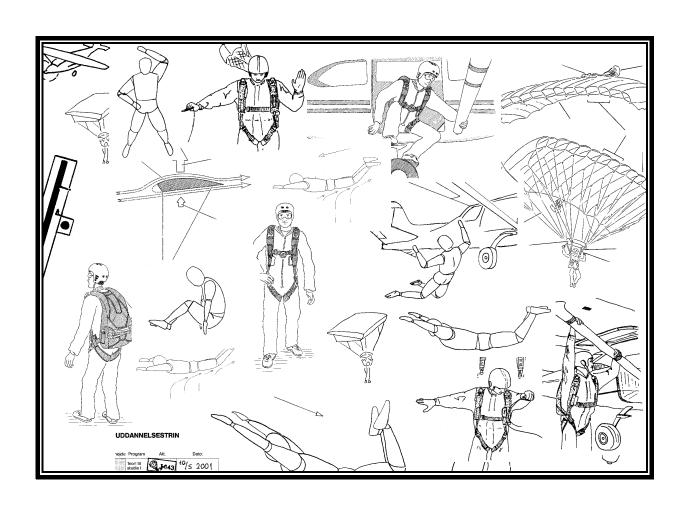


# **Danish Parachute Association**

# Student Manual





# **INTRODUCTION**

Welcome to the fascinating world of skydivers.

We hope you'll enjoy jumping and that you'll want to be a part of our club life, too.

This book contains a short description of the education that you'll go through in order to get your Skydiving License. It's intended to support both your verbal and practical training. Your participation in the training is very important. Ask about anything that you don't understand or that you'd like to know. The more actively you participate, the more you'll benefit from the training. And there is no such thing as a stupid question!

In the back of this book you'll find a section about the history of skydiving, in case you're interested.

There's also a glossary of the many new words you will encounter and an explanation of their meaning.

ENJOY! And once again; welcome!

# **TABLE OF CONTENTS:**

BEFORE JUMPING	5
CLOTHING:	5
EQUIPMENT: TECHNICAL TERMS: HARNESS	5
	6
TECHNICAL TERMS: PARACHUTE	7
THE AERODYNAMICS OF A PARACHUTE:	8
STAGE I	9
THE FLIGHT:	
EXIT:	
AFTER EXIT:	14
WHEN YOU USE A RADIO:	
WHY IS IT IMPORTANT TO FLY INTO THE WIND WHEN LANDING?	
AFTER LANDING	16
LOG CARD	17
OPENING SEQUENCE	18
PROBLEMS	19
LINE TWIST:	_
THE SLIDER DOESN'T SLIDE DOWN:	
DEFLATED CELLS:	
A TOGGLE HAS COME UNSTOWED:	
PILOT CHUTE IS BELOW THE NOSE OF THE CANOPY:	20
EMERGENCY PROCEDURE	21
MALFUNCTIONS	24
TANGLED LINES:	24
SLIDER IS STUCK:	24
THE CANOPY IS TORN:	24
LINE OVER:	24
HORSESHOE:	25
LINE AROUND BODY, ARM OR LEG:	25
STREAMER:	
BROKEN LINE:	
BROKEN STEERING LINE:	26
NO CANOPY:	
HANGING UNDERNEATH:	26
2 CANOPIES ARE OUT:	26
EMERGENCY LANDING WITH THE AIRPLANE:	27
LANDING PROBLEMS:	
LANDING NEAR ELECTRICAL WIRES:	
LANDING IN WATER:	
LANDING IN TREES:	
THERMALS/TURBULENCE:	

STAGE II	29
DUMMY PULL	29
FREE FALL	30
FIRST FREE FALL:	30
DELTA POSITION:	31
BOX POSITION:	31
RELATIVE WIND:	32
STREAMER TOSS AND SPOTTING	32
SPOTTING:	32
INSTRUCTING THE PILOT:	32
STREAMER TOSS:	33
STAGE III	35
DIVE EXIT:	
TURNING:	
FLYING FORWARD AND BACKWARD:	
BACK LOOP:	
TRACK:	38
LICENSE:	39
AFF EDUCATION:	39
DANISH PARACHUTE ASSOCIATION	40
AFTER LICENSE	41
THE HISTORY OF SKYDIVING	42
GLOSSARY	45

# **BEFORE JUMPING**

#### **CLOTHING:**

(which you must provide for yourself)

Practical clothes. You can usually borrow a jumpsuit in the club.

You're welcome to use gloves. The gloves must be thin finger gloves with a grippy palm.

You're welcome to use boots that will support your ankles, for example basketball boots. Nothing with open hooks, though.

#### **EQUIPMENT:**

(which the club will provide)

Hard helmet with chinstrap mounted on the outside.

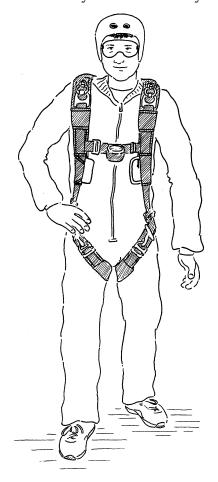
Parachute

Radio

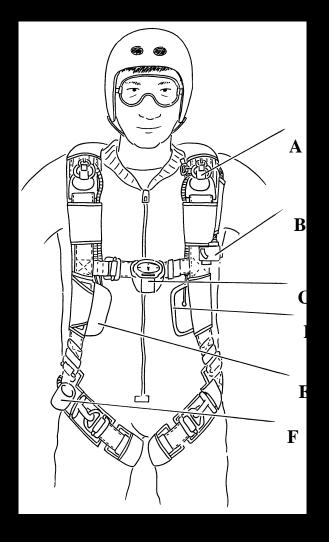
Possibly protective goggles. If you wear contact lenses or glasses, you must wear goggles, too.

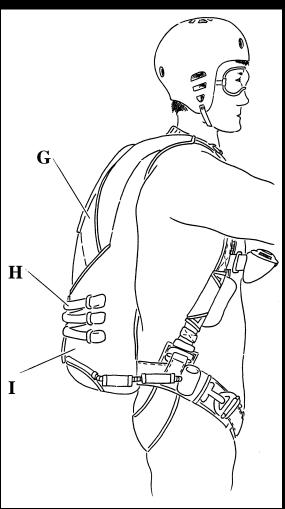
Possibly altimeter. When you do free fall jumping, you must wear an altimeter.

This is how you'll look when you're dressed to make a student jump.

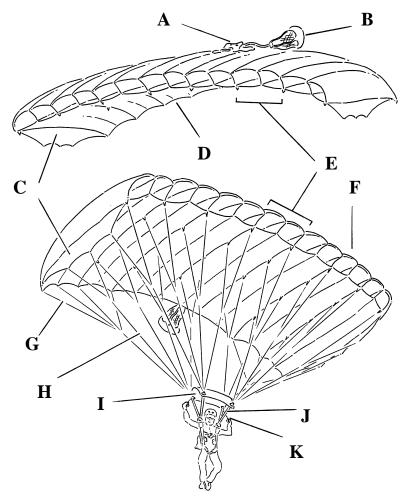








This is how the parachute itself looks when it's inflated:



#### **TECHNICAL TERMS: PARACHUTE**

<u>Harness</u>: The "backpack", that contains the canopies until they're released.

<u>Reserve canopy</u>: Extra canopy that is used in case of a malfunction of the main canopy.

**A** <u>Bag</u>: Canvas bag that the canopy is stored in, before it is packed into the harness.

**B** <u>Pilot chute</u>: An assisting parachute that pulls the main parachute out.

C <u>Stabilizers</u>: The side panels of the canopy.

**D** <u>Tail</u>: The rear edge of the canopy.

**E** <u>Cells</u>: The canopy is made up of a number of chambers (cells).

**F** Nose: The front edge of the canopy.

**G** <u>Steering lines</u>: Lines, that connect to the rear corners of the canopy and are used to steer it.

**H** <u>Lines</u>: Connect the canopy itself with the risers and the harness.

**I** <u>Slider</u>: A square piece of fabric that controls the opening of the parachute.

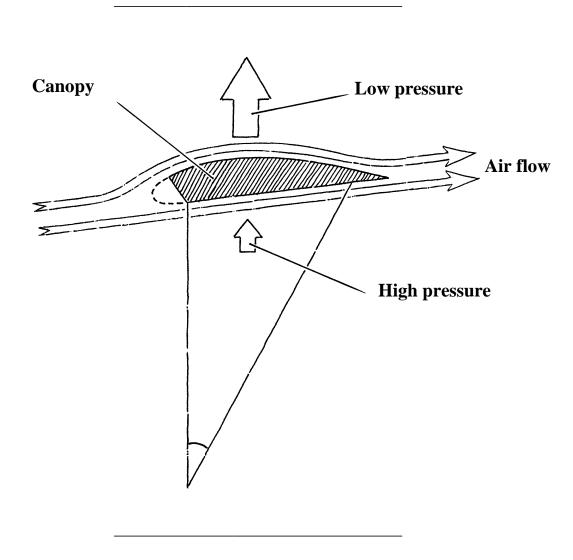
**J** <u>Risers</u>: Wide straps that connect the harness with the lines and the canopy.

**K** <u>Toggles</u>: At the end of the steering lines are toggles that you pull in order to steer the parachute. When the parachute opens, they are attached with Velcro to the rear risers where you can easily take hold of them.

#### **THE AERODYNAMICS OF A PARACHUTE:**

A parachute is made up of cells (chambers) that are filled with air when the canopy unfolds. The air gives the canopy its shape and load-bearing capacity.

A ram-air parachute is built on the same principles as the wing of an airplane – therefore, its principles of flight are the same as those of an aircraft wing.



The top curves more than the bottom. When the parachute moves through the air, the air must travel farther over the canopy than under it. This creates a vacuum above the canopy so it's almost "sucked" upward. This is why the parachute has positive buoyancy just like an aircraft wing.

# **STAGE I**

#### **STATIC-LINE JUMPS**

#### THE FLIGHT:

The airplanes used for skydiving are often small. There's not much room when the plane is full of skydivers wearing their equipment. Usually we sit on the floor, very close to each other.

After you put on all your equipment, a pre-flight equipment check must be made; this means that an instructor checks that all your equipment is as it should be.

Then you'll get the call to go to the airplane. The instructor who'll join you on the plane, the jumpmaster, will fasten the static line and tell you where to sit. You may not enter the plane until all the static lines are secured.

Once you have sat down, you'll remain seated during the whole flight until the instructor tells you otherwise. Be careful not to push the reserve or cut-away handles. And don't get your arms or legs tangled up in the static lines when you move around.

You may not grab hold of the pilot nor the pilot's seat.

If a container opens up inside the airplane, inform the jumpmaster immediately, because this could cause a very dangerous situation.

The airplane will climb as fast as possible to the altitude planned for the jumps. For a jump with automatic opening of the parachute by a static line attached to the airplane, the altitude is 1,000 meters (3300 ft).

#### **EXIT:**

Depending on the type of aircraft, the exit can be made in two different ways. It depends on whether the landing gear of the airplane is extended when you exit, or not.

#### **EXIT WITH WHEEL:**

When the airplane has reached the right altitude and approaches the exit spot, the door is opened.

The jumpmaster shouts: "I will open the door"

Then the jumpmaster opens the aircraft door. This will generate a lot of noise, wind and cold. The jumpmaster looks down, *spots*, and directs the pilot to the exit spot.

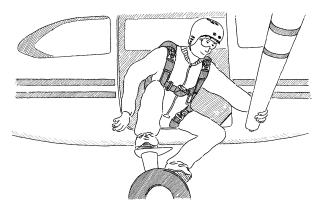
Get ready to exit when you approach the exit spot.

The jumpmaster shouts: "Climb out"

The wheel must be braked, so you remind the pilot.

The student shouts to the pilot: "Brakes on"

Take hold of the door frame with your hands and swing your legs out. Be prepared that the wind is strong outside the door. Place your feet on the wheel or on the strut that connects the wheel and the fuselage of the aircraft. Some skydiving airplanes even have a small step to put your feet on. When your feet are in place, move your left hand from the door frame to the strut between the fuselage and the tip of the wing (the wing strut).

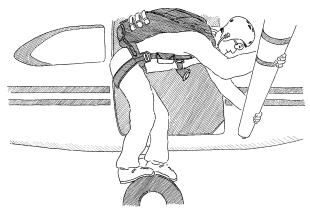


Your feet should now be on the wheel or step – your left hand on the wing strut – your right hand on the door frame.

When you are in place, <u>remain seated</u> until the jumpmaster gives you the next instruction.

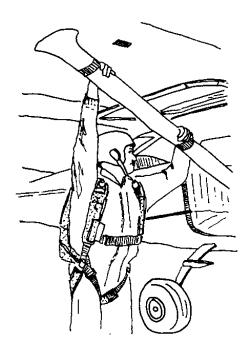
Jumpmaster shouts: "Continue"

Place your right hand next to your left hand on the wing strut. At the same time, stand up. The wind is strong so you have to hold on tight, but it'll be ok! Then move your hands outward along the wing strut until your right hand almost touches the wing.



Some planes have markers to indicate where you should put your hands. When you're all the way out, let go with your feet and hang by your arms.

Look at the jumpmaster.



This may take a little time. The jumpmaster must make sure the aircraft is at the right exit point, and that you're hanging calmly and ready. Now you must jump:

Jumpmaster shouts: "GO"

And/or shows you "Thumbs up"

Look straight ahead, lean your head back and look up. Some aircraft have a point on the wing to look at. Arch your back well and let go of the wing, while you hold this body position and keep looking up at the airplane.

#### **EXIT WITHOUT WHEEL:**

When the airplane has reached the right altitude and approaches the exit spot, the door is opened.

The jumpmaster shouts: "I will open the door"

Then the jumpmaster opens the aircraft door. This will generate a lot of noise, wind and cold. The jumpmaster looks down, *spots*, and directs the pilot to the exit spot.

When you approach the exit spot, you get ready to exit.

The jumpmaster shouts: "'Climb out"

Take hold of the door frame with your hands and swing your legs out. Be prepared that the wind is strong outside the door. Turn your body to face the direction that the airplane is flying.

When you're in place, remain seated until the jumpmaster gives you the next instruction.

**Jumpmaster shouts:** "GO"

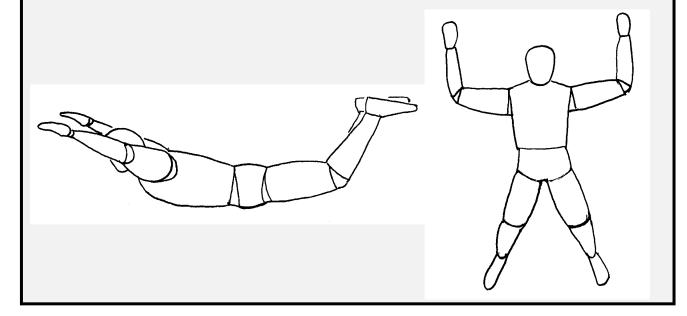
And/or shows you "Thumbs up"

Turn your head to look straight ahead, lean your head back and look up. Then jump out facing the flight direction while you spread your arms and legs out, arch your back really well and keep looking up at the airplane.

#### **EXIT BODY POSITION:**

During free fall, you must be able to fall in a stable and controlled way, and be able to move around. This is done on your stomach, with your arms and legs spread. To avoid flipping over onto your back it's important to <u>fully arch your back</u>.

This is why we practice making a *stable exit* from the very first jump. You start with a body position that looks pretty much like a large X, and arching your back as much as you can. Later you make your body position smaller until you reach the ideal free-fall position, *the box position*. In this position your arms are horizontal from your shoulders to your elbows, your lower arms at a 90-degree angle from your elbows, legs spread and bent 45 degrees upward. Now you can fly!



#### **AFTER EXIT:**

Right after you exit the aircraft, the static line will automatically deploy the parachute. It will only take 4 seconds, before you're under a fully deployed and inflated parachute.

During those 4 seconds you maintain your arching body position and look up at the aircraft while you shout:

"ARCH-thousand - two thousand - three thousand - four thousand - check"

**Check:** Look up at the canopy to check that everything is alright.

**Steering test:** Then take hold of the toggles, pull them loose and conduct the *steering test*.

This means that you pull the toggles down until your arms are stretched and let them come back up again, in one smooth motion. If you let go of the toggles they will stay where they are on the riser, and you can easily take hold of them

again.

**Observation:** Look around to see where you are, relative to the landing area. When you exit,

the airplane is flying away from the landing area so you can fly the parachute

back home with the wind.

**Flying:** Until you are at an altitude of 300 meters (1000 ft), you stay on the upwind

side of the landing area, so that you can fly upwind, toward the landing area. It's a good idea to make S-turns so you fly sideways to the landing area most of the time. Be careful not to go too far to the sides, but remain inside the *wind* 

sector.

When you're halfway down (500 meters (1600 ft)) you should be half way

home.

If you're moving too fast toward the landing area, because the wind is strong,

you should turn the parachute upwind for a while. Always keep noticing the direction of the wind.

**Landing pattern:** About 300 meters (1000 ft) above the ground you should start your landing

pattern. Fly past the landing area and some distance behind it. How far behind it depends on the wind speed. Your instructor will have informed you of this

before you jumped.

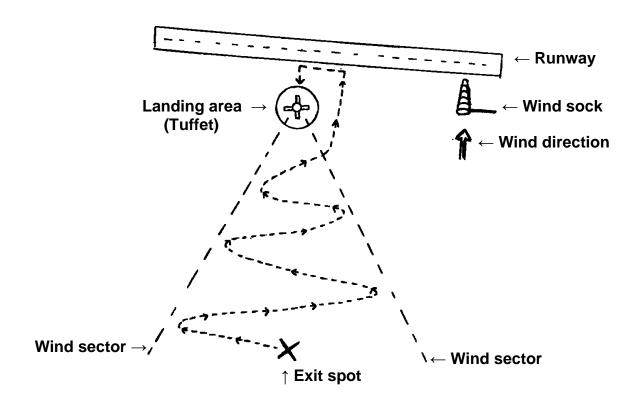
When you're an appropriate distance behind the landing area, turn first across the wind and then at an altitude of about 100 meters (300 ft), turn into the wind. From 100 meters (300 ft) until landing, keep flying directly into the wind, this is your final approach. Look at the wind sock or something else that shows the wind direction and adjust your direction to keep flying directly into the wind. But only make small adjustments, no sharp turns. Never pull the

toggles down further than your shoulders when you're on your final approach.

**Landing:** Prepare for landing by putting your legs together and keeping your hands all

the way up along the risers. Do not look down; instead look toward the horizon. When you're 3-5 meters (10-16 ft) above the ground you pull the toggles all the way down in one smooth motion and keep them down. This

brakes the canopy. It's called to *flare* the parachute.



#### When you use a radio:

When you have checked the canopy and performed the steering test, the radio instructor will speak to you and ask you to make one maneuver so the instructor can see that you are in contact. This maneuver might be to turn to one side, or to kick your legs. After that the instructor will only speak if it's necessary to intervene. You should be able to fly home properly by yourself.

After the instructor asks you, for example, to "turn right" and then "maintain this direction", you steer to maintain that direction by yourself.

When you're on your final approach and coming up to your landing, the instructor will say:

"Prepare for landing – put your legs together – hands all the way up"

You must steer directly into the wind, but only making small adjustments with your wrists.

Then comes the landing instruction:

You must not start to flare until the instructor says FLARE – and be aware that this count may *not* follow a regular rhythm like a rocket launch!

If you can't hear the radio, just stay calm, steer and land the way you have learned. If it's your first jump and you are not near the landing area, pull down the toggles for half brake and land that way instead of flaring.

If the wind is strong, run around to the other side of the parachute as soon as you land. Then it can't catch the wind and drag you along the ground. You can also prevent this by letting go of one of the toggles and quickly pulling the other one in.

\_\_\_\_\_

#### WHY IS IT IMPORTANT TO FLY INTO THE WIND WHEN LANDING?

By itself, a parachute flies forward at a certain speed.

When it's flying downwind, it moves over the ground at its own speed + the speed of the wind.

For example, if the parachute flies forward by itself at 8 meters per second, and the wind is blowing at 6 meters per second, you'll be flying 8 + 6 meters/second over the ground, if you land <u>down</u>wind. That is 14 meters/second, or more than 50km/hour!

When the parachute flies upwind, its own speed will be curtailed by the wind speed.

Therefore, if you land  $\underline{up}$ wind, the parachute will still fly forward at 8 meters/second by itself; but now the wind will blow against you and slow you down by 6 meters/second, so that you'll only be flying  $8 \div 6$  meters/second. This adds up to a ground speed of 2 meters/second or just over 7 km/hour during your landing.

#### 4 MAIN RULES FOR STEERING AND LANDING:

Above 300 meters (1000 ft) – never behind the landing area

Below 100 meters (300 ft) – always upwind

Below 100 meters (300 ft) – toggles never below your shoulders before

flaring

Always land upwind.

#### **AFTER LANDING**

After landing, pick up the parachute so it doesn't get tangled and it's not dragged along the ground when you walk away.

Place the parachute and other gear where the instructors say.

After your first couple of jumps you should start watching when your parachute is being packed so you can learn to do it yourself as soon as possible.

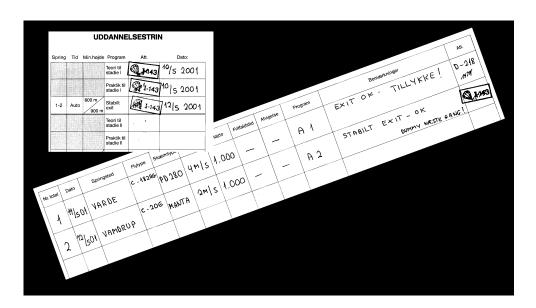
The sooner the parachute is packed, the sooner you can go jump again!

## **LOG CARD**

From the instructors you have to find out how your jump went. The jumpmaster can tell you whether your exit was ok. Regarding steering and landing you should talk to the instructor who guided you on the radio or watched your jump from the ground.

All skydivers must keep a logbook of all their jumps.

As a student you will be given a log card.



This log card is very important because it documents the education you've completed.

The log card contains an overview of all the different elements of your education up until the Skydiving License. Instructors will authenticate each the step you pass as you go along. This means that instructors at other dropzones can see immediately, how far you've progressed.

With your log card and a receipt for paid membership of your club, you can show up at any dropzone in Denmark that's a member of the DFU and you'll be allowed to jump there.

The log card has room to keep track of your first 10 jumps. After that, you'll need a separate logbook. You can write notes about each jump yourself, and then add the input you get from the instructors. Then an instructor must sign to authenticate it.

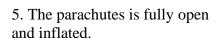
# **OPENING SEQUENCE**

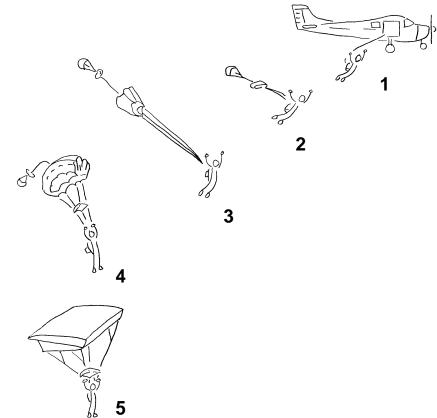
On at least your first 5 jumps the parachute will be activated automatically by a static line that's fastened inside the aircraft and deploys your main canopy when you exit the aircraft.

When the main container opens, the (spring-loaded) pilot chute comes out and it in turn pulls out the main canopy. First the lines are stretched out. Then the bag containing the canopy itself opens and the main canopy is released and inflates.

It looks like this:

- 1. The container opens.
- 2. The lines stretch out.
- 3. The bag opens and the canopy is pulled out.
- 4. The parachute starts to inflate and the slider slides down.





# Checking the parachute after exit means that you check to make sure that

- the canopy is rectangular, meaning completely inflated
- the slider is where is should be
- the parachute can be steered

If one of these things is not right, you have a problem that you need to deal with!

# **PROBLEMS**

#### **LINE TWIST:**

What is wrong?

The canopy is rectangular, but the slider has not slid down and the lines are twisted. The parachute can't be steered because the steering lines are twisted together with the other lines.

What to do?

Grab hold of the risers and pull them apart. At the same time, swing your body in the opposite direction of the twist, until the lines have untwisted. Only then do you pull the toggles loose.

#### THE SLIDER DOESN'T SLIDE DOWN:

What is wrong?

The canopy is rectangular but maybe not fully unfolded. The slider should be right above your head where the lines and the risers meet; this time it has stayed some distance up on the lines.

What to do?

Pull the toggles loose and move them up and down, just like the steering test that you would do in any case.

(When you "pump" the steering lines, the movement will make the slider slide down into place.)

#### **DEFLATED CELLS:**

What is wrong?

The canopy is not rectangular. One or more of the outer cells is not inflated.

What to do?

Pull the toggles loose and move them up and down, just like the steering test that you would do in any case.

(When you brake the parachute by pulling all the way down on the toggles, the pressure inside the parachute will increase and this pushes air out into the cells that were not inflated.)

#### A TOGGLE HAS COME UNSTOWED:

What is wrong?

The canopy is rectangular and the slider is in place. But the parachute is turning to one side.

What to do?

Pull the toggles loose and conduct the steering test.

(When the parachute is packed and the toggles are stowed, they are in half-brake position. If one of the toggles comes loose during the opening sequence, one side of the parachute will fly forward at full speed while the other side is flying at half brake. This makes the parachute turn! You solve this simply by pulling the other toggle loose and starting to steer. Then everything will be fine.)

#### PILOT CHUTE is below the nose of the canopy:

What is wrong?

The canopy is rectangular. The slider is down. The pilot chute should hang behind the parachute just above the *tail*, but instead it's hanging down in front of the *nose* or it's tangled up in a line in the front.

What to do?

Pull the toggles loose and conduct the steering test. If the parachute reacts normally and you can steer it without any problems, it's ok.

The problems that we've just described are not very dangerous. They're things that happen from time to time. For example, you will surely experience a line twist at some point in time.

But every once in a while, very rarely, something will be so wrong with a parachute that you cannot fix it.

Then we're not talking about a problem, but a malfunction.

A malfunction cannot be fixed and that's why we have a reserve parachute!

The unusable main parachute must be released from your harness before you pull the reserve parachute. To release the main parachute and pull the reserve is call "Emergency Procedure" (EP).

It is possible that one of the problems described above can't be solved by the method described.

Then you have to determine whether the parachute can **fly** and whether it can be **steered** so that you can land safely.

If you're in doubt: EMERGENCY PROCEDURE!	

## **EMERGENCY PROCEDURE**

There's only one way to conduct the Emergency Procedure and you must know it like the back of your hand, so you can perform it instinctively without thinking about it.

1. **MAKE THE DECISION**: Can you land safely with this parachute?

If the answer is **NO**:

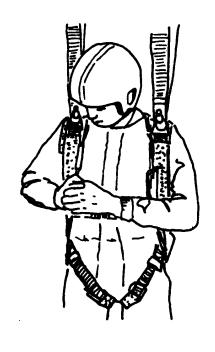
- 2. **LOOK** at the cut-away pud.
- 3. **GRAB** the cut-away pud.
- 4. **LOOK** at the reserve handle and keep your eyes on it while you
- 5. **PULL** the cut-away pud (and throw it away)
- 6. **GRAB** the reserve handle.
- 7. **PULL** the reserve handle (and throw it away)

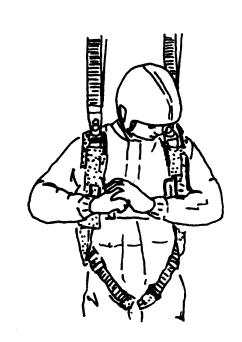
#### 1. MAKE A DECISION

#### 2. LOOK AT THE CUT-AWAY PUD

#### 3. GRAB THE CUT-AWAY PUD

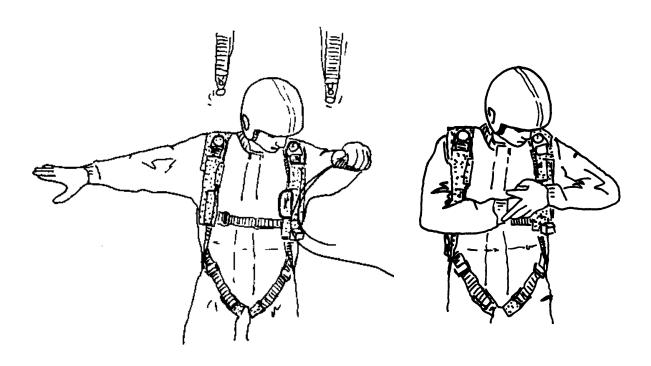






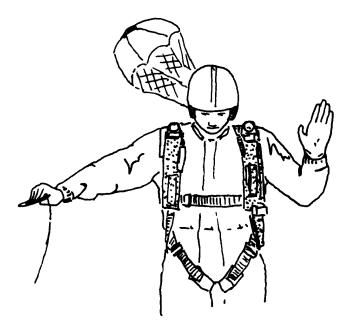
5. PULL THE CUT-AWAY PUD (throw it away)

6. GRAB THE RESERVE HANDLE



#### 7. PULL THE RESERVE HANDLE

(throw it away)



The reserve parachute is usually a ram-air canopy, like the main canopy, and you check and steer it the same way as the main parachute.

When you've conducted the Emergency Procedure you check your parachute, conduct the steering test, steer and land as usual.

There are also round reserve parachutes. They're just as safe as the square ones.

They have toggles in the same place as ram-air parachutes and are steered by pulling down on the toggles. But they are not as steerable as square ones. You land upwind, as usual, but don't flare when landing.

# **MALFUNCTIONS**

TANGLED LINES:
What is wrong?
The lines are not just twisted, but actually tangled up in each other.
What to do?
Emergency Procedure!
SLIDER IS STUCK:
What is wrong?
The slider is stuck so high up on the lines, that the canopy is not sufficiently unfolded and can't be steered properly either.
What to do?
Emergency Procedure!
THE CANOPY IS TORN:
What is wrong?
The canopy is torn up or there is a hole that's bigger than a fist.
What to do?
Emergency Procedure!
LINE OVER:
What is wrong?
A line is crossing the canopy so the canopy isn't rectangular, but looks more like it is split in two.
What to do?

Emergency Procedure!

#### **HORSESHOE:**

What is wrong?

The canopy is not open because the bridle that connects the pilot chute and the main canopy is stuck on the skydiver.

What to do?

You try *once* to free the pilot chute.

If you don't succeed: Emergency Procedure!

#### **LINE AROUND BODY, ARM OR LEG:**

What is wrong?

The canopy has inflated, the slider is down, but you have a line around yourself that pulls the canopy down and causes it to not be rectangular.

What to do?

You try *once* to release the line.

If you don't succeed: Emergency Procedure!

#### **STREAMER:**

What is wrong?

There is almost no air in the canopy and it's flying behind you like a streamer.

What to do?

**Emergency Procedure!** 

#### **BROKEN LINE:**

What is wrong?

A line has broken, is hanging loose and flapping in the air.

What to do?

If the canopy is rectangular and can be steered, it's ok.

Otherwise: Emergency Procedure!

#### **BROKEN STEERING LINE:**

What is wrong?

A steering line is broken.

What to do?

**Emergency Procedure!** 

#### **NO CANOPY:**

What is wrong?

Nothing has come out at all.

What to do?

**Emergency Procedure!** 

#### **HANGING UNDERNEATH:**

What is wrong?

You hang underneath the airplane, stuck on a static line that is still attached to your parachute.

What to do?

- 1. Place both hands on your helmet.
- 2. Jumpmaster will cut the static line.
- 3. Emergency Procedure!

(If you release the reserve parachute before you have been cut loose, the airplane will crash – along with you!

Placing your hands on your helmet shows the jumpmaster that you're aware of the situation and will not conduct the Emergency Procedure yet).

#### **2 CANOPIES ARE OUT:**

What is wrong?

Both your main and reserve parachutes have opened up.

What to do?

Do <u>not</u> touch the toggles. You land with both parachutes.

#### **EMERGENCY LANDING WITH THE AIRPLANE:**

If a problem arises while you're flying in the airplane, you stay calm and follow the instructions from the jumpmaster and the pilot.

If you have to exit the airplane, the jumpmaster will tell you how.

If you have to land with the airplane, you wrap your arms around your legs and place your head between your knees.

# **LANDING PROBLEMS:**

#### **LANDING NEAR ELECTRICAL WIRES:**

There's one exception to the rule of always landing into the wind and never making sharp turns at low altitude; it's if there's a risk of landing on electrical wires. In this case, avoiding the electrical wires is all that matters.

If they <u>cannot</u> be avoided, make yourself as narrow as possible, stretch your arms up and put your legs together and stretch them out.

If you get stuck hanging on the wires, do nothing, but wait for help.

If you land on the ground while the parachute keeps touching the wires, <u>do nothing</u>, but wait for help.

#### **LANDING IN WATER:**

At dropzones close to water you may be required to wear a life vest when jumping.

If you can't avoid landing in water, steer upwind. Before landing, loosen your chest strap. Then land normally, meaning upwind and using the flare. After landing, you inflate the life vest, if you have one, and take off the harness.

#### **LANDING IN TREES:**

If you can't avoid landing in trees, steer upwind. Cross your arms, make a fist with your hands holding the toggles and place them in your armpits while you hold your elbows up in front of your face. Place your legs together and slightly bent. If you get stuck hanging in a tree, <u>do nothing</u>, but wait for help.

#### **THERMALS/TURBULENCE:**

**Thermals** are airstreams that move up and down from the earth. For example, this may be due to the sun heating up an asphalt airstrip so that warm air rises up from it. You can feel the canopy rising and possibly flying unsteadily.

**Turbulence** arises when the wind hits an obstacle, for example a house or some trees. Behind the obstacle, the wind "rolls". It blows in other directions than the one it's coming from, and "air pockets" may arise. You may feel that the parachute is flying steadily but suddenly loses altitude.

If you notice that the parachute is flying unsteadily because of thermals or turbulence, you can stabilize it by pulling the toggles down a little bit to slow down the parachute.

Turbulence can be dangerous. So you should avoid landing *behind* an obstacle such as a forest or a hangar. If the wind is strong, the turbulence may reach far beyond the obstacle.

# **STAGE II**

#### **DUMMY PULL**

When you've made two exits in a stable manner, by holding your body position until the parachute is open, you can start to practice deploying the parachute yourself.

This is done with a *dummy handle* that's just like the real handle and located in the same place.

The parachute will be deployed automatically by the static line attached to the aircraft, but the dummy handle must be pulled as if you were in free fall.

On the first *manual* jump - where you deploy the parachute yourself – you will be in free fall for 5 seconds.

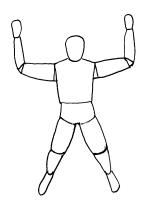
Therefore, you should pull the dummy handle 5 seconds after exiting the plane.

Of course, you must still maintain the fully arched position and make a stable exit.

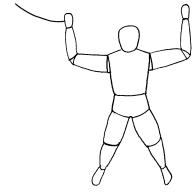
When your right hand reaches for the handle, your body position will become asymmetrical and you risk toppling over.

To counteract this, you simultaneously slide your left hand to a place near the top of your head, where your hand is on one side of your head and your elbow is on the other side.

When you've pulled out the handle, you immediately bring both hands back to the stable free-fall position.







A dummy-pull jump is conducted in this way:

- EXIT
- ARCH-thousand
- 2 thousand
- 3 thousand
- REACH thousand take hold of the handle
- PULL thousand pull the handle

It may be confusing and distracting that the parachute is deployed for several seconds before you have to pull the dummy handle. Therefore, it's important to concentrate on maintaining your position, counting the 5 seconds and then pulling the handle. Only then do you begin to think about the parachute and look up to check it.

After pulling the handle and checking the canopy, you need to stow away the handle. For example, you can put it inside your jumpsuit.

You have to make 3 consecutive jumps where your exit is stable and you pull the dummy handle correctly, before you're allowed to jump without the automatic deployment of the parachute, *go manual* or do a *free fall jump*.

After that, you must make your first manual jump within 24 hours of your last dummy-pull jump.

This means that you have to make an extra dummy-pull jump if you can't make your first manual jump within 24 hours of the third successful dummy-pull jump, for example due to bad weather.

### **FREE FALL**

(manual deployment of parachute)

#### **FIRST FREE FALL:**

Your first free fall lasts 5 seconds and the jump is conducted almost exactly like a static-line jump with a dummy pull.

The difference is that after the 5 seconds have passed and you've pulled the handle, you have to wait for the parachute to inflate. This may take up to 4 seconds, like on a static-line jump.

Therefore, it's important to maintain your stable fully-arched position after you've pulled the parachute. You do this while counting: **arch thousand, 2 thousand, 3 thousand, 4 thousand.** Only then do you relax, look up and check the parachute.

You have to make two stable exits of 5 second's duration. Then your free fall time is increased to 10 seconds. After two stable 10-second jumps, you have to make two jumps of 15 seconds. You count "arch thousand ... 10 thousand/15 thousand" and you also start to keep an eye on your altitude on the altimeter.

Whenever you arch your back well, you will normally always return to your stomach-down position even if you've been unstable or turned over on your back.

If you become unstable or lose your sense of time on a short jump (5- or 10-second jumps), you should arch your back as much as you can and <u>immediately</u> pull the deployment handle.

On a 15-second jump you check your altitude and arch well to return to stable position. If this doesn't help, you pull the parachute right away.

#### **DELTA POSITION:**

If you become unstable or even topple over, you must arch your back well. Normally this will bring you back to your stomach-down position within a few seconds.

If this doesn't help, you can shift to delta position.

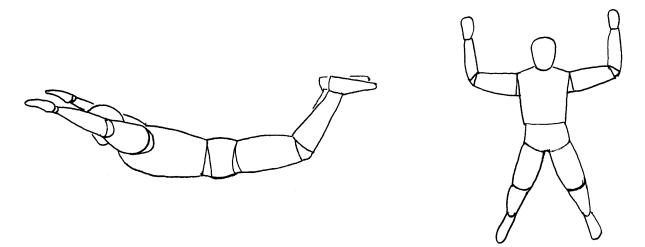
You keep arching your back but stretch your legs out. At the same time, you stretch your arms backward along your body but a little bit out from your body. This will result in a stable dive. Once you're stable, you bring your arms and legs calmly back to box position.

Delta will correct any type of instability whether you're tumbling around or just spinning horizontally.

#### **BOX POSITION:**

In free fall you will accelerate for the first 12 seconds. Then your speed will be stable at around 180-200 km/h.

While your speed is increasing, your arms and legs will be jerked around more. Therefore, you should start to bring your arms and legs closer to your body than in the large X position that you have used up until now. You should approach the ideal free-fall position, *the box position*.



#### **RELATIVE WIND:**

During static-line jumps you will feel as if you're almost standing upright in the air.

When you start free falling, you will find that you're standing for the first few seconds and then start to tip forward until you're lying stomach down.

This is because you fly on the *relative wind* from the aircraft's forward speed for the first few seconds. Once you're free of the aircraft's speed you will start to fall toward the ground and to fall on your own wind.

#### STREAMER TOSS AND SPOTTING

#### **Determining the right exit spot**

Although ram-air parachutes can fly far and fast and be steered precisely, it's important to exit in the right place relative to the landing area.

So you have to be able to find the right exit spot depending on the wind speed and the direction. Then you have to be able to instruct the pilot on how to get to that exit spot.

This is called *spotting*.

#### **SPOTTING:**

You'll need to put your head out the aircraft door to make sure the airplane is flying horizontally.

If the aircraft is climbing, its nose will be facing upward. This might make you think you're farther ahead than you really are. If the aircraft is turning to one side, it may be at an angle, which makes it difficult to assess its position correctly.

#### **INSTRUCTING THE PILOT:**

Before you take off, you have to agree with the pilot on where the exit spot is.

The pilot will make the airplane climb as much as possible in order to get to the altitude that you will be jumping from as quickly as possible.

When the aircraft is approaching that altitude, the pilot will steer it upwind, above the landing area and toward the agreed exit spot. This is called the *jump run*.

During the jump run the pilot will allow for the door to be opened. The door must <u>never</u> be opened before the pilot says so, because he/she has to slow the aircraft down before it's safe to open the door.

When the door is opened, one of the skydivers gives the instructions and does the "spotting".

If the pilot is not flying straight toward the exit spot, the directions are given by waving a thumb-up toward either the left or the right. Normally, one wave indicates a correction of 5–10 degrees.

When an instruction has been given, the aircraft needs time to conduct the turn and return to flying straight ahead, before you assess whether another correction is needed.

If the direction is ok, you signal for straight forward flight with your whole hand.

If it turns out that the airplane has gone too far so you can't exit at the right spot, you must signal for the pilot to turn around and make a new final approach.

#### **STREAMER TOSS:**

As a student you have to pull your parachute so that it's fully inflated at an altitude of 8-900 meters (2600-3000 ft). Experienced skydivers can go lower, but must be under a fully inflated parachute at minimum 600 meters' (2000 ft) altitude.

The wind can have both a different direction and a different force at different altitudes. For example, the wind may have a completely different direction at 3-500 meters' (1000-1600 ft) altitude and be stronger than near the ground. Sometimes you can see this by watching the clouds.

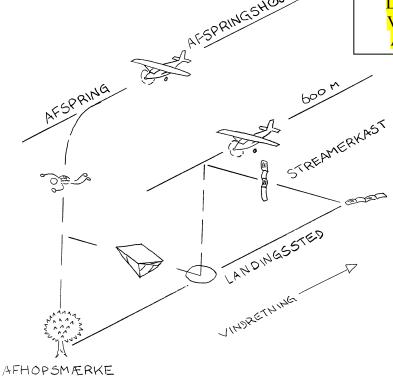
This means that it's not enough to look at the windsock when you determine the exit spot.

To help you judge the wind's direction and force in the relevant airspace as a whole, we use a wind drift indicator, called a *streamer*. (Of course, it's not the same as the malfunction that's called a streamer, too.)

A streamer is a strongly colored piece of paper approx. 6 meters (19 ft) long and 20-30 cm (8-12 inches) wide. It falls at about the same speed as a skydiver in an inflated parachute.

You toss the streamer out of the airplane at the altitude at which you want to be under an inflated parachute. Then you watch how the streamer falls to the ground. When it has reached the ground, you can see how it has drifted on the wind. This helps you calculate where to exit the airplane.

Words for the drawing:
Afspring = Exit
Afspringshøjde = Exit altitude
Streamerkast = Streamer toss
Landingssted = Landing point
Vindretning = Wind direction
Afhopsmærke = Exit marker



If you tossed the streamer over the spot where you planned to exit and the wind carried it past the landing area to land 500 meters (1600 ft) on the other side. Then you know that the exit spot should be 500 meters (1600 ft) farther upwind, away from the landing area.

If the streamer landed somewhere off to the sides of a straight line from the landing area to the place where it was tossed. Then the exit spot must be moved sideways, and the pilot must fly the final approach in a different direction.

If you parallel shift the line between the streamer's "exit spot" and the landing area so that the streamer's landing spot is located at the spot where you want to land. Then the correct exit spot will be at the other end of that line.

When the streamer has landed and you have determined what's the correct exit spot, you inform the pilot. Also inform the pilot if a new direction for the final approach is needed.

When you've made two streamer tosses and are capable of determining the right exit spot by yourself, you'll be approved for jumping without a jumpmaster. From then on, you may jump without an instructor on the airplane.

# **STAGE III**

After you've made two stable 15-second jumps in a row, your free-fall time will be increased to 30 seconds.

#### **DIVE EXIT:**

Until you have completed the 15-second free-fall jumps, you exit the aircraft either by hanging or by sitting in the door facing upwind.

When the free fall is extended you begin to make dive exits.

Sit inside the aircraft facing the rear of the plane. If the aircraft wheel is out you place one leg on the wheel.

Then you dive below the tail of the aircraft with your arms stretched out in front and your legs bent all the way up toward your back. At the same time, you arch your back and bend your head all the way back.

Due to the relative wind that will hit your back, you will get the feeling that you're upside down, and may even be just about to tip over. But just keep arching your back all the way and maintaining your position.

Right when you start to feel that you will tip over, you will be free of the relative wind and start to fall stomach down. When you feel this happening, you straighten your legs and go to box position.

When you have made two stable jumps with 30 seconds' free fall in a row, where you have tried the delta position and made dive exits, you'll be allowed to jump from 4,000 meters' (13,000 ft) altitude. This is the maximum normal altitude for jumps.

#### **TURNING:**

When you're in free fall, air currents come from below and pass around you.

By changing your position, for example turning an arm or a leg, these air currents can be directed and used to push yourself around. You can use it to turn or move forward or backward. You can fly around.

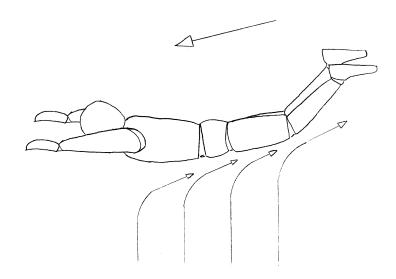
For example, if you want to turn around horizontally to the right, you turn your head, look to the right and lower your right arm a little. At the same time, you tip your left foot slightly toward your right leg.

A left turn is made in the opposite way: Look to the left, lower your left arm a little and tip your right foot toward your left leg.

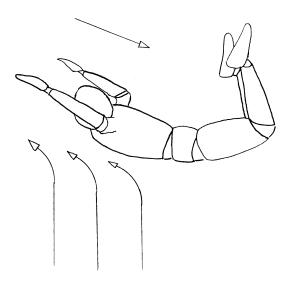
To stop turning, bring your arms and legs back in place. If you're going too fast, make a counter turn.

#### **FLYING FORWARD AND BACKWARD:**

To fly forward you stretch your legs.



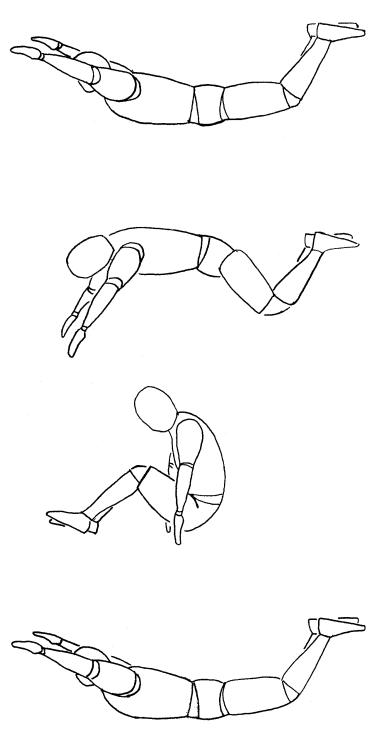
To fly backward, bend your knees.



Again, you can stop the movement by returning to box position.

### **BACK LOOP:**

To make a back loop, a backward somersault, pull your legs up toward your chest, while you stretch your arms forward, down in front and back to the starting position in one swift movement. You will see ground-sky-ground. When you see the earth again, stretch your legs, arch your back and return to box position.



#### **TRACK:**

*Track* is a position used for flying forward very quickly. It's used mostly in connection with *free fall formation skydiving*. In free fall formations the skydivers build different formations in free fall. When it's time to pull the parachute, they must quickly move far away from each other to avoid collisions.

Therefore, being good at *tracking* is important for safety.

To start tracking, stretch your legs out fully. Then slide your arms down along your sides, until they are close to but not up against your body. Place your hands with your palms toward the ground. Instead of arching, you curve your upper body by pushing your shoulders forward while at the same time you sort of "press" your hands down against the wind.

This position is similar to delta. The difference being that in delta you arch your back fully, while in track you make your body "hollow" to create an air bubble that will work with your stretched legs to push you forward.

You can make yourself move forward very fast!	

## **LICENSE:**

#### The requirements for a Skydiving License (called C License in Denmark) are:

At least 40 jumps

Track Test: Two jumps where you track in different directions

Stability Test: One jump where you exit curled up into a ball – "cannonball". You hold the

position for 10 seconds and then straighten up and go into a stable box position. Then you turn 360° twice to one side and at least once to the other

side.

Ability Test: After a stable exit with your head down, you make a 360° turn to one side, a

360 ° turn to the other side and then a back loop.

Theoretic exam on the parachuting rules.

**Packing License** 

**AFF EDUCATION:** 

AFF is an abbreviation of Accelerated Free Fall.

It's an education leading to a Skydiving License where you start to jump free fall already after your first static-line jump. On your first few jumps you will be accompanied by two specially trained instructors, *AFF instructors*. After a certain number of approved jumps, you will be accompanied by only one instructor. After a certain number of additional jumps, you will jump on your own. The education consists of 8 *levels*. The requirements for the license are the same as for the manual education.



# **DANISH PARACHUTE ASSOCIATION**

When you've taken the skydiving course, you're a member of a club under the Danish Parachute Association, DFU. This is the skydivers' organization under the Sports Confederation of Denmark.

The DFU represents skydivers' interests in relation to authorities, manages the training of instructors, organizes competitions such as Danish Championships and much more.

As mentioned previously, you can turn up with your log card at any dropzone under the DFU and jump there.

As a member of the DFU you can always find an overview of all the clubs, their dropzones and other information on the association's homepage <a href="https://www.dfu.dk">www.dfu.dk</a> or from the instructors, of course.

As a skydiver you're subject to the laws governing air traffic, in particular to the instructions from the Transport, Construction and Housing Authority (TCHA) about skydiving in Denmark. It's the rules governing air traffic no. 9-1, called *BL 9-1*. Among other things, these rules are part of the theoretic exam required for getting your Skydiving License.

In addition, the DFU has a set of rules called the Skydiving Rules and Regulations, *the FB* in daily speech, that you're obligated to know and comply with as a DFU member.

## **AFTER LICENSE**

When you've obtained your Skydiving License, you'll have many different, exciting skydiving activities to choose from. Some of them are competitive disciplines with competitions at both national and international level:

Accuracy (also called Precision):

This discipline is about landing as precisely as possible. There are different types of parachutes that are especially suitable for steering and landing precisely. Skilled accuracy skydivers can land within a few centimeters of a marker that's only 3 or 5 cm (1-2 inches) in diameter.

FS:

In Formation Skydiving several skydivers exit at the same time and make a variety of formations in free fall. The most common competitions are for teams of 4 or 8 persons. However, competitions for 16, 20, 40 or as many as 100, do exist. The official world record is with 400 skydivers flying together in a pre-determined formation. FS used to be called RW for **R**elative **W**ork because the skydivers fly relative to each other.

Style:

The Style discipline takes place in free fall and the goal is to complete two rounds, each consisting of one 360° turn to one side, followed by a 360° turn to the other side and a back loop, as fast and as cleanly as possible. This is called a *style series*.

Freestyle:

A Freestyle team consists of two persons. One of them performs acrobatic exercises, similar to ballet, in free fall. The other one follows him/her with a video camera to record the performance. In 2001 Denmark won gold at the World Championship!

CRW:

In Canopy Relative Work, skydivers fly together under open canopies and make different formations.

Freeflying:

This term refers to different ways to move around in free fall that basically only have one thing in common: that you don't fly in the usual, stable stomach-down position. In *Sit Fly* (or *chute assise* in French) the skydiver sits as if on a chair. In *Head Down* the skydiver flies head down, as the name would indicate.

**Skysurfing**: The skydiver stands on a 'surfboard' in the free fall.

For safety reasons, additional training is needed if you want to be in contact with other skydivers during free fall or under open canopy.

Ask the instructors or read more about that in the Skydiving Rules and Regulations (FB).

## **THE HISTORY OF SKYDIVING**

Skydiving is actually not a new sport. The construction and testing of parachutes took place long before airplanes and balloons existed.

The multi-talented artist and inventor, Leonardo da Vinci, built the world's first parachute as early as 1495. The design was never tested, but based on his drawings, the general belief nowadays is that it would have worked.

In 1617 Fausto Veranzio jumped from a tower in Venice with a parachute constructed from wood and canvas.

In 1680 skydiving was one of the jests performed by the court jesters for the King of Siam. They jumped from a tower with canopies similar to umbrellas, tied to a belt around their bodies.

In 1783 the Montgolfier brothers carried out attempts at skydiving, alongside their experiments with hot-air balloons.

The world's first official jump with a parachute was conducted by the Frenchman André Jaques Garnerin on October 22, 1797. He jumped from a hot-air balloon above Paris from an altitude of 600 meters (2000 ft). Garnerin made a number of jumps during the following years. One of them was in 1802 near London, where he jumped from an altitude of 2,400 meters (8000 ft) in a silk canopy of about 23 square feet.

The first person to save his life with a parachute, was a Polish man named Kuparento. He jumped from a balloon on fire over Warsaw in 1808.

All the parachutes used for jumping from balloons were not packed before the jump. They were simply hung above the balloon by a string at the top. Later developments brought along parachutes that could be folded up.

When airplanes arrived, at first the parachutes were attached in a bag on the outside of the plane. The bag was tied to the pilot's safety harness so that the parachute was pulled out of the bag, when the pilot exited the aircraft.

This way of packing was predominant until April 28, 1919 when Leslie Irvin from the USA made the world's first free fall with a manually activated parachute when he jumped over McCook Field, Ohio, from an altitude of about 450 meters (1500 ft).

This was the beginning for the parachutes that have been in use up until the parachutes that we use today.

Long before parachutes were used as safety equipment for saving lives in case of airplane crashes, they were used for sports and as entertainment in market places, at town fairs, etc.

A woman named Georgia "Tiny" Bradwick made more than 1,100 jumps between 1908 and 1922. They were all part of the entertainment at so-called "Barnstorming Shows" in the USA.

In 1922, a manually activated parachute was used for the first time to save a life. Lieutenant Harold Harris from the USA escaped from his plunging aircraft and deployed his parachute by himself.

The very first competition in skydiving took place in Russia in 1930 where skydivers competed to see who could touch a marker when landing.

1933 saw the beginning of the use of parachutes as a "means of transport" for large numbers of soldiers. The first paratroopers came from Russia.

Our modern form of skydiving, with free fall and accurate landings, was developed in France during the years 1948-1952. At first, by Leo Valentin and later by 10 state-run skydiving centers for civilians, that were established in 1949.

The French greatly advanced both free fall and canopy piloting.

In 1951 the first official World Championship of accuracy skydiving was held in Yugoslavia.

During the next World Championship in 1954 the sport was accepted into the Fédération Aéronautique Internationale (FAI), the world organization for all types of air sports.

In 1955 the sport turned up in the USA in its by then advanced form. Since then Americans have been leading the rapid progression of the sport.

In Denmark, one of the pioneers was Emilie Sannom, pilot, actress and daredevil who made a living performing air acrobatics and skydiving. She died on August 31, 1931 during a show in the Djursland region. One of the organizers had accidentally deployed "Mille's" own equipment before the show, so she had to use someone else's equipment, which then failed. Emilie Sannom plunged to the ground and died. She was the first skydiver in Denmark to die.

John Tranum had learned to skydive in the USA. In 1935 he wanted to set a world record in jumping from a high altitude. Tranum was quite the daredevil and was making a living from aerobatics, motorcycles, cars and skydiving. Now he wanted to jump from an altitude of 10 km above a field near Ringsted. Unfortunately, Tranum died during the attempt, although not during the jump itself. He died from a lack of oxygen on the way up in the airplane, because of a defective oxygen tank.

The Dane Kurt Holt first experienced the sport in Sweden in the early 1960's. Holt learned skydiving there and then brought it back to Denmark, where he founded the Danish Parachute Club (DFK) on February 12, 1963, together with other interested Danes.

Back then, DFK had a weekly training day at the Gymnastics School of the Danish Defence where the members were trained by Danes who had served as paratroopers in the French Foreign Legion. In order to actually jump, they had to go to Sweden, because there were no civilian dropzones in Denmark yet.

The first skydiving competition in Denmark took place in June 1965. It was the "Vandel Stævne" on the Randbøl Heath in Jutland. The sport was still so new here that they had to 'import' the Swede, Stig Einerth, who acted as both pilot, packer and instructor. Because there were still no Danish skydiving pilots, packers nor instructors.

The equipment used for jumps was on loan from the Jaeger Corps, at Aalborg Airbase. On February 14, 1966, DFK was renamed the Danish Parachute Association (DFU). In October 1970, the DFU was accepted into the Sports Confederation of Denmark and has been a recognized sports organization since then. Among other things the DFU is associated with Team Denmark.

## **GLOSSARY**

**Accuracy**: Also called Precision. A discipline in skydiving where the goal is to make a

precise landing with an open canopy.

**Bag:** The bag that the *canopy* is packed inside.

**BBF**: **B**asic **B**ody **F**light. A *free fall formation* education.

**BOC**: Bottom Of Container. See *hand deploy*.

**Bridle**: A strong strip of tape that connects the *pilot chute* with the main *canopy* or (in

the case of the reserve canopy) the bag.

**Canopy**: The term is sometimes used about only the part of the parachute that is made of

fabric.

**Cell**: One of the chambers that make up the *canopy*.

**Closing loop:** A string with an eyelet on one end. Used during the packing of a parachute to

close the *container* by pulling the closing loop through holes in the closing flaps and then finally locking it by pushing the *closing pin* through the loop.

**Closing pin:** A pin that closes the *container* by being pushed through the hole in the *closing* 

loop.

**Connector links**: Couplings between lines and *risers*.

**Container:** Main container/reserve container are the terms used to describe the two rooms

that the harness contains. The reserve *canopy* is packed into the top one and the

main *canopy* is in the bottom one.

CRW: Canopy Relative Work (used to be called Canopy Formation). Jumps where

formations are made under open canopies.

**Cut away:** Release of the main *canopy* from the *harness* in connection with the

Emergency Procedure.

**Cut-away pud:** The handle that you pull in order to release the main parachute. It's usually

fabric-covered.

**Cypress**: An electronic safety-activation device that automatically deploys the reserve

parachute at a specific altitude, if the skydiver's fall hasn't slowed down

sufficiently, indicating that the main parachute is not fully inflated.

**DFU**: Dansk Faldskærms Union, the Danish Parachute Association.

**Dummy handle:** A practice handle for rehearing the deployment of the main parachute.

**FB**: DFU's rules, the Skydiving Rules and Regulations (Faldskærmsbestemmelser in

Danish).

**Flare**: Braking the parachute during landing.

**Free bag:** The bag that the reserve *canopy* is packed into. It's called free because it falls

away when the reserve parachute is deployed. This is contrary to the bag for the

main canopy which remains attached.

**Freeflying**: Free falling, alone or with others, while going head down, sitting in the air or

doing basically anything except lying in a stable stomach-down position.

**Freestyle**: Free fall where the skydivers perform different acrobatic maneuvers. It's like "air

ballet".

**FS/RW**: Formation Skydive, used to be called **R**elative Work. Jumps where you make

formations during free fall.

**FXC**: A mechanical safety-activation device that automatically deploys the reserve

parachute at a specific altitude, if the skydiver's fall has not slowed down

sufficiently, indicating that the main parachute is not fully inflated.

**Grommets**: Metal reinforcement rings that are found, for example, on the *bag* and the *slider*.

**Hand deploy**: A system for deploying the main parachute where the *pilot chute* is located in a

pocket on the leg strap of the *harness* or below the *main container*. The latter is most common today. It's also called *BOC*, **B**ottom **Of Container**. You deploy the *canopy* by pulling the *pilot chute* out of the pocket and letting it catch air. That pulls out the *closing pin*, opens the main *container* and releases the *canopy*.

**Harness**: The "backpack" that contains the parachutes. This is how the parachutes are

fastened on the skydiver's body.

**Jumpmaster**: An instructor who joins the student on the airplane and makes sure the student

exits at the right spot.

**Lanyard:** Safety system consisting of a line that connects the main canopy with the *pin* of

the reserve canopy. It automatically deploys the reserve *canopy* when the main

canopy is released by a cut away.

**Nose**: The front edge of the parachute/*canopy*.

**Pilot chute**: A small canopy that deploys the main parachute when it's thrown - or pulled by a

spring - away from the skydiver. It catches air and pulls out the main canopy so

that it, in turn, catches air and inflates.

**Pull out**: A system for deploying the main parachute, where the *pilot chute* is inside the

container under the closing flaps. With a handle that's a fabric cushion, you pull

the *closing pin* directly out of the *closing loop* to open the *container*. The pilot

chute is then pulled into the wind, catches air and pulls out the canopy.

**Rig**: Another word for *harness*. It's also used about the entire parachute, including the

harness with the canopies inside, ready for jumping.

**Risers**: Straps that connect the *harness* with the lines.

**RW**: See FS/RW.

**Slider**: A piece of parachute fabric or tape that connects the *canopy*'s four sets of lines. It

controls and slows the opening sequence.

**Stabilizers**: The side panels of the canopy.

**Static line**: A cord that automatically deploys the main parachute. On one end, the cord is

attached to the *closing pin* of the main *container*. On the other end, it's fastened inside the aircraft. When the skydiver exits the plane, this cord automatically pulls

out the closing pin.

**Style**: A skydiving discipline where skydivers perform a fixed series of movements as

quickly and as cleanly as possible.

**Tail**: The rear edge of the parachute/*canopy*.

**TCHA** The Transport, Construction and Housing Authority

**Track**: A freefall position in which you move forward horizontally very quickly.

**3-ring system**: A system of 3 metal rings that connect the main canopy's *risers* with the *harness*.

It's this system that releases the main *canopy* from the *harness* when the *cut-away* 

pud is pulled.

# Dansk Faldskærms Union

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