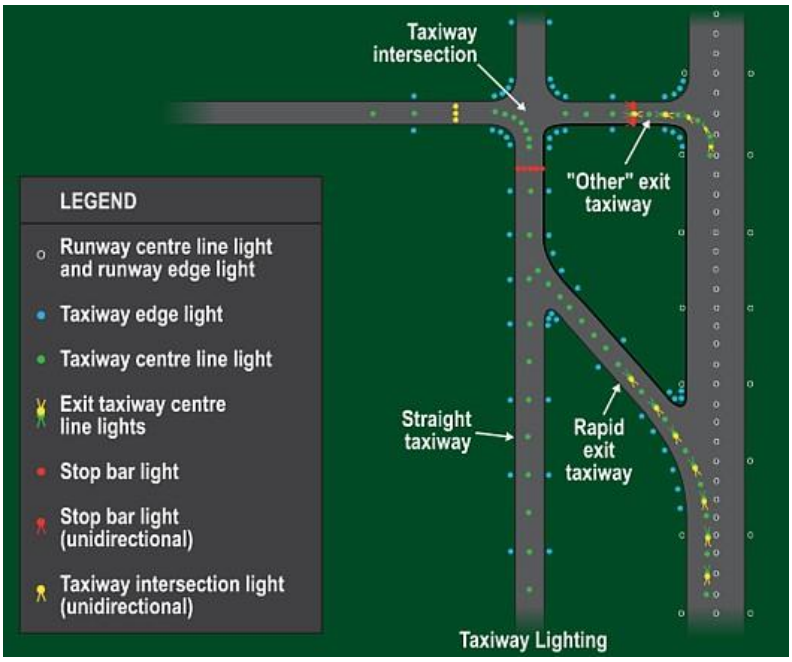
The purpose of runway guard lights is to warn pilots, and drivers of vehicles when they are operating on taxiways, that they **are about to enter a runway**.

The **lights** are **flashing yellow** and show in the direction of taxiing aircraft.

They are installed at the **entrance to runways** used in **RVR conditions less than 550 m where a stop bar is not fitted (asked in ANAC)**, and in RVR conditions of 550 - 1200 m where traffic density is high.

There are two configurations of runway guard lights known as Configuration A and Configuration B:





Visual Aids for Denoting Obstacles

The responsibility for marking/lighting of obstacles on or near aerodromes must be determined between the aerodrome licensee and the owners of the structures. Licensees are responsible for the marking and lighting of all obstacles on the movement area irrespective of ownership.

The treatment of obstacles in this chapter is concerned with the identification and marking of **obstacles on and in the vicinity of aerodromes**, which may be collision hazards to local flying and en route operations. Aerodrome obstacles are those obstacles that protrude through the OIS out to a **distance of 15 km from the aerodrome**. The obstacles are determined by survey and are detailed in the aerodrome entry in the AIP.

Marking and/or lighting of objects

The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles. It does not necessarily reduce operating limitations which may be imposed by an obstacle.

Fixed obstacles should be marked and, if the aerodrome is used at night, lit. The marking may be omitted when the obstacle is lit by high intensity obstacle lights by day.

Marking of objects

Fixed objects

All fixed objects to be marked shall, whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

Orange/red and white should be used, except where such colours are not conspicuous when viewed against the background.

Marking by flags

Flags used to mark fixed objects shall be displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15 m. **Flags shall not increase the hazard presented by the object they mark.**

Flags used to mark fixed objects should be **orange (asked in ANAC)** in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.

Mobile objects

Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

When mobile objects are marked by colour, a **single conspicuous colour** should be used, preferably **red or yellowish green** for **emergency vehicles (asked in ANAC)** and **yellow** for **service vehicles** (maintenance vehicles, ATC vehicles, 'Follow Me' vehicles, aircraft towing vehicles, refuellers etc.). **(asked in ANAC)**

Lighting of objects

The presence of objects which must be lit shall be indicated by low, medium or high intensity obstacle lights, or a combination of such lights.

Note: High- intensity obstacle lights are intended for day use as well as night use.

Mobile objects

Whenever a permitted vehicle is on the movement area the lights are to be switched on.

Low-intensity obstacle lights, Type C, displayed on vehicles associated with **emergency or security shall be flashing-blue** and those displayed on **other vehicles shall be flashing-yellow (asked in ANAC)**. The lights specified are to be fitted at the highest point of the prime mover.

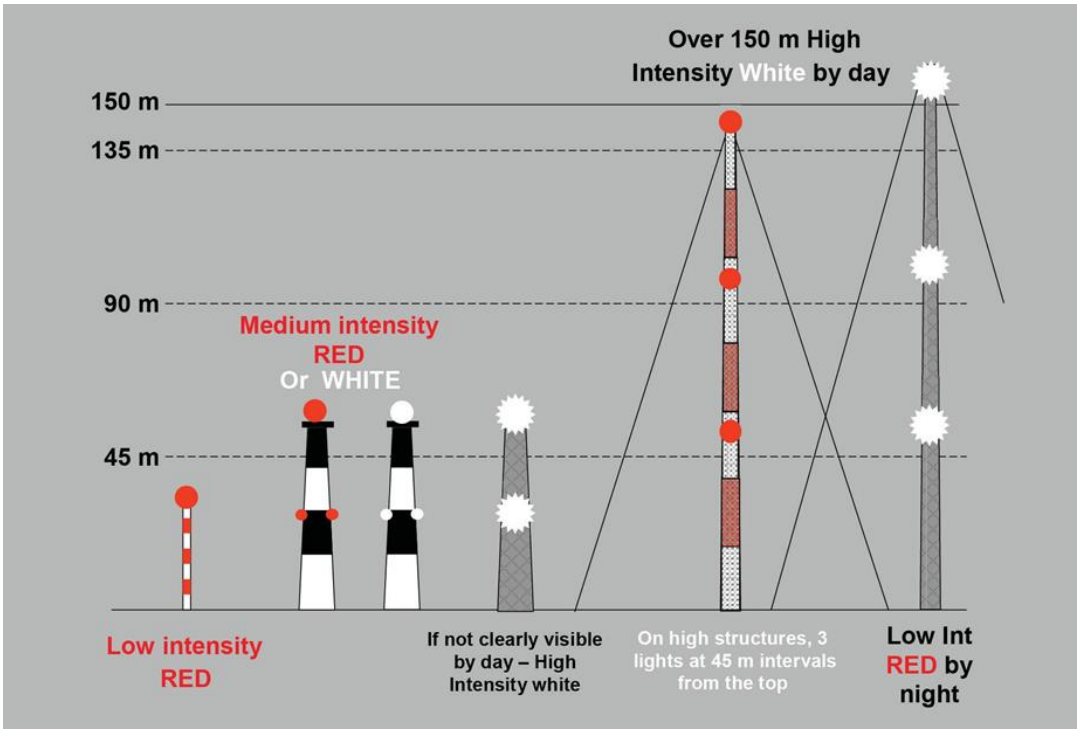
Trailers are to be lit with low intensity steady red lights at the highest point.

Low-intensity obstacle lights on objects with limited mobility such as **aerobridges** shall be low intensity fixed-red.

Emergency Vehicles

Vehicles which are not normally based on the aerodrome (civilian fire/rescue vehicles) when called upon for assistance, are to show **flashing blue lights** and are to be escorted by vehicles with radio communication with ATC.

Fixed objects



Low Intensity Lights

Low intensity obstacle lights on fixed objects shall be **fixed red lights (asked in ANAC)** and have intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which they would normally be viewed.

Where the use of low intensity obstacle lights would be inadequate or an early special warning is required, then medium or high intensity obstacle lights should be used.

Medium Intensity Lights

Medium intensity obstacle lights shall be **flashing red lights**, except that when used in conjunction with high intensity obstacle lights they shall be flashing white lights.

The flash frequency shall be between 20 and 60 per minute. **Medium intensity obstacle lights located on an object should flash simultaneously**.

Medium intensity obstacle lights should be used, either alone or in combination with low intensity obstacle lights, where the object is an extensive one or its height above the level of the surrounding ground is greater than 45 m.

High Intensity Lights

High intensity obstacle lights shall be **flashing white lights**. **(asked in ANAC)**

High intensity obstacle lights located on an object should flash simultaneously at a rate between 40 and 60 per minute. High intensity obstacle lights located on a tower should flash sequentially; first the middle light, second the top light and last the bottom light.

High intensity obstacle lights **should be used to indicate the presence of an object** if its **height** above the level of the surrounding ground **exceeds 150 m** and an aeronautical study indicates such **lights to be essential for** the **recognition of the object by day**. **(asked in ANAC)**

En-route Obstacles

Objects located beyond 15 km radius of the aerodrome are normally considered to be obstacles to aircraft in flight only if they exceed height of 150 m. En route obstacles are usually lit by steady red lights at night and high intensity flashing white lights by day. Environmental considerations may preclude the use of high intensity lights.

Marking of Overhead Wires or Cables

Overhead wires or cables are marked by coloured spheres.

Visual Aids for Denoting Restricted Use of Areas

A closed marking shall be displayed on a runway or taxiway or portion thereof which is permanently closed to the use of all aircraft.

A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

Closed runways and taxiways, or parts thereof

Location

On a runway a closed marking shall be placed at each end of the runway, or portion thereof, declared closed, and additional markings shall be so placed that the maximum interval between markings does not exceed 300 m.

On a taxiway a closed marking shall be placed at least at each end of the taxiway or portion thereof closed.

Characteristics

The **marking** shall be **white** when displayed on a **runway** and shall be **yellow** when displayed on a **taxiway**. (Note: When an area is temporarily closed, frangible barriers or markings utilizing materials other than paint or other suitable means may be used to identify the closed area).

When a runway or taxiway or portion thereof is permanently closed, **all normal runway and taxiway markings shall be obliterated**. **Lightings** on a closed runway or taxiway or portion thereof **shall not be operated**, except as required for maintenance purposes.

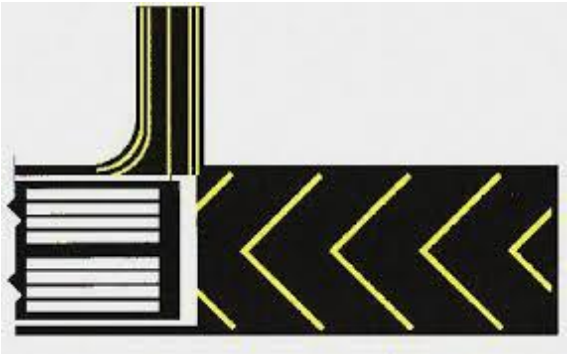
Non-load-bearing surfaces

Shoulders for taxiways, runway turn pads, holding bays and aprons and other non-load-bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft shall have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking.

A **taxi side stripe marking** should consist of a **pair (2) of solid lines**, each 15 cm wide and spaced 15 cm apart and **the same colour as the taxiway centre line** marking. **(asked in ANAC)**

Pre-threshold area

When the surface before a threshold is paved and exceeds 60 m in length and is **not suitable for normal use by aircraft (can still be used as a stopway)**, the entire length before the threshold should be marked with a **yellow chevron marking**. The chevron marking **should point towards the threshold**. **(asked in ANAC)**



If it is **not suitable for (any) use by aircraft** then it should be **marked with a white X**. **(trap in ANAC between the two)**

Where a **runway threshold is temporarily or permanently displaced**, **white arrows** shall be provided on the portion of the runway before the displaced threshold. **(asked in ANAC)**

Unserviceable areas

Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights shall be used.

Aerodrome operational services, equipment and installations

Rescue and firefighting (RFF)

The **principal objective** of a rescue and firefighting service is to **save lives (asked in ANAC)** in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and firefighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The rescue may require the use of equipment and personnel other than those assessed primarily for rescue and firefighting purposes.

(Asked in ANAC) The most important factors bearing on effective rescue in a survivable aircraft accident are:

- **the training received; (one of the most important)**
- **the effectiveness of the equipment; and**
- **the speed with which personnel and equipment designated for rescue and firefighting purposes can be put into use.**

Level of protection to be provided

The level of protection provided at an aerodrome for RFF shall be appropriate to the aerodrome category.

Exceptionally, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided may be not less than one category below the determined category.

The aerodrome category shall be determined from the table below, **based on the longest aeroplanes (overall length) normally using the aerodrome and fuselage width (asked in ANAC)**. If, after selecting the category appropriate to the longest aeroplane's over-all length that aeroplane's fuselage width is greater than the maximum width for that category then one category higher is used.

During anticipated periods of reduced activity, the level of protection available shall be no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements.

Category	Aeroplane Overall Length	Maximum Fuselage Width	Number of rescue/ fire fighting vehicles
1	0 m up to but not including 9 m	2 m	1
2	9 m up to but not including 12 m	2 m	1
3	12 m up to but not including 18 m	3 m	1
4	18 m up to but not including 24 m	4 m	1
5	24 m up to but not including 28 m	4 m	1
6	28 m up to but not including 39 m	5 m	2
7	39 m up to but not including 49 m	5 m	2
8	49 m up to but not including 61 m	7 m	3
9	61 m up to but not including 76 m	7 m	3
10	76 m up to but not including 90 m	8 m	3

Response time

Response time is considered to be the **time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam** at a **rate of at least 50 per cent** of the discharge rate. **(asked in ANAC)**

Maximum response time is **3 minutes (180 seconds)**, but they should try to achieve a response time of **2 minutes (normal limit)**. **(asked in ANAC)**

Emergency Access Roads

Emergency access roads should be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention should be given to the provision of ready access to approach areas up to 1000 m from the threshold, or at least within the aerodrome boundary. Where a fence is provided, the need for convenient access to outside areas should be taken into account. Note: Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

Fire Stations

All RFF vehicles should normally be housed in a fire station. Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.

The fire station should be located so that the access for RFF vehicles into the runway area is direct and clear, requiring a minimum number of turns. Providing the response time can be met, the fire station need not be within the aerodrome confines.

An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic.

Apron management service

A service provided to **regulate the activities and the movement of aircraft and vehicles** on **an apron**. **(asked in ANAC)**

When warranted by the volume of traffic and operating conditions, an appropriate apron management service should be provided on an apron by an aerodrome ATS unit, by another aerodrome operating authority, or by a cooperative combination of these, in order to:

a) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

b) regulate entry of aircraft into, and coordinate exit of aircraft from, the apron with the aerodrome control tower; and

c) ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.

Ground servicing of aircraft

Fire extinguishing equipment suitable for **at least initial intervention** in **the event of a fuel fire** and personnel trained in its use shall be **readily available during the ground servicing of an aircraft** **(asked in ANAC)**, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

a) the use of a sufficient number of exits for expeditious evacuation; and

b) a ready escape route from each of the exits to be used in an emergency.

Facilitation

Information on customs and health (**Facilitation**) can be **found in AIP**. **(asked in ANAC)**

Definitions

Deportee - A person who had legally been admitted to a State by its authorities or who had entered a State illegally, and who at some later time is formally ordered by the competent authorities to leave that State.

Inadmissible person - A person who is or will be refused admission to a State by its authorities. **(asked in ANAC)**

Unaccompanied baggage - Baggage that is transported as cargo and may or may not be carried on the same aircraft with the person to whom it belongs.

Entry and departure of aircraft

The documentation required by States for the entry and departure of aircraft, crew and passengers have evolved from the same documentation required for shipping and much of the terminology has been retained. Government regulations and procedures applicable to the clearance of aircraft shall be no less favourable than those applied to other forms of transportation.

Documents — requirements and use

No documents other than those provided for in Annex 9 shall be required by the public authorities from operators for the entry and departure of aircraft.

Contracting States shall not require the aircraft operator to deliver to the public authorities more than **three copies** **of any of the documents** (general declaration form, passenger and cargo manifest, simple stores list) at the time of entry or departure of the aircraft. **(asked in ANAC)**

Documents may be typewritten, produced in electronic data form or **handwritten** **with** **block lettering in ink** or indelible pencil. **(asked in ANAC)**

General Declaration Form

(Asked in ANAC) A general declaration is an internationally recognized form which contains:

- Operator
- **Aircraft registration marking** and **Flight number**
- **Place of Departure** and **Arrival** (**date** as well)
- **Name of crew** and assigned place
- **Number of Passengers**
- Declaration of health conditions (signed by crew members)
- Signature field

It is the eventual aim to eliminate from the general declaration, any reference to passengers.

Contracting States will not require the presentation of the General Declaration when this information can be readily obtained in an alternative and acceptable manner.

It is **signed by an authorized agent or the PIC**. **(asked in ANAC)**

Manifests

Passenger and Cargo manifests are additional internationally recognized documents that detail names of passengers and the nature of goods and number of packages embarked on the aeroplane.

Cargo Manifest

The **production and presentation of the Cargo Manifest and the air waybill(s)** shall be the **responsibility of** the **aircraft operator or his authorized agent (IATA cargo agent)**. **(asked in ANAC)**

Cargo Manifest shall include:

- Operator
- Aircraft ID and flight number
- Point of loading and unloading (places)
- Air waybill number
- Number of packages
- Nature of goods (to be completed when required by the state)

A **cargo manifest may be requested by a Contracting State (asked in ANAC)** in paper form, it shall accept either:

a) the form completed according to the instructions; or

b) the form partially completed, with a **copy of each air waybill representing the cargo on board the aircraft**. **(asked in ANAC)**

A Contracting State which continues to require the presentation of a Cargo Manifest shall, apart from the information indicated at the heading of the format of the standard Cargo Manifest format, not require more than the following three items: **(asked in ANAC)**

- **the air waybill number**
- **the number of packages related to each air waybill number**
- **the nature of the goods**

Arrangements concerning international general aviation and other non-scheduled flights

Advance notification of arrival

Contracting States shall accept the information contained in a flight plan as adequate advance notification of arrival, provided that such information is received **at least two hours in advance of arrival (asked in ANAC)** and that the landing occurs at a previously designated international airport.

Clearance and sojourn of aircraft

An aircraft that is **not engaged in scheduled** international air services and which is making a flight to or through any designated international airport of a Contracting State and is **admitted temporarily free of customs duty (asked in ANAC)** in accordance with Article 24 of the Convention shall be allowed to remain within that State, **for a period to be established by that State (asked in ANAC)**, without security for customs duty on the aircraft being required.

Entry and departure of persons and their baggage

In order to facilitate and expedite the clearance of persons entering or departing by air, Contracting States shall adopt border control regulations appropriate to the air transport environment and shall apply them in such a manner as to prevent unnecessary delays.

In developing procedures aimed at the efficient application of border controls on passengers and crew, Contracting States shall take into account the application of aviation security, border integrity, narcotics control and immigration control measures, where appropriate.

Documents required for travel

Contracting States shall ensure that no documents other than those provided for in this chapter shall be required by visitors for the entry into and departure from their territories.

(Asked in ANAC) Contracting States **shall not require** visitors travelling by air, rightfully holding valid passports recognized by the receiving State and holding valid visas, where appropriate, **to present any other document of identity**. (**valid passport and visa, if required, is enough**)

Contracting States shall issue a separate passport to each person, **regardless of age**. **(asked in ANAC, need passport for all ages)**

> The documents required for travel are the **same as** would be required **if** the **person arrived by ship**. **(trap in ANAC)**

When a **passenger** is only transiting through the territory of a Contracting State as part of his/her flight trip (and **spending 2 days or less**), the **Contracting State shall usually not require a visa for such passenger**. **(asked in ANAC)**

Exit visas

Contracting States **shall not require exit visas** from their own nationals wishing to tour abroad nor from visitors at the end of their stay. **(asked in ANAC)**

Disposition of baggage separated from its owner

Contracting States shall permit aircraft operators to forward mishandled baggage to the location of its owner and shall not hold aircraft operators liable for penalties, fines, import duties and taxes, on the basis that the baggage was mishandled.

Unaccompanied baggage shall be cleared under the procedure applicable to **accompanied baggage or under another simplified customs procedure distinct from that normally applicable to other cargo**. **(asked in ANAC)**

Identification and entry of crew and other aircraft operators' personnel

Contracting States shall establish measures, with the cooperation of aircraft operators and airport operators, to **expedite the inspection of crew members and their baggage**, as required at departure and upon arrival. **(asked in ANAC)**

CMC's (Crew Member Certificates)

Was developed as a card for use for **identification purposes** by crew members **(asked in ANAC)**. It is issued as a **machine readable card only (asked in ANAC)**, **leaving crew licences to serve their purpose of attesting to the professional qualifications of the flight crew members**. **(asked in ANAC)**

For **identification purposes**, the **CMC is enough** (no passport, no visas, no travel documents, no licences). **(asked in ANAC)**

For **working** purposes, you need the licence, logbook, and so on.

Contracting States shall accept CMCs, for visa-free entrance of crew members when arriving in a **duty status** on an international flight and **seeking temporary entry** for the period allowed by the receiving State. **(asked in ANAC)**

A **visa can be requested** when **off duty** coming from an international flight for **permanent entry**. **(asked in ANAC)**

(Asked in ANAC, doesn't make much sense)

National identity cards **(national card)** can be used by crew to facilitate and expedite the process.

Entry procedures and responsibilities

Contracting States **shall not require a written declaration** of **baggage from passengers and crew**, when no dutiable or restricted goods are being carried. **(asked in ANAC, shall accept oral declaration)**

The **responsibility** of an aircraft operator for **custody and care of passengers** and crew members shall **terminate from the moment such persons have been admitted into that State**. **(asked in ANAC)**

Entry and departure of cargo and other articles

In order to facilitate and expedite the release and clearance of goods carried by air, Contracting States shall adopt regulations and procedures appropriate to air cargo operations and shall apply them in such a manner as to prevent unnecessary delays.

When, **because of error**, emergency or inaccessibility upon arrival, goods are **not unladen at their intended destination**, Contracting States **shall not impose penalties, fines or other similar charges (asked in ANAC)** provided:

- the aircraft operator or his authorized agent notifies the customs of this fact, within any time limit laid down;
- a valid reason, acceptable to the customs authorities, is given for the failure to unload the goods; and
- the Cargo Manifest is duly amended.

Mail documents and procedures

Contracting States shall carry out the handling, forwarding and clearance of mail and shall comply with the documentary procedures as prescribed **by the Acts in force of the Universal Postal Union**. **(asked in ANAC)**

Inadmissible persons and deportees

Inadmissible persons

Responsibility of the **Operator**. **(asked in ANAC)**

When a person is found inadmissible and is returned to the aircraft operator for transport away from the territory of the State, the **aircraft operator shall not be precluded from recovering from such person any transportation costs involved in his removal**. **(asked in ANAC)**

Operator shall remove inadmissible person to:

- the point the journey commenced, or,
- **any place where he/she is admissible**. **(asked in ANAC)**

Deportees

A Contracting State deporting a person from its territory shall serve him a deportation order. Contracting States shall indicate to the deportee the name of the destination State.

Contracting States removing deportees from their territories shall assume all obligations, responsibilities and costs associated with the removal.

Unruly passengers

Each Contracting State shall, to deter and prevent unruly behaviour, promote passenger awareness of the unacceptability and possible legal consequences of unruly or disruptive behaviour in aviation facilities and on board aircraft.

An unruly passenger can be **transferred to the authorities in any State**. **(asked in ANAC)**

Potentially disruptive passengers shall be **boarded prior to all other passengers and seated in the rear part of the aircraft**. Last ones to disembark. PIC is notified of the carriage of these passengers and may refuse. **(asked in ANAC)**

Search and Rescue

Definitions

Uncertainty Phase (INCERFA) - A situation wherein uncertainty exists as to the safety of an aircraft and its occupants. Normally this phase is activated when an aircraft is overdue for more than half an hour. The flight plan is used to find out where the aircraft could be. In most cases these situations are cleared by investigations via telephone. Quite often pilots forget to close their flight plan after landing at an uncontrolled airfield.

Alert Phase (ALERFA) - A situation wherein **apprehension** exists as to the safety of an aircraft and its occupants. If the uncertainty phase does not clear up the situation, an alert phase is initiated. Therefore, a flight plan database is used to collect more details about the type of aircraft, registration, number of persons on board, routing, alternate airports and fuel on board. These data are analysed, together with radar information, if available. **SAR personnel and equipment is prepared** for operation to be ready for a possible distress phase. **(Mostly asked)**

Distress Phase (DETRESFA) - A situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance. This phase also initiates professional search and rescue measures where specialized air and ground vehicles and personnel are actively searching for the missing aircraft.

Rescue coordination centre (RCC) - A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region. **(asked in ANAC)**

Rescue subcentre (RSC) - A unit subordinate to a rescue coordination centre, established to complement the latter according to particular provisions of the responsible authorities.

Establishment and Provision of SAR Service

Contracting States shall arrange for the **establishment and provision of SAR services within their territories**. Such services shall be provided on a **24 hour basis (asked in ANAC)**. In providing assistance to aircraft in distress and to survivors of aircraft accidents.

Contracting States shall delineate the search and rescue regions within which they will provide search and rescue services. Contracting States **shall establish a rescue co-ordination centre (RCC) in each SAR region. (asked in ANAC)**

Those portions of the **high seas or areas of undetermined sovereignty** for which search and rescue services will be established **shall be determined** on the basis of **regional air navigation agreements**. **(asked in ANAC)**

COSPAS-SARSAT is a satellite system designed to provide **distress alert and location data to assist search and rescue (SAR) operations**, using spacecraft and ground facilities to detect and locate the signals of **emergency/distress beacons operating** on **406 Megahertz (MHz)** or **121.5 MHz**. **(asked in ANAC)**

Operating Procedures

Procedures at the scene of an accident

If the first aircraft to reach the scene of an accident is not a search and rescue aircraft, **it shall take charge of on-scene activities of all other aircraft subsequently arriving until the first search and rescue aircraft reaches the scene of the accident**.

If, in the meantime, such aircraft is unable to establish communication with the appropriate rescue coordination centre or air traffic services unit, it shall, **by mutual agreement**, hand over to an aircraft capable of establishing and maintaining such communications until the arrival of the first search and rescue aircraft.

Procedures for a pilot-in-command intercepting a distress transmission (asked in ANAC)

Whenever a distress transmission is intercepted by a pilot-in-command of an aircraft, the pilot shall, if feasible:

- **acknowledge the distress transmission; (first thing to do)**
- record the position of the craft in distress if given;
- take a bearing on the transmission;
- inform the appropriate rescue coordination centre or air traffic services unit of the distress transmission, giving all available information; and
- **at the pilot's discretion**, while awaiting instructions, proceed to the position given in the transmission.

Signals with Surface Aircraft. The following manoeuvres performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress (repetition of such manoeuvres has the same meaning):

- Circling the surface craft at least once;
- Crossing the projected course of the surface craft close ahead at low altitude and:
    - Rocking the wings; or
    - Opening and closing the throttle; or
    - Changing the propeller pitch.

- Heading in the direction in which the surface craft is to be directed.

Assistance No Longer Required. The aircraft should indicate the fact by crossing the wake of the surface craft close astern at a low altitude and rocking the wings; or opening and closing the throttle; or changing the propeller pitch.

A parachute flare showing a red light is a distress signal. (asked in ANAC)

SAR Signals

Ground-air visual signal code for use by survivors

No.	Message	Code symbol
1	Require assistance	
2	Require medical assistance	
3	No or negative	
4	Yes or Affirmative	
5	Proceeding in this direction	

Ground-air visual signal code for use by rescue units

No.	Message	Code symbol
1	Operation completed	
2	We have found all personnel	
3	We have found only some personnel	
4	We are unable to continue. Returning to base	
5	Have divided into two groups. Each proceeding in direction indicated	
6	Information received that aircraft is in this direction	
7	Nothing found. Will continue to search	

To indicate that ground signals have been understood, during the day **rock the aircraft's wings**, during the night **flashing on and off twice the aircraft's landing lights, or if not so equipped, by switching on and off twice its navigation lights.**

Marking of Droppable Supplies

Packages of supplies to survivors may be dropped from aircraft. In such circumstances the content of the packages is to be indicated by the attachment of colour coded streamers.

- **Red** Medical supplies and first aid equipment.
- **Blue** Food and water. (**Mnemonic: water is blue)**
- **Yellow** Blankets and protective clothing.
- **Black** Miscellaneous equipment such as stoves, axes, cooking utensils, etc

Emergency Frequencies

- VHF **121.500 MHz** (Aeronautical mobile emergency VHF) **(Most important)**
- UHF **243.000 MHz** (Aeronautical mobile emergency UHF)
- HF 2182 kHz (International maritime distress and calling HF)
- SARSAT 406 MHz (SAR beacon frequency (also radiates on 121.5))

Security

Definitions

(Sadly, all of them are asked in ANAC)

Aircraft Security Check - means an inspection of those parts of the interior of the aircraft to which passengers may have had access, together with an inspection of the hold of the aircraft in order to detect prohibited articles and unlawful interferences with the aircraft.

Airside - The movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled.

Screening - means the application of technical or other means which are intended to identify and/or detect prohibited articles.

Security

(ICAO Annex 17, year 2011) **Safeguarding international* civil aviation against acts of unlawful interference.** This objective is achieved by a combination of measures and human and material resources.

(ICAO Annex 17, year 2002) A combination of measures and human and material resources intended to **safeguard international* civil aviation against acts of unlawful interference**.

Security Control - means the application of means by which the introduction of prohibited articles may be prevented.

Security restricted area - Those areas of the airside of an airport which are identified as priority risk areas where in addition to access control, other security controls are applied. Such areas will normally include, inter alia, **all commercial aviation passenger departure areas between the screening checkpoint and the aircraft,** the ramp, baggage make-up areas, including those where aircraft are being brought into service and screened baggage and cargo are present, cargo sheds, mail centres, airside catering and aircraft cleaning premises.

Unidentified baggage - Baggage at an airport, with or without a baggage tag, which is not picked up by or identified with a passenger.

*All ICAO Annexes refer to the international civil aviation even if they do not mention the term

Objectives

The aim of aviation security shall be to **safeguard international civil aviation operations against acts of unlawful interference. (asked in ANAC)**

Each Contracting State shall have as its primary objective the safety of **passengers, crew, ground personnel and the general public** in all matters related to safeguarding against acts of unlawful interference with civil aviation. **(asked in ANAC, general public is the keyword)**

Organization

National organization

Each Contracting State shall establish an organization and develop and implement regulations, practices and procedures to safeguard civil aviation against acts of unlawful interference taking into account the safety, regularity and efficiency of flights. Each state shall also **establish and implement a written national civil aviation security programme** for this matter. This programme shall apply to **international civil aviation operations** and also to **domestic operations at the state's discretion**. **(asked in ANAC)**

Each Contracting State shall ensure that the appropriate authority arranges for the supporting resources and facilities required by the aviation security services to be available at **each airport serving civil aviation. (asked in ANAC)**

Airport

Each Contracting State shall require **each airport serving civil aviation (asked in ANAC)** to establish, implement and maintain a written airport security programme appropriate to meet the requirements of the national civil aviation security programme. These airports shall have an authority responsible for coordinating the implementation of security controls.

Each Contracting State shall ensure that an **airport security committee (asked in ANAC)** at each airport serving civil aviation is established to assist the authority mentioned above.

Measures

ICAO Annex 17 comprises rules in order to establish security measures for passengers with regards to **cabin baggage, checked baggage, cargo and other goods, access control and airport design**. **(asked in ANAC)**

If there is a security threat on board an aircraft which is still on the ground during boarding procedures **Pilot-in-command, Police or Airport manager** can be contacted. **(asked in ANAC)**

An aircraft shall not carry munitions of war **unless a written permission of the Authority and the operator is obtained. (asked in ANAC)**

Passengers

States are also to ensure that there is no possibility of mixing or contact between passengers subjected to security control and other persons not subjected to security control, after the security screening at airports has been applied. **If mixing does occur, the passengers and their baggage will be re-screened before boarding an aeroplane. (asked in ANAC)**

Checked Baggage

Unaccompanied baggage can't be transported unless the baggage is stowed in separate compartments from the passengers, and it has been the **subject of additional security control measures. (asked in ANAC)**

Law Enforcement Officers and Carriage of Weapons

Each Contracting State shall ensure that the carriage of weapons on board aircraft, by law enforcement officers and other authorized persons, acting in the performance of their duties, **requires special authorization in accordance with the laws of the States involved**. Each Contracting State shall consider requests by any other State to allow the travel of armed personnel, including in-flight security officers, on board aircraft of operators of the requesting State. **Only after agreement by all States involved shall such travel be allowed.**

Each Contracting State shall ensure that the **pilot-in-command is notified as to the number of armed persons and their seat location**. **(asked in ANAC)**

Carriage of weapons in other cases **(example, asked in ANAC: sporting shotgun)** is **allowed only** with the **operator's permission**, the **commander's knowledge** and when an authorized and duly qualified person has determined that **they are not loaded**, if applicable, and then only if **stowed in a place inaccessible to any person during flight time.**

Deportees and Persons in Custody

States shall introduce specific security measures for the air transport of potentially disruptive passengers: **deportees, inadmissible persons and persons in lawful custody**. **(asked in ANAC)**

Each Contracting State shall ensure that the **aircraft operator and the pilot-in-command are informed** when these passengers are obliged to travel because they have been the subject of judicial or administrative proceedings. **(asked in ANAC)**

It is normal practice that deportees and persons in custody are **embarked first and before any passengers**. **(asked in ANAC)**

Response to Acts of Unlawful Interference

Each Contracting State shall take appropriate measures for the safety of passengers and crew of an aircraft which is subjected to an act of unlawful interference **until their journey can be continued**. **(asked in ANAC)**

Each Contracting State responsible for providing air traffic services for an aircraft, which is the subject of an act of unlawful interference, shall collect all pertinent information on the flight of that aircraft and transmit that information to all other States responsible for the air traffic services units concerned, including those at the airport of known or presumed destination, so that timely and appropriate safeguarding action may be taken en-route and at the aircraft's known, likely or possible destination.

Each Contracting State **shall provide assistance** to an aircraft subjected to an act of unlawful seizure, including the **provision of navigation aids, air traffic services and permission to land**. **(asked in ANAC)**

Each Contracting State shall take measures, as it may find practicable, to ensure that an aircraft subjected to an act of unlawful seizure which has landed in its territory **is detained on the ground, unless to do so would prejudice human life**. **(asked in ANAC)**

(Asked in ANAC) Each Contracting State in which an aircraft subjected to an act of unlawful interference has landed **shall notify** by the most expeditious means the **State of Registry** of the aircraft and the **State of the Operator** of the landing and shall similarly transmit by the most expeditious means all other relevant information to:

- **the two above-mentioned States;**
- **each State whose citizens suffered fatalities or injuries;**
- **each State whose citizens were detained as hostages;**
- **each State whose citizens are known to be on board the aircraft; and**
- **the International Civil Aviation Organization.**

Each Contracting State shall ensure that commercial air transport operators providing service from that State **have established, implemented and maintained a written operator security programme that meets the requirements of the national civil aviation security programme of that State. (asked in ANAC)**

The operator shall **establish and maintain an approved security training programme (asked in ANAC)** which ensures crew members act in the most appropriate manner to minimize the consequences of acts of unlawful interference.

Security Procedures in Other Documents

Annex 2 – Rules of the Air

If an aircraft is subjected to unlawful interference, the pilot-in-command shall **attempt to land as soon as practicable (asked in ANAC)** at the nearest suitable aerodrome or at a dedicated aerodrome assigned by the appropriate authority unless considerations aboard the aircraft dictate otherwise.

When an aircraft subjected to an act of unlawful interference must depart from its assigned track or its assigned cruising level without being able to contact ATS, the pilot-in-command should, whenever possible:

- **attempt to broadcast warnings on the VHF channel in use or the VHF emergency frequency (asked in ANAC)**, and other appropriate channels, unless considerations aboard the aircraft dictate otherwise.
- proceed in accordance with procedures promulgated in **Regional Supplementary Procedures (Doc 7030) (asked in ANAC)**; or
- if no applicable regional procedures have been established, proceed at a level which differs from the cruising levels normally used for IFR flight by:
    - **150 m (500 ft)** in an area where a **vertical separation minimum of 300 m (1 000 ft) or RVSM** is applied; or
    - **300 m (1 000 ft)** in an area where a **vertical separation minimum of 600 m (2 000 ft)** is applied.

Annex 6 – Operation of Aircraft

Security of the flight crew compartment - In all aeroplanes which are equipped with a flight crew compartment door, this **door shall be capable of being locked. It shall be lockable from within the compartment only. (asked in ANAC)**

Door shall be closed and locked **from the time all external doors are closed following embarkation until any such door is opened for disembarkation. (asked in ANAC)**

Least-risk bomb location - Specialized means of attenuating and directing the blast should be provided for use at the least-risk bomb location.

Reporting acts of unlawful interference - The **pilot-in-command** shall **submit a report** of an act of unlawful interference without delay **to the competent authority and shall inform the designated local authority. (asked in ANAC)**

Annex 14 - Aerodromes

An **isolated aircraft parking position** is to be designated for the parking of **aircraft subject to unlawful interference**. The position **shall be never less then 100 m from other parking positions (asked in ANAC)**. It is not to be over underground utilities such as gas and aviation fuel and where feasible electrical or communications cables.

The taxiing instructions shall keep the aircraft as far away from other aircraft and installations as possible.

Aircraft Accident and Incident Investigation

ICAO Annex 13 applies to any geographical area.

Definitions

Accident - An occurrence associated with the operation of an aircraft which **takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked (asked in ANAC)**, in which:

- a **person is fatally or seriously injured** as a result of:
  - being in the aircraft, or
  - **direct contact with any part of the aircraft (asked in ANAC)**, including parts which have become detached from the aircraft, or
  - **direct exposure to jet blast (asked in ANAC)**, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or
- the **aircraft sustains** damage or **structural failure (asked in ANAC)** which:
  - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
  - would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or
- the **aircraft is missing** or is completely inaccessible.

Incident - An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation. (Example, asked in ANAC: pilot-in-command becomes incapacitated during climb-out phase, and co-pilot lands.)

Serious incident - An incident involving circumstances indicating that an accident nearly occurred.

Maximum mass - **Maximum certificated take-off mass**. **(asked in ANAC)**

Occurrence (EU Directive 2003/42) – An operational interruption, defect, fault or other irregular circumstance **that has or may have** influenced flight safety and that **has not resulted** in an accident or serious incident. **(asked in ANAC)**

Investigation

Objective

The sole objective of the investigation of an accident or incident shall be the **prevention of accidents and incidents**. It is not the purpose of this activity to apportion blame or liability. **(asked in ANAC)**

Responsibility for Investigation

A **Contracting State** is **obligated** to **investigate an accident/incident within its state** but not over high seas. State of Occurrence **may delegate** the whole or any part of the conducting of **such investigation to another State by mutual arrangement and consent (asked in ANAC)**. In any event the State of Occurrence shall use every means to facilitate the investigation.

When accident or incident occurred in the territory of a **non-Contracting State** which **does not intend** to conduct an investigation, the **State of Registry should conduct an investigation** in cooperation with the State of Occurrence but, **failing such cooperation, should itself conduct an investigation with such information as is available. (asked in ANAC)**

If the accident or incident occurred outside the territory of any state or the location of the occurrence cannot be determined, the **State of Registry** is to instigate the investigation.

If the State of Occurrence declines to investigate the incident, the State of Registry (or the State of the Operator) may investigate.

Participation

State of Registry, the State of the Operator, the State of Design and the State of Manufacture are entitled to be represented at any investigation. When the State conducting an investigation of an accident to an aircraft of a **maximum mass of over 2250 kg (asked in ANAC)** specifically requests participation by these states, **they shall each appoint an accredited representative**.

Any State which on request provides information, facilities or experts to the State conducting the investigation shall be entitled to appoint an accredited representative to participate in the investigation. **(asked in ANAC)**

Report

If an accident or incident occurs, to report it, you should follow **ICAO Annex 13**. **(asked in ANAC)**

State conducting the investigation shall **publish a final report according to ICAO Standards**. **(asked in ANAC)**

The Preliminary Report shall be submitted to appropriate States and to the International Civil Aviation Organization in **one of the working languages of ICAO. (asked in ANAC)**

ICAO is to be notified of any accident or serious incident involving an aircraft with a maximum mass of over 2250 kg.

A final report **must be sent to ICAO** for an aircraft with a **maximum mass of more than 5700 kg.**

EU Considerations

EU Directive 94/56

Member States are obliged to investigate every accident or serious incident with the aim of preventing any reoccurrence thereof. Investigation of incidents, other than serious, is also encouraged. The Directive makes clear distinction between liability and technical investigation.

The investigations shall in no case be concerned with apportioning blame or liability.

EU Directive 2003/42

The objective of this Directive is to contribute to the improvement of air safety by **ensuring that relevant information on safety is reported, collected, stored, protected and disseminated**.

The sole objective of occurrence reporting is the prevention of accidents and incidents and not to attribute blame or liability.

Member States shall require that occurrences are reported to the competent authorities.

Sources

ICAO Annexes and Documents
Oxford Aviation Academy Manual
Aviation Exam
BGS Online
Other Websites

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