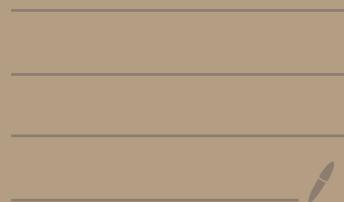


# Air law

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## 01 International Law: Conventions, Agreements and Organisations

01

### Basic Rule

- Right of sovereignty of that territory apply when **overflying** it
- Over high seas, ICAO rules apply
- Cabotage = domestic air service

ICAO

- Created in 1944 Chicago convention
- HQ in Montreal
- Council is responsible for the Assembly
- Assembly meets every 3 years
- Council and Assembly elect a President for those 3 years
- Air Navigation Commission finalizes SARPs for submission and adoption
- Has 19 members appointed by ICAO council

### Annexes and SARPs

- ICAO has 19 Annexes
- Annex 1 - Personnel Licensing (memo Pilot #1)
- Annex 2 - Rules of the air (2 rules VFR, IFR)
- Annex 7 - Aircraft registration
- Annex 9 - Facilitation of PAX and cargo (normal goods are half, dangerous goods are 18)
- Annex 11 - ATS (looks like antenna)
- Annex 13 - Accident Investigation (Friday, the 13th Bad luck!)
- Annex 14 - Aerodrome, visual ground aid
- Annex 17 - Security (SEventeen, SEcurity)
- Annex 18 - Dangerous goods (at 18 you can buy DGR, beer, cigarettes,...)
- These contain Standards and Recommended Practices (SARPs)
- ICAO council should be informed immediately when a State deviates from a standard through a filed difference
- These differences are published in the AIP

## 02 Other conventions and agreements

- International Air Transport Agreement**  
→ Carriage of traffic between State of Registration and any other participating State

### Technical freedoms

1<sup>st</sup> Freedom: Fly across a territory without landing

2<sup>nd</sup> Freedom: Land in a territory for non traffic purposes  
↳ technical stop  
↳ refueling  
↳ maintenance

### Commercial freedoms

3<sup>rd</sup> Freedom: Put down traffic from the home state in another

4<sup>th</sup> Freedom: Take on traffic in another state to the home state

5<sup>th</sup> Freedom: Put down and take on traffic in another state to a 3<sup>rd</sup> Party

### ICAO conventions

- Warsaw - damage → Commander may deliver person to authorities
- Tokyo - Crime → Take actions to restrain or secure PAX
- Rome - Damage caused by foreign aircraft to 3<sup>rd</sup> party
- Paris - Non scheduled commercial flights

## 03 World Organisation

### IATA (International Air Transport Association)

→ Trade association for aviation operators  
→ "Represents, leads and serves the airline industry"

## 04 European Organisations

EASA → Suggest implementation of rules to the EU commission  
→ promotes highest common safety standards NOT ICAO!

↳ regulatory material involves

### Hard Laws

- legislative act
- legal obligation
- rules and regulation
- binding

### Soft laws

- technical standards
- details about hard laws
- guidance material
- certification specification
- acceptable means of compliance
- non-binding

Eurocontrol → Manages Air Traffic Flow Management in EU

## 2 Airworthiness of Aircraft, Aircraft Nationality and Registration Marks

### 02 Certificate of Airworthiness (CoA) Complies with Annex 8

CoA → renewed or remain valid laws of state of registry  
↳ If damage sustained, state of registry says if still airworthy  
↳ required for any flight  
→ in another state, must receive permission from state of registry

State of Design ensures that aircraft > 5700kg have a system related to aircraft airworthiness

## 03 ICAO Annex 7 - Aircraft Nationality and Registration Marks

State of Registry → on whose register the aircraft is entered

Aircraft → derive support in the atmosphere from reaction of air other than reaction of air against Earth surface → helicopter, glider & airship

Heavier-than-air aircraft → any aircraft deriving its lift chiefly from aerodynamic forces

## 04 Nationality marks, common marks and registration marks

Registration marks → chosen by state of registry or common mark registering authority

→ left half of the lower surface of the wing  
↳ chooses the combination of numbers and letters

Common mark → Selection by ICAO + Telecommunication Union  
→ assignment by ICAO  
→ nationality mark HB - Switzerland

## 04 Personnel licensing

### 02 Aircrew Regulation - Annex 1 (Part-FCL)

CPL • Privilege of PPL and LAPL

- Act as PIC in commercial single pilot
- Act as PIC in any non-commercial plane
- Act as copilot in commercial multi-crew
- Modular 200h
- Integrated 150h (< 5h on ground)

- 20h VFR XC as PIC with 1x 300NM trip  
↳ landing at 2 aerodrome
- 10h instrument (< 5h on the ground)
- 5h night (5 TOS and 5 LDGs as PIC)

### IR

- 50h XC PIC (10 in plane)

Flight test rating

• 1000h / 400h as PIC

### ATPL

- Can act as PIC of a multi-crew plane in IFR

Gives privilege of PPL, CPL and LAPL

ATPL-A 250h as PIC, 70 as co-pilot

• 100h sim time (< 25h in FNPT)

• 500h multi pilot CAT

• 500h PICUS (or 250 as PIC)  
↳ under supervision

• 200h XC (> 100 as PIC/PICUS)

• 75h instrument (< 30 on the ground)

• 100h night as PIC or co-pilot

Mountain rating  
• 6 landings in 24 months  
• valid 24 months

### Towing rating

• > 100h and 200 TOS + landings as PIC on aeroplane or TIGC  
• min 5 tows in last 24 months

### Night rating

5-5-5

### Aerobatics

• 5h of aerobatics instruction in aeroplane or TIGCs flown with engine power after license > 30h as PIC

## Definitions

**Cross country (XC):** flight point of departure and arrival following pre-planned route, using standard navigation procedures

**CAT:** Commercial Air Transport

**MPA:** Multi-pilot Aircraft

**Class A:** turbo-prop/jet > 9 PAX or > 5700 kg

**Class B:** Prop < 9 PAX or < 5700 kg

**Class C:** piston > 9 PAX or > 5700 kg

**Night:** hours between end of evening civil twilight and morning civil twilight as may be prescribed by appropriate authority

**Flight time:** From the first movement for the purpose of TO until coming to rest

**Proficiency Check:** demonstration of skills to revalidate or renew rating valid 6 months and can be revalidated 3 months in advance

**Competent authority:** apply for licenses or ratings/certificates

## Validity, Revalidation and Renewal

- IR skill test/proficiency check theory remains valid for 7 years
  - rating valid for 1 year (flying)
- Must be revalidated 3 months before expiry
- Operator proficiency 6 months
- Validity of type and multi rating is 1 year from date of issue
- If expired > 3 years refresher training at ATO and proficiency check (i.e. initial training)
  - Still valid = revalidation
  - Expired = renewal
  - Class rating valid 2 years (SEP)
  - Type rating valid 1 year

## 04.03 Aircrew Regulation - Annex IV (Part - MED)

Revalidation may be up to 45 days prior to expiry date

### Class 1: CPL, MPL and ATPL

medical validity from date of medical examination

- 12 month
- Single Pilot CAT > 40 → 6 months
- < 5 years ⇒ renewal
- expired > 5 years ⇒ initial class 1 exam

Limitations only removed by the Authority

### Decrease in medical fitness

- Seek medical advice from AME/AeMC when:
  - Significant illness
  - Ill > 21 days
  - In hospital for any period
  - Started new medication
  - First need correcting lenses
  - Never fly under influence of psychoactive substances
  - Limitations only removed by the Authority

### Class 2 - Other flying

- 60 months
- 24 months 40 - 50
- 12 months 50 - 65
- 6 months > 65

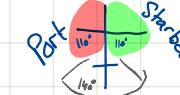
### LAPL

### Right of way

- Head-on, turn right → ground, Stop
- Converging, aircraft on right has priority
- Overtaking (< 70°) aircraft being overtaken has priority
- Landing: lowest has priority
- Powered heavier than air < gliders

### Hand Signals

- Brakes applied → clenched fist
- Interphone → hands on ears



### Lights

- Anti-coll → engine running
- Nav light → night → prescribed by authority

## OS Rules of the Air According to ICAO Annex 2 and SERA

### OS.01 Overview

A-201.

**SERA** (Standardised European Rules of the Air) **SVFR**

- Objective: rules of the air
- when to turn on anti-collision lights
- operate in CTR below VMC
- Danger Area: airspace, dangerous activities may exist
- This deviation differ by 5%, must be reported

**Flight visibility:** full visibility from flight deck

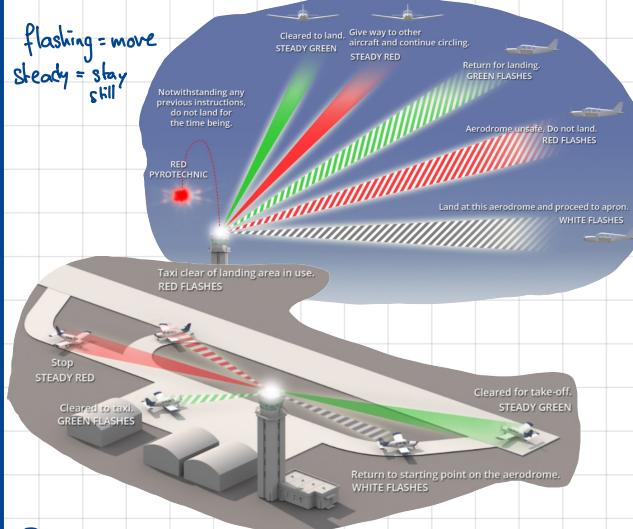
### OS.02 Rules of the Air

- PIC holds final authority
- deviation allowed only for flight safety

### OS.03 General rules

#### Simulated Instrument Flight

- Requires dual control and qualified Safety pilot
- A "competent observer" does not count



## Comms failure

VMC → land at nearest airport and report ASAP to ATCU

IMC → Maintain speed and level 7600

- ATC no radar 20 min
- ATC radar 7 min
- return to FPL in the most direct manner

## Flight Plans

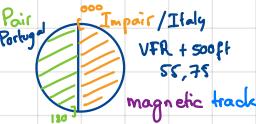
- Submitted 60 min prior (unless airborne 10 min)
- Should amend or cancel if delay controlled > 30 min off blocks uncontrolled > 60 min off blocks
- In case of alternate destination inform ATS 30 min before ETA

### Deviations

Variation in TAS > 5% or ETAs with difference > 2 min must be reported

### OS.04 VFR

- highest FL200 (RVSM FL290)
- SVFR → max 140 kts → > 1500 m visi



1000 ft above highest obstacle in 600m radius  
500 ft above uncongested area / water

### OS.05 IFR

#### RVSM Airspace (FL290 - 410)

1000ft separation continues



Min equipment → suitable and appropriate for the route

**HOC** → 1000ft above highest obstacle within 8 km or 3000ft AGL  
→ 2000ft mountainous areas

### OS.06 Interception of civil aircraft

7700 Mode A

- rocking wings → will comply
- abrupt climbing turn 90° → proceed
- irregular flashing of lights → in distress  
121.5 MHz / 243 MHz

AM LOST  
DESCEND  
YOU LAND  
CALL SIGN  
CAN NOT

You must file a FPL and advise ATCs of changes

# 06 Aircraft Operations

10-23%

## 06.02 Definitions and abbreviations

DER: Departure End of Runway

precision approach: uses azimuth, elevation and distance information

AGL: Above Ground Level

DA/DH = Precision decision

MDA/MDH = non-precision minimum descent

STAR = Standard instrument Arrival

Radial = magnetic bearing extending from a VOR station

APV = Approach procedure with vertical guidance

Procedure turn = manoeuvre turn away from track followed by opposite direction to intercept reciprocal

OIS = Obstacle Identification Surface

## 06.03 Departure procedures

### Procedure Design Gradient (PDG)

- 5m/16ft above DER

- PDG =  $2.5\% + 0.8\% = 3.3\%$

$\uparrow$  OIS  $\downarrow$  increasing obstacle clearance

- Clearance at DER is 0ft (Memo: St Martin has a fence)

### Straight Departures

- Track guidance within 90km of DER

- Within 15° of centerline (otherwise → turning departure)

### Turning Departures

- Track guidance within 10km after turn completion

- turns can be expedited at altitude, fix or facility

- Omnidirectional departures → used with no track guidance
  - expect sectors to be avoided with no navigation aid
  - Restrictions are expressed in Bearing and distance

## 06.04 Approach Procedures

Straight In → angle between RWY and track  $\leq 30^\circ$

Circling Approach → visual (no radio aids) at MDA/H
 

- $\uparrow$  to descend need threshold in sight

### Speed Categories

- during an approach, speed is the most significant factor

Category	V <sub>AT</sub> kts
A	> 91
B	91-120
C	121-140
D	141-165

$$V_{AT} = 1.3 \cdot V_{SO}$$

$\downarrow$  stalling speed

### Missed Approach Segment

- From MAPt when not visual
- Min 2.5% climb gradient
  - ↳ 2% approved if safeguards
- If started before MAPt → continue to MAPt (at higher altitude)

**Initial** MAPt to climb established
 

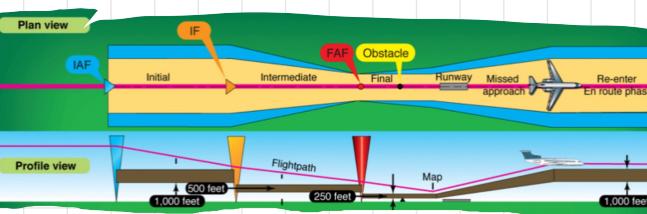
- ↳ config change but no turns

**Intermediate** Max change 15° from initial track with 30m obstacle clearance

**Final** from 50m (164ft) obstacle clearance is first obtained to point where new approach/hold can start. Turns possible
 

- Up to 3 second turning reaction time

### Instrument Approach Procedure



### Arrival Segment

### Initial Approach Segment

- MOC > 300m
- At the end of a STAR

### Intermediate Approach Segment

- MOC primary area = (300m reducing to) 150m (492 ft)
- Speed reduced and aircraft configured

### Final approach segment

- MOC Final = FAF 90m / FAF 75m
- Alignment for descent and landing
- FAP is 3-10 NM from Threshold
- Max 6.5% descent gradient

Accuracy track guidance  
No track guidance

ILS VOR NDB  
22.4° ± 5.2° ± 6.0°  
± 1.4° ± 4.5° ± 6.2°

## 06.05 Holding procedures

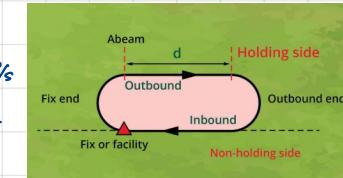
- Deviation from in-flight procedure of holding is dangerous
  - If unable to conform to procedures for holding → inform ATC ASAP
  - Pilot should attempt to maintain track with heading and lining
- Holding** → used to separate aircraft when traffic volume high
  - Standard is Right hand turn

↳ Stacked with 1000ft vertical separation

Shuttle = climb/descend

pattern least between 25° bank
 

- R turn 3/8



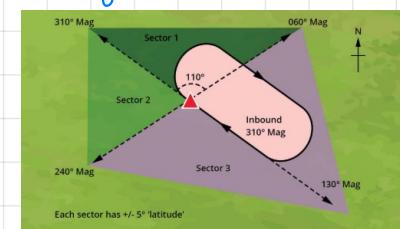
Outbound timing begins over or abeam fix, whichever is later

Still airtime for the outbound leg should not exceed:

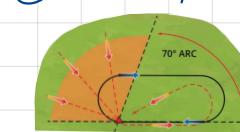
- 1min < 14'000 ft max 230 uts
- 1.5min > 14'000 ft
- Specified at DME distance

### 3 Methods to enter racetrack (with ± 5° flexibility)

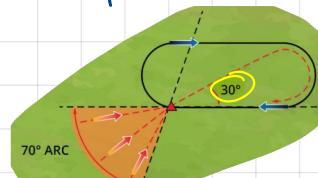
- Determined by Magnetic heading



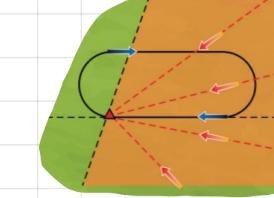
### ① Parallel entry



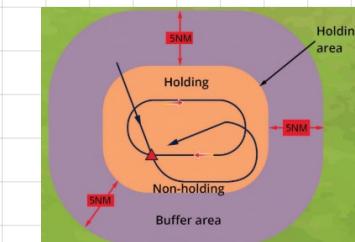
### ② offset entry (30° diverging left from inbound track)



### ③ Direct entry



- Obstacle clearance applied through holding area
- MOC 1000 ft (2000 ft mountainous)
- Buffer zone of 5NM decreasing MOC down to 0ft



### Obstacle Clearance OCA

$$OCA/H + margin = DA/H$$

precision approach = "compliance"  
non-precision = "3%"  
circling = "cannot" or "infringing"

Vertical distance between wheel & glide antenna  
A, B, C, D, E

## 06.06 Altimeter Setting Procedures

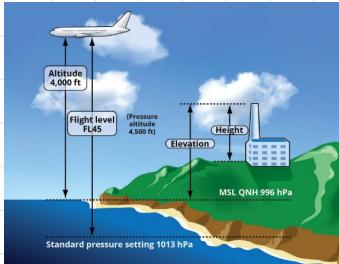
Altimeter 0 - 30'000 ft  $\pm 20$ m (60ft)  
0 - 50'000 ft  $\pm 25$ m (80ft)

QNH  
QFE: vertical distance from datum  
ex: Set alt subscale to indicate Off on airport ground

Altitude: vertical distance from MSL with correct QNH

FL: Once above the safe-in-all case altitude, the problem becomes air traffic separation

SPS: Standard Pressure Setting = 1013.25 hPa = FL0  
↳ give pressure altitude

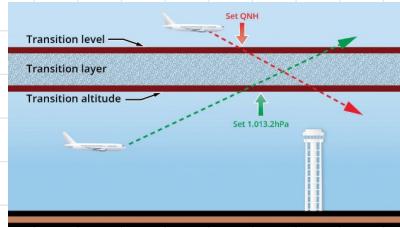


Transition altitude: after TO, subscale changes from ALT to 1013 hPa at transition point

- > 3000 ft and rounded to next 1000 ft
- if two AD close common TA will be used or highest transition altitude
- published in AIP and appropriate charts

Transition Level (TL)

- established by ATIS, ATC



## 06.07 Parallel or near-parallel RWY

**Mode 1:** Independent parallel approaches

- No radar separation
- NTZ between localizers centerlines

**Mode 2:** Dependant parallel approaches

- Reduced radar separation of 3NM

**Mode 3:** Independent parallel departures

**Mode 4:** Segregated parallel operations  
→ one RWY departure, one RWY approaches

Mixed operation: approaches and dep on same RWY

Semi-mixed operation: one RWY App or Dep, one RWY both

Normal Operation Zone (NOZ)

No-transgression Zone (NTZ) → From THRESH nearer RWY to a point where 1000 ft vertical separation is reduced b/w aircrafts



At least 60 m wide

## 06.08 Secondary Surveillance Radar (Transponder)

Mode A: only squawk code

Mode C: Squawk + FL

Mode S: Squawk + FL + ability to exchange data

7500 man with knife (unlawful interference)

7600 need a fix (Comm failure)

7700 See you in heaven (distress)

Airborne collision avoidance system (ACAS)

→ ACAS I: TA

→ ACAS II: TA + RA

2000 IFR/Radar service available  
7000 VFR

If XPR broken → ok to depart and repair at nearest airport

• Set SSR to 7500 and then 770

## 06.09 Regulation (EU) No 965/2012 on Air Operations

↳ applies to all types of commercial and non-commercial

EASA Air Ops Part-SPA (Annex V) → refers to specific approvals

→ subparts: 1) longest PBN ... service operation

Part - CAT → Motor and non-motor powered aircraft

Part - NCC

Non-Commercial air operations with complex motor aircraft

Subparts: General requirement  
Operational procedures

Aircraft performance and operating limitations  
Instruments, data and equipment

Part - NCO → Non-Commercial air operations with other than complex motor-powered aircraft

Subparts: General requirement  
Operational procedures

Aircraft performance and operating limitations  
Instruments, data and equipment  
Specific requirement

Class A IFR only, Separated, ATC service

Class B IFR + VFR, Separated, ATC service

JAS  
Speed limit  $\leq 250$  kts for IFR  $< 10'000$  ft (3050m)

FIS  
Class C IFR separated, VFR separated from IFR, ATC service or Traffic information Service, ↳ IFR still don't have speed limit

Class D IFR separated, VFR not, ATC service for IFR and Traffic information for VFR

ATC Clearance/Comms no longer needed for VFR (Uncontrolled Airspace)

Class E IFR separated, VFR gets traffic info (as far as applicable)  
SVFR

Class F Advisory Airspace, (IFR) separated (as far as applicable)  
VFR not separated, FIS

Class G Open FIS, same as F but IFR not separated

SPEC1 (Special aerodrome met report): issued when significant change in weather at aerodrome

Alerting Service: (provided by ATS unit responsible of aircraft ATN)

- INCERFA Uncertainty phase (30min) No comms
  - FIS + Alerting often provided by same ATS
  - ALERFA Alert phase - apprehension (5min) landing/unlawful
  - DESTRESSA Distress/Danger phase Distress/Fuel/forced landing
- ↑ Serious and imminent threat requiring immediate assistance

CTR lateral limit: 5 NM on approach side

Routes

- Not more than 6 characters, ideally max 5 starting with at least 1 number and 1 letter basic designator: 1 letter + number from 1 to 999

Part of Regional Network

- Non - RNAV A, B, G, R

- RNAV L, M, N, P

Not part of regional Network

- Non RNAV H, J, T, V, W

- RNAV Q, R, Y, Z

Prefix

K = Low level (Helicopters)

U = Upper

S = Supersonic

Suffixes

- Y - 22.5 NM between 30° and 90° above FL200

- Z - 15 NM between 30° and 90° below FL190

- F Advisory only

- G FIS only

Prohibited, Restricted, Danger areas

State territory indicator & P/R/D + ID figure

## METAR

SPEC1 if:

- Δ wind direction  $> 60^\circ$
- Δ wind Speed  $> 10$  kts

FIR = FIS + Alerting Service

Lower limit of FIR should be at least 700 ft (200m) above ground/water

Essential traffic info

- Cruising level
- type and wake turbulence category
- direction of flight
- position

## 07.02 ICAO Doc 4444 Air Traffic Management

- FIX: at least 45° separated at a distance of 15NM
- DR: at least 45° separated at a distance of 15NM
- NDB: at least 30° separated at a distance of 15NM
- VOR: at least 15° separated at a distance of 15NM
- Memo: always 15NM, then the lesser the angle, the better the aid

### Summary of Separation distance

- Min unless prescribed = 5NM
- Min = 3 NM
- Absolute min = 2.5 NM
- Between aircraft on same LOC : 3NM
- Between aircraft on same LOC - additional separation for wake turb = 2.5NM
- When "Disregarding" = 2.5 NM
- Between aircraft on adjacent LOC : 2 NM

### Independent parallel approaches

- When one approach diverges by 30° from Missed approach track of adjacent approach
- Min vert separation = 1000 ft / 300 m
- Min horiz separation = 5.6 km / 3 NM
- Established at least 2NM prior to intercepting glide path / MLS elevation angle
- Intercept normally at 30° not exceeding 45°
- Speed adjustment on final: ± 20 kts until 4 NM from threshold
- Separation for radar  
L: 8-, M: 3+, H: 2+  
Add these numbers together ( $L+H = 8+2=6$  NM)
- AFIS (Aerodrome Flight Information Service): never gives clearance but can relay
- Primary Surveillance radar (PSR)
  - Radar identification by executing heading change of >30° (PSR 3 letters, = 30°)

- Secondary Surveillance radar (SSR) ✓ Non-RVSM +200ft  
RVSM +200ft
- Automatic dependant surveillance (ADS): broadcast information by data link
  - ADS-B (ADS-Broadcast): transmit and receives information by data link
  - ADS-C (ADS-Contract): data is sent via "contracts"
- Allimeter setting rounded down to nearest hPa: 1013.25 → 1013
- Fly maintaining own separation in VMC airspace class D/E, VMC, hours of day/light

### Departure separations:

- 3 min if preceding aircraft > 20 kts
  - 2 min if preceding aircraft > 40 kts
  - 1 min if they are flying diverging tracks > 45°
  - Departing aircraft may take-off in any direction until 5 min before arriving aircraft
  - Same RWY opposing aircraft sep: < 760m
- 

### Longitudinal separation (time or distance)

- Based on DME: 20 NM
- Same track opposite direction: 10 NM
- 10 NM if preceding aircraft is > 20 kts faster
- 10 NM climbing/descending

### Lateral separation (by different routes)

DME (on track)

### Same level & Same/crossing track

- 15 min default
  - 10 min when nav aid permits
  - 5 min lead aircraft > 20 kts
  - 3 min lead aircraft > 10 kts
- Min long sep. Mach number: 80 NM / 10 min

### Climbing & descending

- 15 min default
- 10 min regular fix
- 5 min if 2nd aircraft begins level change with 10 min of the other aircraft reporting over an exact reporting point (ASR/ALS)

### SRA (Surveillance Radar Approach)

- Approach terminated and clearance to land 2 NM before touchdown
  - Unless accuracy permits, distance and level given each 0.5 NM
- Runway transmission not interrupted while aircraft is in a distance of 4 NM from touchdown

- Aircraft shall not be vectored to boundary closer than 2.5 NM
- Vectoring terminated: Resume own navigation, position is...
- Composite separation: vertical + horizontal separation, reduced separation

Heavy (H) > 136'000 kg

Medium (M) > 7000 kg and < 136'000kg

Light (L) < 7'000kg

### Wake Turbulence

- wake turb sep minima apply on parallel RWY if space < 760m

### Radar Separation

	H	M	L
Receiving	4 3 2	5 3 3	6 5 3
Following			

### Non-Radar Separation

#### DODIA

- Departure 2 min
- Opposite 3 min
- Displaced threshold 2 min
- Intermediate 3 min
- Arrival 2 min (3 min for L)  
↳ After M doesn't need separation  
H after M

### Mach number technique separation

Distance: 80 NM minimum

1/1 - Mach number = Minutes

Wind change: 2 kts tailwind, 5 kts crosswind, 10 kts headwind

Expected Approach Time (EAT): time to leave Hold expected by ATC

As soon as possible: 10 min

When it differs: 5 min or more

When expected to hold 30 min or more

### Transition level given by ATC (it changes)

Calculation is  $|QNH - 1013| \cdot 30$

ex: TA = 3000ft  $\Rightarrow QNH = 990$

$$23 \cdot 30 = 690 \text{ ft}$$

$$|1013 - 990| = 23$$

3000 ft + 690 ft rounded up = 3600 ft

### Transition Altitude

- published on charts
- constant

### Airmet - Low

### SIGMET - High (Supersonic)

### Routine Air Report

3 sections POM

#### ① Position (IPTANE)

Ident  
Position  
Time  
Altitude  
Next pos & time  
Ensuing sig. Point

#### ② Operational

ETA  
Endurance

#### ③ Meteorological Information

### Separation by RNAV/RNP

- 80 NM separation (RNAV airspace)
- 50 NM if RNP 10
- 30 NM RNP 4

1 - 2/1

- AIIS ensures the flow of information necessary for safety, regularity and efficiency of international air navigation
- Each State shall provide an AIIS in its territory including an Integrated Aeronautical Information package

- NOTAM issued by Aeronautical Fixed Service (AFS)

### AIC Colour Codes:

Pink: Safety issues (Almost red, danger)

Yellow: operational matters such as ATS facilities and requirements (ATC controller smaller so teeth yellow)

White: Administrative matters, e.g. Exam dates and fees (white house)

Marine: Aerospace, danger area map

Green: Maps, charts and plates (Trees are green on map)

Movement area = MAN (occurring) + APRON (think about a man wearing an Apron)

AIP the MAIN PUBLICATION containing all the necessary information about what rules apply in a country, how aviation is organized and how stuff is done and run in a country. It has 3 parts: GEN, ENR and AD

AIP Supplement contains info only TEMPORARY changes LONGER THAN 3 MONTHS or short changes that contains lots of text/graphic

that would be too long in NOTAM

AIP Amendment contains info about LASTING changes to AIP

#### • GEN

- SAR crews need LOCATION INDICATORS, MET SERVICES including SIGMET & confirmation of any DIFFERENCES in NATIONAL REGS/ICAO SARPs & CHARGES FOR AD/Heliports

#### • ENR

- Following a Departure onto a lower ATS Route I had a Comms failure and was asked to hold quite close to a bunch of PROTECTED Areas, pending RWY signals for my approach

#### • AD

- It was getting late but the RWY lights were on, MET information provided and Fuel grades available

## NOTAM and PIB (Pre-Information Bulletin)

- Published information less than 3 months
- NOTAMs get published or revised (to see if stuff still happening) every month
- English only
- Distributed by the Aeronautical Fixed Service (AFS)

## AIC

- Information on legislative stuff (law changes, pricing, etc..)
- Updated yearly  
↳ flight safety / technical
- is numbered sequentially based on calendar year  
↳ air navigation / administration

## AIRAC

- Provides information about changes in advance
- mostly used by aircraft FMCs
- changes published 42 days in advance and reach pilot 28 days in advance
- Operational Significant change**

Acronym

## Distribution of NOTAM via AFTN (Aeronautical Fixed Telecommunication Network)

- SNOWTAM**
- ASHTAM**
  - Green: Ceased activity
  - Yellow: Decrease in activity
  - Orange: Active, plume below FL250
  - Red: Active, plume above FL250

AIS services 2h before/after flight minimum

## C9 Aerodromes

8-18'.

### General

Aerodrome reference code → simple method to give characteristic of the airfield

Element 1 (number 1 to 4), depicts field length	1 = 800 2 = 800 - 1100 3 = 1100 - 1800
Element 2 (letters A to F), relates to the aeroplane wingspan (old syllabars also outer main gear wheel span)	A=80 B=111=11 (1-15) C=33 (24-36) D=44 (36-58) E=55 (52-68) F=66 (65-80)
Ex: Code 2A	

## Aerodrome (AD) data

- AD reference point (ARP)
  - Planned geometric centre of aerodrome
  - Remains despite changes over time

- Pavement classification Number (PCN)
  - Used when aircraft with MTOM > 5000kg
  - Describes the strength of the pavement

- Aircraft classification number (ACN)
  - Impact an aircraft has on the pavement

Safe use of airfield if PCN, ACN

Light aircraft (<500kg)  
don't use PCN/ACN system instead:

- Max allowed mass
- Max tyre pressure

## Declared distances

- TORA**: Take off run available
- TODA**: Take off distance available (TORA + clearway)
- ASDA**: Accelerate-stop distance available (TORA + stopway)
- LDA**: landing distance available

Pilots must report condition of the movement area (RWY, taxiway, apron) to AIS/ATS

- Construction
- Broken surface
- Water, snow, slush, ice or frost
- Anti-ice or de-ice chemicals
- Mud, dust, volcanic ash, oil, rubber
- Temporary hazards, parked aircraft, wildlife
- Broken visual aids
- Power supply failures

## Runway Condition Report (RCR)

- Dry RWY
- Contaminated RWY (Surface condition shall be assessed and reported)
- Wet RWY
- Compacted snow
- Slippery - wet RWY
- Dry Snow
- Frost
- Ice
- Standing water
- Wet Ice
- Wet snow

Three different type of water deposit on RWY

- Damp: change of color
- Wet: no pools
- Standing water: depth > 3mm
- Flooded: extensive standing water is visible

## Braking Action

Code	Coefficient	Braking Action
5	> 0.4	Good
4	0.39 to 0.36	Medium to Good
3	0.35 to 0.30	Medium
2	0.29 to 0.26	Poor to Medium
1	< 0.25	Poor

## Physical characteristics

### Runway Threshold (RWY THR)

- usually located at the RWY extremity
- displace shr if operational consideration justifies

### Stopway

- Aircraft can stop in the case of an abandoned TO
- Rectangular area
- Situated at the end of the TORA



### Clearway

- Clear area for initial climb to a specific height
- Origin is at the end of the TORA
- Length shouldn't exceed 1/2 TORA
- Width is 75m on each side of the centre-line
- Rectangular, over land or water

### Runway-end Safety area (RESA)

- obstruction free area of land at each end of the runway strip - does not include stopway
- min. length of 90m starts at the end of RWY strip
- 2x width of RWY
- Provided for RWY code 1 to 4
- Reduce the risk of damage to an aeroplane undershooting or overrunning the RWY
- Not necessarily paved

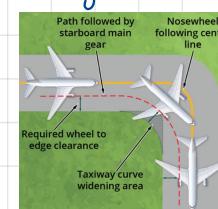
### Taxiways

#### Rapid-exit taxiways

- minimize the runway occupation time only on landing
- 50kt for Code 3 and 4 RWY
- 35kt for Code 1 and 2 RWY
- Intersecting angle is ideally 80°, but between 25 and 45° ok

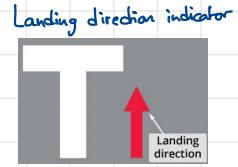
#### Widening curves

- useful when traffic density is medium or heavy
- Specified distance from RWY centreline
- Leaves the taxiways clear
- Intermediate Taxiway holding position
  - Should be established on a taxiway at any point other than a RWY-holding where needed



## Visual Aids for navigation

### Wind Direction Indicator (Windsack)



- At least 1 per aerodrome
- At least 3.6m long
- Ø > 0.9m
- visible from 300m height
- White and orange
- Illuminated at night

### Signalling lamp

- used in tower to provide light signals
- Red, Green, White
- Able to Morse Code
- Small beam spread to target a specific plane

### Signal Area and its Visual Ground Signals

- Must be clearly visible from the sky

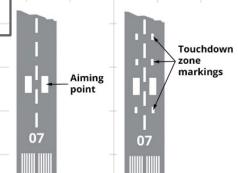
<b>C</b>	A horizontal white or orange 'T'. Takeoff and landings are in the direction of the shaft of the 'T' as indicated by the arrow.
<b>07</b>	A set of two digits, displayed vertically at or near the control tower for aircraft on the manoeuvring area. The direction for takeoff, expressed in units of 10° magnetic to the nearest 10°.
<b>X</b>	White crosses on runways. A runway area unit for movement of aircraft.
<b>X</b>	A horizontal right-hand arrow of conspicuous colour. This may also be displayed at the end of the runway, or strip, or taxiway.
<b>X</b>	A horizontal red panel with a yellow diagonal stripe. The manoeuvring area is in a poor state and pilots must exercise special care when approaching and landing.
<b>X</b>	A horizontal red panel with a yellow cross. Aerodrome unit for aircraft movements. Landings are prohibited, probably for an extended period.
<b>+/-</b>	A horizontal white double cross. Saliplane (glider) flying is in progress.

### Markings

- On RWY they are White
- On TWY they are Yellow
- Apron colour are a conspicuous color which shall contrast with that used for aircraft stand marking
- RWY Designation Marking
  - 2-digit number of the RWY (+R, L, C if applicable)
- THR marking (divide RWY width by 3.75)

RWY width m	Stripes total	Stripes each side
18	4	2
23	6	3
30	8	4
45	12	6
60	16	8

- Aiming point → origin of PAPI or ILS
- Touchdown zone (TDZ)
  - where planes should land



## Runway Holding Position Marking

- A red board either side of the taxiway

• Consists of a taxiway designation and a number

• Indicates an ILS critical area

• Pattern A:

- Supplemented with a RWY designation sign
- In RVR conditions of less than 550m where a stop bar is not installed

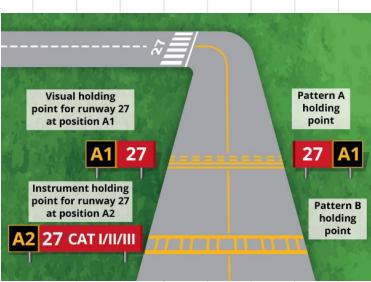
• Pattern B:

- Supplemented with a CAT I, II or III holding position sign as appropriate

• If no markings

- 50m from RWY edge, where RWY length > 900 m

- 30m from RWY edge, where RWY length < 900 m



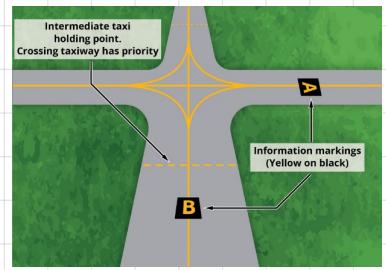
## Intermediate Holding Position Markings

- Between two paired taxiways

• Consists of markings

## Aircraft Stand Markings

- Should be on any paved parking and de-icing area



## Lights

- Must be turned on at least one hour before an aircraft arrives

• Frangible: structure means to break easily

• Elevated approach lights must be frangible for the 300 m nearest to the RWY

• Taxiway centreline lights:

- Fixed lights showing green

• Are alternating green and yellow from the beginning of the taxiway near the RWY centreline to the perimeter of the ILS/MLS critical/sensitive area

• RWY edge lights are required to show at all angles in azimuth only where they are intended to provide guidance during circling

## Aerodrome Beacons (ABNs)

- Flashing light 20-30 flashes per min
- When the airfield is used for night operations

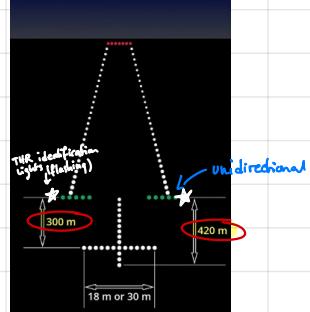
## Simple Approach Lighting System

The fixed, unidirectional RWY THR and wing bar lights are green

• Extends over a distance at least 420 m from the RWY THR

• A crossbar 300 m from the THR

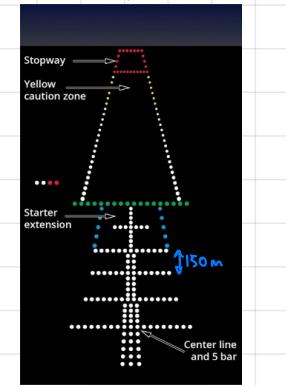
• Row of lights either 18 or 30 m in length



## Typical Calvert-type Precision Approach CAT I lighting system

- Over a distance of 900 m from RWY THR
- 5 cross bar 150 m apart

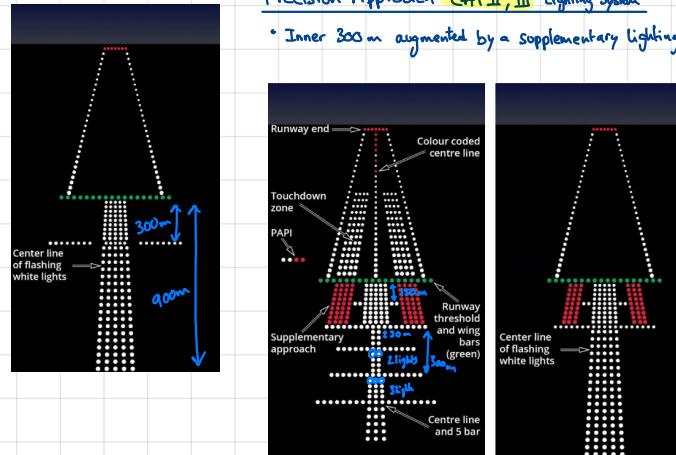
• If you overfly the 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> you are 300 m from the THR



## ICAO Precision Approach CAT I Lighting System

### Precision Approach CAT II, III Lighting System

- Inner 300 m augmented by a supplementary lighting



## Precision Approach Path Indicators (PAPI) and Abbreviated - PAPI (APAPI)

- Gives a reference to the median angle
- PAPI wing bar
- Provided for aircraft having eye-to-wheel heights not exceeding 16 m
- MEHT: Min eye height

## Signs

- Height provides clearance for aircraft propellers or engine pods

### Mandatory instruction signs:

- Only ones in Red Background and white ← Twy HLD position

### Pattern A signs

### Pattern B signs

### No-entry signs

- Situated at the beginning of the area to which the entrance is prohibited, on either side of the Twy

### Information signs/Location signs

## INFO

## LOCATION

### Markers

- Twy edge marker
  - are retroreflective blue

Black on yellow, tell a fellow (info)

Yellow on black, where you at

## Visual aids for denoting obstacles

- Spherical red markers on overhead power line or cables

### Mobile object colors

- Service vehicle - yellow (think of follow-me car)
- Emergency vehicle - red or yellowish-green (think of fire-truck)

### Mobile object lights

- Service vehicle - flashing yellow (think of a road work trade at night)
- Emergency vehicle - flashing blue (ambulance at night)

### Obstacle Flag

- Orange

### Obstacle Light

- Low intensity - fixed red (chimney at night)
- High intensity - flashing white to recognize by day if > 150m
- One or more low, medium or high intensity lights as close as practicable to top of obstacle

## Visual aid for denoting obstacles

closed RWY unfit for surface movement

closed TWY



Pre-threshold area of RWY  
not suitable for normal movement uses  
chevrons Stopway only

Edge or shoulders of an apron that is non-load bearing surfaces  
→ One pair of lines in colour of the taxiway centre line

## Aerodrome (AD) operational services, equipment and installations

### Rescue and firefighting service (RFF)

- Level of minimum protection must still be sufficient to the highest category of aeroplane planned to use the aerodrome at that time.

- The category of RFF is based on the aeroplane length and its maximum fuselage width

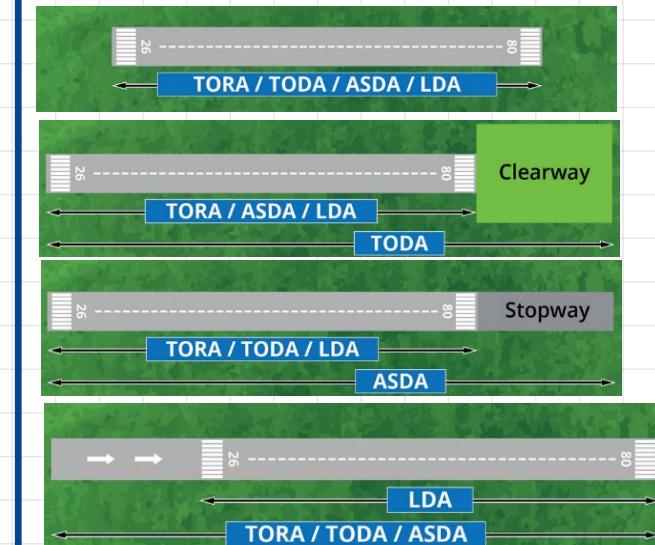
### RFF response time:

- Time from initial call to the first responding vehicle arrives ready to copy foam
- Normal limit 2min
- Max limit 3min (180 s)

### When aircraft is being refuelled with Pax on board

- Ground equipment dispose, for the minimum necessary emergency exits operating, in case of evacuation
- Sufficient exits
- Ready emergency escape route
- There has to be a sufficient number of fire fighting equipment at least initially

## Attachment A to ICAO Annex 14, Volume 3, - Supplementary Guidance material



**10 Facilitation** [1-2%]

- Entry and departure of aircraft**
- General declaration**
  - Aircraft registration marks, Flight number, Date and place of departure, Destination, # crew and PAX
  - Signed by authorized agent or PIC
  - 3 copies each
- Entry and departure of crew:**
  - Oral declaration for crew is enough
  - Prioritize crew before passengers
  - Crew member certificates (CMC)**
    - Provides identification of aircrew
    - Machine readable card only
    - Replaces passport and visa but does not replace logbook or pilot's license
    - Contracting States are responsible of issuing CMC
    - Visa waived with a CMC and on duty for temporary access
- Entry and departure of Pass and Bags**
  - Passport and a visa are sufficient form of documentation
  - Passport required at all ages
  - Never need an exit visa
  - The State is required to adopt border control regulations appropriate to the air transport environment and prevent unnecessary delays
  - Disruptive passengers are boarded prior to all passengers
  - Inadmissible person (wrong document):**
    - Person who is refused admission to a State by its authorities
    - The operator shall not be precluded from recovering from such person any transportation costs arising from his/her inadmissibility
    - Take the person to any country that can accept him
    - Operator is responsible
  - Unruly Pass:**
    - Can land and transfer in any state
    - Unaccompanied baggage:
      - Treated like cargo
      - Simplified procedures similar to accompanied baggage
      - Require an airway bill
  - Entry and departure of Cargo:**
    - Not penalties, fines, custom duties or taxes if wrong destination airport of cargo

**11 Search and Rescue (SAR)** [1-2%]

**Essential definitions**

**Emergency phases:**

- INCERFA** - Uncertainty phase
  - Uncertainty exists in respect of aircraft and occupant safety
- ALERFA** - Alert phase
  - Apprehension exists regarding the safety of an aircraft as well as its occupant
  - RCC is alerted (Rescue Coordination Centre)
  - SAR prepares their personnel and equipment
- DESTREFA** - Distress phase
  - Reasonable certainty exists that an aircraft as well as its occupants are in grave and imminent danger, or they require immediate assistance.
  - Distress: Grave or imminent danger  
"Mayday Mayday Mayday"

**Organisation**

- Establishment of SAR
- 24 h basis
- SAR regions shall not overlap and neighbouring regions shall be adjacent
- SAR in high seas is conducted by the basis of Regional Air Navigation agreements
  - are areas not owned by a certain state
- Each contracting State of ICAO is required to provide facilities for SAR operations to be undertaken in its airspace

**(COSPAS-SARSAT is a SAR satellite-aided tracking system (+) a space system for the search of vessels in distress)**

**RCC - Rescue Coordination Centres**

- Established in each SAR region
- Can also have sub centres

**Operating procedures for non-SAR Circles**

- Procedures at the Scene of an accident**
- Directing surface craft to the scene**
- Procedures for the PIC first arriving at an accident**
  - Before SAR arrives you take charge of on-scene activities of all other aircraft subsequently arriving
- Intercepting a distress transmission**
  - Record the position of the craft in distress if given and if possible take a bearing on the transmission
  - Acknowledge the transmission and begin to search the aircraft in distress
  - Procedure**
    - Record the position of the craft if given
    - If possible take a bearing of the transmission
    - Inform the appropriate RCC or ATCS
    - While awaiting instructions, proceed at your discretion towards the position given

**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	N
4	Yes or Affirmative	Y
5	Proceeding in this direction	↑

Ground-air visual signal code for use by rescue units		
No.	Message	Code symbol
1	Operation completed	LLL
2	We have found all personnel	LL
3	We have found only some personnel	++
4	We are unable to continue. Returning to base	XX
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	NN

**Air to Ground Signals**

- Daylight: Rock wing
- Darkness: Flash twice landing lights or NAV light

**Droppable Supplies**

- Red: Medical supplies and first aid equipment
- Blue: Food and Water
- Yellow: Blankets and protective clothing
- Black: Misc equip. (stoves, axes and cooking utensils)

**Security - Safeguarding International Civil Aviation against Acts of Unlawful Interference (ICAO Annex 17)** [2-4%]

**Essential definitions of ICAO Annex 17**

Airsides	Aircraft security checks
<ul style="list-style-type: none"> <li>Movement area</li> <li>Adjacent terrain</li> <li>Buildings</li> </ul>	<ul style="list-style-type: none"> <li>Inspection of the hull and interior of aircraft for bombs</li> </ul>

**Screening**

The application of technical or other means which are intended to identify and/or detect prohibited articles

**Security control**

A means by which the introduction of weapons, explosives or other dangerous devices, articles or substances which may be used to commit an act of unlawful interference can be prevented

**Security - restricted area**

- Areas between the screening checkpoint and the aircraft

**Unidentified baggage**

- Baggages with or without a baggage tag, that are not picked up or identified by passengers

**General Principles**

- Objectives of security
- Safety of PAX, crew, ground personnel and general public
- Security programme is established by each Contracting State
  - they must implement measures, human and material resources to safeguard international civil aviation
- Security measures for PAX with regards to:
  - cabin luggage, checked baggage, cargo and other goods, access control and airport design

**Preventive Security Measures**

- Objects not allowed on board
  - Weapons
  - Explosives
  - Dangerous devices, articles and substances
- Mixing of PAX after screening
  - If people are mixed after screening PAX+ bags should redo security check
- Special categories of PAX (SCPs)
  - Deportee
  - Inadmissible people (INAD)
  - People in custody
  - If PAX travel due to judicial proceedings, the operator and PIC are informed
- Law enforcement Officer carrying weapons on board
  - air marshals may carry weapons on board
  - PIC must be notified of seat location and number of armed person
  - A request must be made to the State of embarkation
- Other weapons
  - Sports weapon may be stored in carriage if they are inaccessible to anyone during flight

**Management of Response to Acts of Unlawful Interference**

- The contracting States will make provisions to ensure that an aircraft affected by an unlawful seizure act which has landed in their territory, would be detained on the ground unless to do so would prejudice human life
- Immediately notify State of registry of the aircraft, State of the operator and ICAO

**Operators Security Programme**

- Must have a written operator security programme
- Establishes and maintains an approved security training programme

**Security Procedures in other documents**

- Primary goal with unlawful interference is to land the aircraft as soon as possible
- In case of hijack
  - Communicate with ATC
  - Land ASAP
- You can fly at different level than normal to show ATC that you have been hijacked
  - 1000 ft above FL290
  - 500 ft below FL290
- A door is installed and must be closed during flight
  - Closed and locked as soon as external doors are closed following embarkation
  - CCTV to monitor who wants to come in
- Hijack airplane should be parked isolated by minimum 100 m

## 13 Aircraft Accident and Incident Investigation [2-47]

### Essential Definitions of ICAO Annex 13

- **Accident** → even after complete stop

- Someone is killed or seriously injured
- The aircraft suffers damage or structural failure needing major repair or replacement of items ↳ except engine damage
- The aircraft is lost or unreachable

### Aircraft

- Any machine that derive atmospheric support from the reaction of air, except reactions against the earth's surface

### Flight recorder

- Recording equipment installed in the aircraft to assist/complement accident/incident investigation

### Incident

- An occurrence, other than an accident, associated with the operation of an aircraft, which affects or could have affected the safety of the operation

### Investigation

- prevent future accidents
  - Gathering and analysing information
  - Determining causes and contributing factors
  - Making conclusions

### Maximum mass

- Maximum certificated take-off mass

### Operator

- Person, enterprise operating an aircraft

### Serious Incident

- High chance of an accident

- Serious injury → **Serious engine failure = serious incident**

- Hospital for 48h

- Bone fracture

- Laceration

- Burns

- Poison or radiation

### State of design

### State of Manufacture

### State of Occurrence

- Where the accident took place

### State of the operator

### State of Registry

### Accident and incident investigation in ICAO Annex 13

13 Bad lock

- Purpose is to prevent further accidents and incidents

- ICAO notified of any accident or serious incident > 2250 kg

- Final report must be sent to ICAO > 5700 kg

- The State of occurrence must notify State of:

- Registry

- Operator

- Design

- Manufacturer

- Contracting State is obligated to investigate an accident within its state (but not overseas)

- Preliminary report submitted in one of the working languages of ICAO

When accident occurred in territory of non-contracting state which is not making an investigation

↳ **State of Registry** → should conduct investigation with State of Occurrence  
→ and itself with such information available

• When location of accident cannot be established as being in the territory of any State, the **State of Registry** shall conduct investigation of accident

### Accident and incident investigation in EU regulation

- EU regulation No 216/2011

- Purpose = reporting to prevent accident with no blame
- Safety management system (SMS), importance of reporting the safety-related occurrences and their analysis including follow up actions
- Operator designates 1-2 persons → collect reports + evaluate, process, analyze  
↳ safeguard confidentiality of identity of reporter

- EU regulation No 996/2010

- Safety investigation into accidents and serious incidents

### Occurrence

- An operational interruption, defect etc.. that has NOT resulted in accident or serious incident

### Accident and Serious Incidents

- difference between accident and serious incident is the outcome
- Serious incident, accident could have happened

### Accident and Incidents

- Incidents are events when there was no intent in flying

### Incident: Could/May affect safety

### Accident: Fatally/Seriously injured

- Adverse effect
- Major repair
- Replacement
- Missing

### Cockpit voice recorder

- Records everything except the cabin attendants' communications