Parachuting Operations

Essentials

# Pilot´s and Skydiving Club´s Pre-flight preparation

## MASS AND BALANCE LIMITATIONS

1. **Study** your aircraft´s performance envelope.
2. **Make sure** you load your aircraft correctly.
3. **Use checklists** to ensure correct take-off configuration.
4. Your aircraft´s envelope is your safety net. **Stay within it.**

See card on Mass and balance calculations.

DEVELOP A SYSTEM WHICH ENABLES THE PILOT-IN-COMMAND TO COMPUTE OR REVIEW WEIGHT AND BALANCE ON EVERY FLIGHT.

EASA

AVIATORS CLUB

Essentials

## SKYDIVER'S POSITION AND ORDER

The weight of the skydivers varies from one to another.
To incorrectly order them into the cabin can cause the aircraft to be outside its envelope, causing unnatural strain on flight controls and trim. The jump master should inform the pilot when heavy people are siting close to the tail. The jump master should inform the pilot when heavy people are siting close to the tail. Heavy jumpers are not an issue during the drop, but rather during takeoff. The heavy people can be seated closer to the pilot or assigned to the next flight.

## JUMP MASTER AND PILOT'S COORDINATION

The coordination between pilot and jump master is essential.

- ✓ **Informing the pilot** of the jump altitude is essential. Depending on the type of jump, your aircraft may use a low altitude (around 3,000 ft) or a high altitude.
- ✓ The aircraft is **noisy**, and communication is most often done with **RED**, **YELLOW** and **GREEN light signals** within the aircraft. In some aircraft there are only **RED** and **GREEN** lights.
- ✓ Some aircrafts have **no lights** like Cessna 182 or 206. In this case the Communication could be:
  - ✈ Pilot says "3 minutes", "2 minutes" or "one minute" so everyone starts to get ready
  - ✈ The pilot uses optionally a sound signal
  - ✈ The pilot says "DOOR" so the Jump Master can open the door
  - ✈ The pilot says "EXIT" so skydivers are free to exit

Parachuting Operations


# Pilot's vs Skydiving Club's responsibilities

## UNDER NON-COMMERCIAL OPERATION (NCO) RULES

**All responsibility** for the preparation, the aircraft and its operation and persons on board **falls on the pilot.**

**BEST PRACTICE:** Declare to your authority your operation to enable them to better monitor your operation and enable you to share responsibilities of the operation in a fair and safe manner.

## UNDER SPECIAL OPERATION (SPO) RULES

The **SPO rules** enforce **the skydiving club** to take **more of the responsibility** and frees the pilot to focus on what he needs to do. The club has an SMS and ensures the processes are properly performed. It also ensures the pilot is properly trained and the aircraft is approved for the operation.

EASA

AVIATORS CLUB

Parachuting Operations

# Jump master responsibilities


## COMMUNICATION

The jump master **communicates** to the skydivers all orders from the pilot. He also communicates the current situation back to the pilot either with vocal messages or hand signals.

- ✓ **Assist pilot** in W&B process.
- ✓ **Identify himself** as the jumpmaster to all aircraft occupants.

## SUPERVISE

- ✓ **Always approach** the aircraft safely especially when the engine is running.
- ✓ **Observe** the changing of the weather.

## EQUIPMENT

**Ensure** each skydiver has all the needed equipment,

- ✓ Ensure that the AAD (automatic activation device) is armed on each skydiver.
- ✓ Helmet put on and strap closed.
- ✓ Each skydiver has the equipment properly bucked.

EASA

AVIATORS CLUB

POWER UP

## COORDINATE

- The jumpmaster is responsible **to check** if the pilot is dropping at the proper place.
- Every skydiver in the load should know **the spotting**.
- **A map** with spotting information inside the plane, or close to the aircraft before boarding should be mandatory.
- To coordinate **the exit order** of the skydivers.
- **Organise** the jump groups and **establish the exit order** for each load, considering the type of jumps, jump run direction, winds aloft, and aircraft seating.
- Set up the loading sequence (see the Mass and balance calculations card).

## SAFETY EQUIPMENT

- Skydivers should **keep their safety belts fastened** (if availble) and helmet straped on until the aircraft reaches an altitude where, in case of an emergency, there is enough time to exit, deploy, and open the canopy fully. Some Drop Zones set this minimum at 1000 ft, others at 1500 ft.

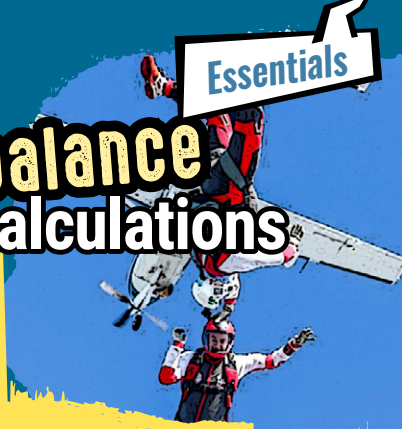
## EMERGENCY SITUATIONS

- **Act** in case of any kind of **emergency** (Aircraft problems, premature container openings, parachute entangled in the fuselage etc.)

Parachuting Operations

Essentials

# Mass and Balance calculations



## AIRCRAFT'S MASS AND BALANCE ENVELOPE

Each aircraft has its limits. The aircraft design demands respect to these limits when loaded with passengers. Failure to respect those limits can cause a fatal outcome.

- **Know** and **understand** your aircraft's limits.
- **Follow FOM** to the letter.
- All on board must know **what is allowed** and what is not.
- **Coordination** between the pilot and jump master is vital. Whether it is for hanging outside the aircraft (including the number of people permitted to do it) and also the number allowed to be behind the red line.

## WEIGHING PAX, CARGO AND FUEL

- **Weigh each person** participating in the flight (with equipment on), including pilot and any other cargo or equipment.
- **Fuel weight** must be considered as well in the calculation.
- **Refuel** at the right time so you never reach the reserve fuel limit.
- **Respect** the **maximum number** of skydivers prescribed in the aircraft manual.

EASA

AVIATORS CLUB

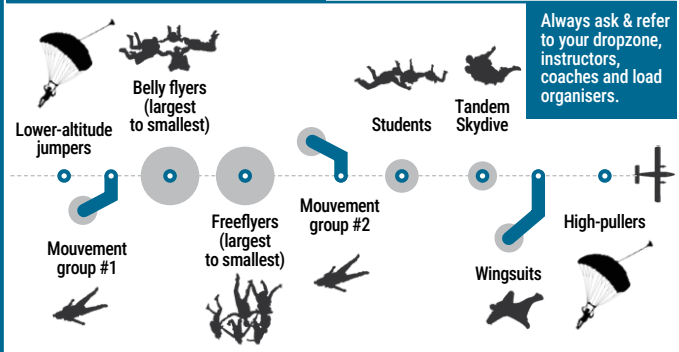
Essentials

# LOADING SEQUENCE OF THE SKYDIVERS

Type of jump and group size dictate the loading sequence, meaning who sits where in the aircraft. Load jumpers in the reverse order of exit.

## RECOMMENDED EXIT ORDER

● Freefall area ● Break-off deployment area




The position of the High Pullers depends on "how high" they open their parachutes. Communication between the Wing Suiters, High Pullers, and pilot is crucial. "Flocking" is a new discipline growing faster. The skydivers open high (mostly just after exit) and fly their canopies together. Pilots should be aware of canopies flying at high altitudes.

## CALCULATING THE C⚡G

- ✓ **Use** an accepted template that contains the parameters for the aircraft in use.
- ✓ **Add in** all the weight data accordingly to see if you are inside or outside of the aircraft's envelope.
- ✓ **Use** relevant formulas for calculating weight and balance.

## LANDING

- ✓ **The pilot should be prepared** to land with a fully loaded aircraft (maximum number of skydivers and full fuel) in case of an emergency.

EASA

AVIATORS CLUB

Deep Dive

# Take-off and climb

## Emergency procedures

### PRE-FLIGHT PREPARATION

- Mentally decide what to do in different scenarios.

### TAKE-OFF

- In case of engine failures – Where to land
- Before Take-off Checklist, e.g. trim setting, and flaps.

### CLIMB

- In case of control difficulties – If altitude is sufficient order the skydivers to jump. If not, aim for best glide speed and best landing area.
- Every drop zone should inform what is the minimum exit altitude (example Skydive Spain is 1000 feet, Brazil 1500 feet).
- The skydivers should know the procedures depending on the altitude.
  - 1 - stay in the plane (brace position)
  - 2 - activate the reserve parachute without cutaway
  - 3 - activate the main parachute

Deep Dive

## IN CASE OF POWER LOSS

- **AVIATE**, push controls forward for best gliding speed.
- **NAVIGATE**, to the best landing location.
- **COMMUNICATE**, notify ATC.

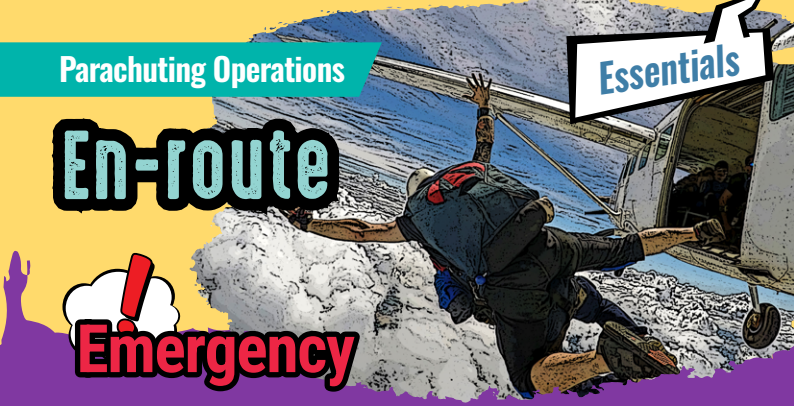
Care should be taken **to ensure that the aircraft and its occupants are properly loaded** and ready for take-off. Using the **proper aircraft checklist**, a complete run-up should be made at least before the first flight of the day and after each time the aircraft is fuelled. During take-off and climb-out:

- The aircraft should always be flown with all **gauges kept in the normal operating range**.
- After liftoff, unless the situation dictates otherwise, **accelerate the aircraft** to and maintain best-rate-of climb airspeed.
- Maintain **a safe climb attitude** to avoid stall and prevent skydivers from sliding to the rear of the aircraft.
- **No acrobatic manoeuvres** with skydivers onboard.
- **Safety belts** or other approved restraints **should be fastened** below 1,000 feet AGL except as directed by the pilot.
- Considering the passengers on board, **the airplane should be flown smoothly**, and steep turns avoided.
- In addition to those listed herein, **all radio transmissions** advised in the AIM should be made **for all aircraft operations**.

Parachuting Operations

Essentials

# En-route Emergency



## IN CASE OF EMERGENCY:

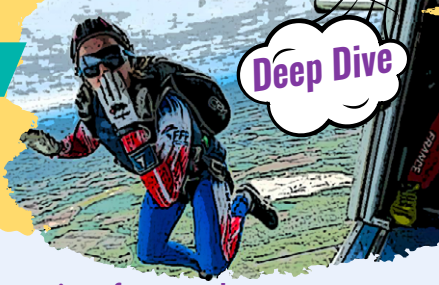
- In case of skydiving equipment issues, **communicate with the Jump Master** to determine if the jump can proceed.
- In case of **decent**, consider **the speed of the aircraft** so the ADD is not activated.
- During flight, **respect the recommandation** from the ADD manufacturer.
- To **avoid** unintended AAD activations, the aircraft must **descend at a controlled rate** of less than 2,000 feet per minute (10 m/s), starting at least from 2,000 feet AGL.
- In case of entanglement of the skydiver or other emergency, there should be **a seatbelt knife** attached **close to the door**.

EASA

AVIATORS CLUB

Parachuting Operations

# En-route




## LIGHT SIGNALS

### Light signals differ from one aircraft to another:

**Aircraft with no light signals:**

Some aircrafts have no lights like Cessna 182 or 206.
In this case the Communication could be:

- Pilot says **"3 MINUTES", "2 MINUTES"** or **"ONE MINUTE"** so everyone starts to get ready.
- The pilot says **"DOOR"** so the JM can open the door.
- The pilot says **"EXIT"** so skydivers are free to start jumping.

**Aircraft with RED and GREEN lights:**

- **RED – Open door, no jumping,**
- **GREEN – Skydivers can jump,**
- **RED – skydivers to stop jumping.**

**Aircraft with RED, YELLOW, and GREEN lights:**

When the aircraft is jump run and ready to start the dropping, to give the signal to skydivers:

- **RED – No jumping,**
- **YELLOW – Be ready and you can open the door,**
- **GREEN – Skydivers can jump.**

Deep Dive

# HANGING OUTSIDE THE AIRCRAFT

Some larger aircraft enable skydivers to hold and hang outside the aircraft **to enable several skydivers to leave the plane at the same time**. However, this practice **causes enormous drag** and if the aircraft is already close to stall speed, it can easily cause both a stall and a spin.

- In case of skydiver(s) hanging outside, **more speed is needed** to counteract the increased drag.
- The pilot must always be told in advance how many skydivers plan **to stay in the back of the aircraft and hang outside** before letting go. This has also to do with the aircraft's structural integrity.

Parachuting Operations

Deep Dive

# Exiting the aircraft

## BEFORE OPENING THE DOOR

- ✓ **Minimum** altitude to open the door should be **2000ft**.
- ✓ Jumpmaster asks everyone to **check pilot chutes**.
- ✓ Person in the door **opens the door**. The door needs to be **fully open** (putting the foot to hold the door is not a good idea).
- ✓ In case of a premature opening, **the door can be damaged**. The skydivers should remain inside to prevent the parachute from damaging the structure of the plane.
- ✓ If the door is **fully open** and there is a premature opening there is **more chances** for everyone to **leave** the aircraft.

EASA

AVIATORS CLUB

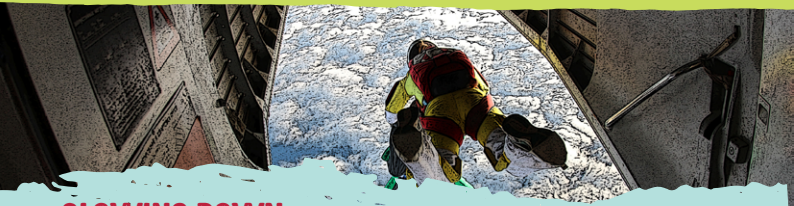
Deep Dive

## WING SUITERS

Pay special attention to wing suiters who can be in the aircraft path.

## AIRCRAFT'S LIMITS

The pilot must **ensure correct speed** to conduct a safe flight.



## SLOWING DOWN

It is a common practice to **slow down the aircraft before** the skydivers **exit the aircraft**. By doing so it becomes easier for the skydivers to exit but it also can cause the aircraft to stall and spin, inhibiting the skydivers to exit.

- ✓ Communicate with Jump Master **on the skydiver's intention**.
- ✓ If there is a direct jump out of the aircraft, then **lowest stall speed is acceptable**.

Deep Dive

# Rapid Decent and Landing

## RAPID ENGINE COOLING (PISTON ENGINES)

The aircraft should **fly straight** and **level** for at least **10 seconds** after dropping skydivers before initiating a descent. The usual practice is to **idle** the engine(s), **dive** the aircraft towards the aerodrome´s approach path, **land** and **take up the next load** of skydivers. During the dive the engines cool dangerously fast. **Wear** and **tear in engines** on aircraft used in parachuting operations is therefore different than on other aircraft used in more normal operations. Each pilot must keep this in mind and adhere to the POH for the aircraft being flown.

Deep Dive

## LANDING

- The pilot should give instructions to the skydivers about **the best place to sit** (depending on the aircraft and how many skydivers still inside the aircraft).
- Ensure that before landing **checklist is completed**.
- In case one or more skydivers are still on-board during landing, they have to **properly secure themselves** before landing.
- In case of emergency, **check the proper procedure** for landing with **full aircraft**.
- Special attention is needed for skydivers when **leaving** the plane **after complete stop** to avoid walking towards the propeller. **Ground crew should help** with that **or the most experienced skydiver** in the plane should be the one to open the door and assuring skydivers walk in the correct direction.
- Be aware of the skydivers with **open parachute** and their **position in the air**, especially when the landing zone is near the runway.

Parachuting Operations


# Operational responsibilities

## DROP ZONE (DZ) MANAGER

Whether the skydiving operation is a commercial centre or a club, one **person must be designated** as the on-site official responsible for the day-to-day operations.

- ✓ **Supervise** all skydiving-related **activities**.
- ✓ **Ensure compliance** with all federal, state and local rules and regulations.
- ✓ **Coordinate with the Chief instructor** on matters pertaining to skydiving safety and training.

## Parachuting Operations

POWER UP

- **Coordinate DZ activities** with other aeronautical users, facility managers and community officials and leaders, as appropriate.
- In coordination with the airport manager, **establish a parachute landing area** and discuss airport traffic patterns.
- **Provide** the relevant **air traffic control facility** with written notification for the calendar year.
- **Develop** and **maintain** Standard Operating Procedures **(SOPs)** specific to the local skydiving operations, and add additional DZ-specific procedures to their operations handbook as necessary.

EASA

AVIATORS CLUB

Parachuting Operations


# Drop Zone Controller (DZC)

Every **Drop Zone** should have a **DZ Controller** – a person responsible at least for checking that all skydivers **open** their parachutes and **land in the Parachute Landing Area (PLA)**. Sometimes skydivers land off, and a fast response can make the difference between life and death.

***FOR EXAMPLE:*** The main tasks are to ensure that all skydivers from each load deploy a fully functional canopy, avoid any emergency situations, adhere to the drop zone rules regarding the flight path, and land safely in the designated area.

EASA

AVIATORS CLUB

POWER UP

# MAIN RESPONSIBILITIES

### 1. Monitor Skydivers in the Air:

Count canopies, confirm safe openings, and ensure all skydivers land in or near the designated landing area.

### 2. Track Landings:

Use a manifest copy to tick off each jumper after landing. Act immediately if someone is missing or lands off.

### 3. Emergency Response:

Coordinate fast action in case of an injury, off-landing, or emergency. Call rescue services if needed.

### 4. Radio Communication:

Stay in contact with pilots, ground crew, and instructors during jumps—especially during student or tandem operations.

### 5. Weather Checks:

Monitor wind, visibility, and conditions that could affect safe jumping and landing. Halt operations if needed.

### 6. Student/Tandem Oversight:

Keep an eye on student or tandem jumpers and ensure instructors are aware of landing area conditions or hazards.

### 7. General Safety Supervision:

Make sure the landing area is clear of obstacles, people, or aircraft. Watch for dangerous approaches or landing patterns.

### 8. Log Incidents or Near-Misses:

Report any unusual or unsafe events, following DZ procedures.

Parachuting Operations


# Chief Pilot's responsibilities

## CHIEF PILOT'S RESPONSIBILITIES

The **Chief Pilot** must meet all the requirements of the jump pilots, as listed under the "Jump Pilot" card. Duties and responsibilities of the chief pilot include:

- ✓ **Serve as chief** of aircraft operations for the DZO.
- ✓ **Ensure** that **all aircraft** under the control of the jump operation **are airworthy** and that they comply with all appropriate STCs and field approvals.
- ✓ **Ensure** that **all pilots** under the control of the jump operation hold currently **valid** pilot's **certificates** and medical certificates.

EASA

AVIATORS CLUB

## Parachuting Operations


- **Coordinate scheduling** of aircraft **maintenance** or verify that maintenance has been performed on transient/leased aircraft.
- **Schedule** flight crew members and aircraft.
- **Coordinate all training**, both initial and recurrent, of flight crew members to ensure that jump pilots are qualified in procedures for flying skydivers.
- **Prepare** and **maintain** pilot records, training records, flight schedules and correspondence pertaining to flight operations.
- **Maintain** current aircraft **checklists**.
- **Establish procedures** and **maintain quality control** of fuel storage and fuelling operations.
- **Maintain** current **library of all rules** pertinent to skydiving flight operations.
- **Develop a system** which enables the pilot-in-command to compute weight and balance for every flight.
- **Develop training points** (for new skydivers) and **orientation points** (for visiting skydivers), to include aircraft emergency procedures.

EASA

AVIATORS CLUB

Parachuting Operations

# Responses in case of accidents

## Emergency response

- It's important to pause all skydiving operations after an accident. Call and notify the responsible authorities in case of an accident.
- Jumping should not continue until the ambulance or rescue team has left the landing area. This ensures safety and gives space for emergency responders to work without risk or distraction.

EASA

AVIATORS CLUB

Deep Dive

# Jumpmaster responsibilities

## JUMPMASTER

**The most experienced person** on the load—should be designated the jumpmaster. The pilot and jumpmaster must work as a team for the safety and enjoyment of the skydivers. Specific duties include:

- ✓ **Identify** himself as the jumpmaster to **all** aircraft **occupants**.
- ✓ **Ensure the safe approach** to and loading of the aircraft, especially if an engine is running, unless there is a loadmaster to perform this function.

## Parachuting Operations


- **Ensure** that all parachutists on board **have been properly trained** and are adequately **equipped** for the jump before the aircraft taxis for take-off.
  All harnesses must be on and buckled, ready to jump, prior to boarding the plane.
  **No occupant will be permitted to remove his harness** when there is an open aircraft door.
- **Ensure** all parachutists have been **properly briefed** in the procedures to be followed in the event of an aircraft emergency.
- **Spot each parachute drop** or designate a spotter for each separate pass.
- **Assists in maintaining aircraft** within weight and balance limits throughout flight.
- **Ensure** all federal, state and local **rules** and regulations **are followed**.
  In coordination with and at the direction of the pilot, determine and take appropriate action in case of an aircraft emergency.

EASA

AVIATORS CLUB

Parachuting Operations

# Ground Operations


**Standard operating procedures are based on the concept that safety is paramount. Essential elements of safety include:**

- ✓ Properly **maintained** equipment,
- ✓ Thorough **training** and **motivation** of staff,
- ✓ Devoted **attention** to detail,
- ✓ Good **judgment**,
- ✓ Sound **operational planning** and
- ✓ **Efficient use** of available resources.

General appearance of the skydiving operation, including exterior and interior of the jump aircraft, is also important as it portrays an image of professionalism.

All staff members should be conscious of the image portrayed by the skydiving community and should emphasise professional conduct and appearance.

EASA

AVIATORS CLUB

Parachuting Operations

# Ground Operations


## MAIN POINTS TO CONSIDER

- For every flight, **there must be a manifest**, one copy of which is carried in the aircraft during the flight and one that is stored at ground operations. The manifest must **contain the names** of those on board. The **weight** of each skydiver (with equipment) must be recorded and available to the pilots, either as part of the manifest or on a separate document.
- At least **one hour before** skydiving is to begin, a **call** to the nearest **FIS station** should be made to obtain NOTAM and weather information, and to ensure that the NOTAM for skydiving has been filed for the day's activity.
- A **complete pre-flight** of the jump aircraft, must be conducted before the first flight and according to the owner's flight manual.

EASA

AVIATORS CLUB

## Parachuting Operations


- **Aircraft fuelling** must be in accordance with **industry standards** and no flight will begin with less than sufficient fuel on board for the intended flight plus 30 minutes reserve fuel for daytime operations and 45 minutes for nighttime operations.
- **Access to the flight line** and aircraft loading area by spectators **must be limited** for security reasons.
- All aircraft occupants must properly **use a safety belt** (if available) and have their helmet straped on during aircraft taxi, take-off and landing.
- Aircraft must be **loaded in accordance with the flight manual** and the pilot-in-command must ensure that each flight is conducted within weight and balance limits.
- Before the aircraft engines are started, special care must be taken to **ensure the area around the aircraft is clear**.
- In case of **formation flights** or more than one aircraft operating **at the same time**, it is the responsibility of all **pilots** and **jumpmasters**, to **coordinate each plane's activity**. Specific procedures for formation flight, including descent, should be developed by the chief pilot, and made available to all involved.

EASA

AVIATORS CLUB