A “How to” Guide to the Adrenaline Pumping Sport of Skydiving

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Introduction

Originally, parachuting was developed as an emergency procedure for troubled aircraft. The military since has developed many tactical uses for skydiving. The military has also grown a tradition for skydiving demonstrations around the world. This is evident in the many skydiving teams that are sponsored by Military agencies around the world. The US Army Golden Knights, the US Navy Leapfrogs, the Canadian Forces Parachute Team, the British Army Red Devils, the Royal Air Force Falcons, The Indian Air Force Parachute Team and the Indian Air Force all female team. The list goes on and on. Skydiving has become a regularly scheduled event at Airshows and major events around the world. The popularity grows every year.

Skydiving is and exhilarating sport. Often when you ask a person who has made a skydiving jump you will get one of two possible answers. They will either respond by saying they hated it and were terrified or they loved it and it was the most amazing experience of their life. I have personally logged 1128 jumps and have achieved 2 records and countless awards. I have been on three world record attempts although none were successful. I have had a notable skydiving career. This manual is meant to show persons interested in skydiving how to get started, the licensing process and the different disciplines they can pursue.

Top left to right: Indian Air Force all female team, British Army Red Devils, Canadian Forces Parachute Team

Chapter One
Learning to Skydive
Skydiving Certification

Skydiving is a sport that can be intimidating to begin participating in. This section of this manual describes the beginning of a student’s certification into skydiving. We will talk in depth about the certification process and examine the three methods for certification. The three methods are Accelerated Free Fall (AFF), Instructor Assisted Deployment (IAD) and static line, and Tandem Free Fall. IAD and static line has four jumps where the parachute is deployed by the instructor or deployed by a tether to the plane. The Student flies the parachute to the ground solo. Upon completion of these four jumps the student continues his or her training by meeting up with the AFF course level four. Tandem Free Fall has a series of three jumps that the student takes with an instructor. The student is tethered to the instructor and shares the same parachute. Upon completion of these three jumps then the student continues training by meeting up with the AFF course level two. AFF is the most commonly used method for obtaining your initial skydiving certification.

Accelerated Free Fall

This training discipline is where certified instructors accompany the student in freefall holding onto the student’s harness at first while the student demonstrates certain skills. It can be compared to learning to ride a bike with training wheels. Since the student is wearing his own parachute, he must be trained to handle emergency procedures as well as landing procedures. AFF training usually consists of a several hour ground course, and the first jump can often be accomplished the same day. The student then jumps an additional six times, completing a set of tasks every jump. Upon successful completion of the first seven jumps with satisfactory instructors a student may begin solo jumps without an instructor. The student is limited to skydiving alone until he or she has reached the first license level (A license).
**AFF Dive Flow**

As stated before each level has a certain set of skills that needs to be mastered before moving on to the next level. The skills and order in which these skills are to be performed is known as the “dive flow”. This section will address the dive flow during the seven levels of AFF training. Refer to the end of this section to see the “skydiver’s lingo” definitions.

**Level 1 Dive Flow**

Exit Count  
Circle of Awareness (CoA)  
Practice Touches x 3  
Short CoA every 3-5 seconds  
6,000’ Pull Sequence  
Canopy Control  
Landing Approach

**Level 2 Dive Flow**

Exit Count  
Circle of Awareness (CoA)  
Practice Touches x 2  
Short CoA every 3-5 seconds  
90 degree Team Turns  
Forward Movement/Leg Awareness  
Stop all maneuvers by 6,500 – 7,000 feet  
6,000’ Pull Sequence

**Level 3 Dive Flow**

Exit Count  
Circle of Awareness (CoA)  
Practice Touch x 1  
Short CoA every 3-5 seconds – un-linked freefall with heading maintenance and hover control  
5,500’ Pull Sequence
**Level 4 Dive Flow**
Exit Count  
Circle of Awareness (CoA)  
90 degree Turns  
Forward Movement/Leg Awareness  
Short CoA after each Maneuver  
5,500’ Pull Sequence

**Level 5 Dive Flow**
Exit Count  
Circle of Awareness  
360 degree Turns  
Forward Movement/Intro to Tracking  
5,000’ Pull Sequence

**Level 6 Dive Flow**
Exit Count  
Circle of Awareness  
Back Flips x 2 – or Other Unstable Maneuvers  
Tracking  
4,500’ Pull Sequence

**Level 7 Dive Flow**
Exit Count – Solo Exit  
Short Circle of Awareness  
Front Flip – or Other Unstable Maneuvers  
360 degree Turns  
Tracking  
4,500’ Pull Sequence
Skydiver’s Lingo

**Circle of Awareness (COA)** - As soon as you exit the plane and every once in a while you are jumping. The student looks at the horizon, then the altimeter, then left, and the right.

**Exit count** - move up and stand in the opened airplane door. Look forward and acknowledge the prop by yelling “Prop”. Lean outward yelling “Out” then lean inward yelling “In” then jump outward from the plane while arching into the wind.

**Practice touch** - the motion of reaching to deploy the pilot chute.

**Pull sequence** - COA, then wave off, then throw the pilot chute to deploy the main canopy

**Short Circle of Awareness** – only check the horizon and then the altimeter

**Tracking** - a position used for fast movement away from other skydivers. This is used to “track” away from another skydiver to ensure a safe distance for opening the parachute.

**Un-linked freefall** - the instructors will let go of the student and let them fall maintaining stability and heading.

**Unstable Maneuvers** – Any movement that makes the skydiver lose control momentarily. This is used to show the instructor that the student is capable of regaining control in case of an emergency.

**Wave Off** - a large motion with the arms to signify that you will be opening your parachute soon. This motion looks like your arms are performing a jumping lack.
Chapter 2

Skydive licensing
Skydive licensing

Skydiving Licenses

Licensing in the skydiving world tells a drop zone jump master what a skydiver is capable and qualified to do. Most recreational skydives can be done with low level licensing but if a skydiver wants to advance he or she will have to pursue higher ratings. This chapter will examine the licenses and how to achieve them. The licensing system is progressive meaning that each license must be obtained and applied to the next license.

A License

First a student must be familiar with the A License proficiency standards. Every license will build off of these standards. These skills are listed here.

Aircraft and spotting

1. Demonstrate understanding of seat belt use and applicable FARs.
2. Identify local runway headings, lengths, and aircraft approach and departure patterns.
3. Using an “aviation winds aloft forecast”, select the correct exit and opening point.
4. Recite cloud clearance and visibility requirements for above and below 10,000 feet MSL.
5. Receive a briefing on weight and balance, the effect of a jumper on aircraft control surfaces when outside an aircraft, spotting, and radio and onboard communication procedures.
6. In routine jump conditions, plan with a jump pilot and spot the aircraft without assistance.

Emergency review

1. In a training harness, recognize and take appropriate action for all parachute malfunctions (two review sessions following the first-jump course).
2. Review power line avoidance and landings.
3. Review tree avoidance and landings.
4. Review building avoidance and landings.
5. Review water avoidance and landings.
6. Review aircraft emergency procedures.

Exit and free fall skills

1. Demonstrate freefall control on all axes, with a backloop, front loop, and barrel roll.
2. Dive a minimum of 100 feet after another jumper and dock safely without assistance from the other jumper (two times).
3. Plan and independently execute a break-off from a group skydive with a minimum 100 feet of horizontal separation from another jumper or group. Separation must be gained independently in a straight track within ten degrees of a radial heading from the center of the formation.
4. Locate and open clear of other jumpers and wave off to signal deployment.
5. Jump and deploy while stable within five seconds after exit from 3,500 feet AGL.
Canopy skills
1. Plan and fly a landing approach pattern that promotes smooth traffic flow and avoids obstacles.
2. Demonstrate a stand-up landing.
3. Perform a braked approach and landing.
4. Land within 20 meters of a preselected target on at least five jumps.
5. Perform rear-riser turns (brakes set and released).
6. Above 2,500 feet, perform a maximum-performance 90-degree toggle turn, followed immediately by a turn of at least 180 degrees in the opposite direction (two times).
7. Above 1,000 feet, perform front riser dives and turns (may be waived if insufficient strength).
8. Accurately predict the presence and effects of turbulence in the landing area.

Equipment knowledge
1. Demonstrate knowledge, inspection, donning, use, and owner maintenance of all equipment to be used on the jump.
2. Calculate the wing loading of both main and reserve canopies and compare the sizes against the manufacturer’s published recommendations.
3. Demonstrate the understanding, use, and disconnection of a reserve static line.
4. Demonstrate the understanding and use of an automatic activation device.
5. Pack a main parachute without assistance.
6. Check equipment for another skydiver.
7. Perform manufacturer-recommended owner service on a canopy release system.
8. Change or adjust a main closing loop.
9. Show knowledge of FAA rules on parachute packing intervals and required personnel.

Now that there is an understanding of the A License proficiency card the qualifications of the A license are as follows:

Persons holding a USPA A license may jump without supervision, pack their own main parachute, engage in basic group jumps, perform water jumps, and must have:

a. completed 25 jumps
b. completed all requirements listed on the USPA A License Proficiency Card
c. completed five group freefall skydives involving at least two participants
d. received the signature and official stamp on the USPA A License Proficiency Card or USPA A License Progression Card (ISP)
B License
Persons holding a USPA B license are able to exercise all privileges of an A-license holder, perform night jumps, with 100 jumps are eligible for the USPA Coach Rating, and must have-

a. obtained a USPA A license
b. completed 50 jumps including:
   (1) accumulated at least 30 minutes of controlled freefall time
   (2) landed within ten meters of target center on ten jumps
c. aerial performance requirements, either:
   (1) demonstrated the ability to perform individual maneuvers (left 360, right 360, backloop, left 360, right 360, backloop) in freefall in 18 seconds or less
   (2) or successful completion of the planned formation(s) on ten group freefall jumps
d. documentation of live water landing training with full equipment in accordance with the procedures in the Skydiver’s Information Manual
e. passed a written exam conducted by a current USPA I, I/E, S&TA, or USPA Board member.

C License
Persons holding a USPA C license are able to exercise all privileges of a B-license holder, are eligible for the USPA Instructor rating (except USPA Tandem Instructor), participate in certain demonstration jumps, may ride as passenger on USPA Tandem Instructor training and rating renewal jumps, and must have--

a. met all current requirements for or hold a USPA B license
b. completed 200 jumps, including accumulating at least 60 minutes of controlled freefall time
c. landed within two meters of target center on 25 jumps
d. aerial performance requirements, either:
   (1) during freefall, perform in sequence within 18 seconds-a backloop, front loop, left 360-degree turn, right 360-degree turn, right barrel roll and left barrel roll
   (2) completed at least two points on an 8-way or larger random skydive
e. passed a written exam conducted by a current USPA I/E, S&TA, or USPA Board member.
D License
Persons holding a USPA D license are able to exercise all privileges of a C-license holder, are eligible for all USPA ratings, and must have-

a. met all current requirements for or hold a USPA C license
b. completed 500 jumps including accumulating at least three hours of controlled freefall time
c. made two night jumps (recommended that the first one be a solo and one in a group) with a freefall of at least 20 seconds
   (1) with verification of prior night-jump training from a USPA Instructor holding a USPA D license
   (2) with the advice of an S&TA, in accordance with USPA BSRs
d. Passed the written USPA D license exam conducted by a current USPA I/E, S&TA, or USPA Board member.
Chapter 3

Skydive Style

Felix Baumgartner world record altitude jump from 128,100 feet surpassing the sound barrier at 833.9 miles per hour
Skydiving Disciplines

There are several skydiving methods used in today’s military. On the title page to this chapter you will see the world record jump by Felix Baumgartner. This type of jump is known as a “HALO” jump.” High Altitude Low Opening.” This method is very dangerous and is only used in military operations. There are several ways to skydive known as disciplines in recreational skydiving. This chapter will discuss the different disciplines in recreational skydiving. The skydiving community has continued to develop over the years. The older disciplines are affectionately known as “Old School” and inversely we will classify the newer disciplines as “New School”.

Old School Disciplines

Canopy Formation

In canopy formation, sometimes called "canopy relative work," jumpers open their parachutes immediately after exiting the airplane. They then fly their parachutes together and build formations by holding onto each other’s canopies. Canopy Relative Work aka. CReW is a longstanding discipline in skydiving. This is widely considered as one of the most dangerous disciplines in skydiving. The risk to becoming entangled with another skydiver is high and very difficult to rectify. This is also widely known as one of the most beautiful to watch. This discipline is also very spectator friendly as the formations are easy to see from the ground.

Freefall Style & Accuracy Landing

Often referred to as "the classics," style and accuracy are skydiving's oldest disciplines. In style, an individual jumper performs a pre-determined series of loops and spins in freefall as quickly as possible. For accuracy, a jumper under his parachute tries to land on a quarter-sized dot on a landing tuffet.
Formation Skydiving

Sometimes referred to as "belly-flying" or "relative work," formation skydiving involves jumpers falling in a belly-to-earth orientation and building formations by holding onto each other’s arms or legs. Formation skydives can range from 2-ways to groups in the hundreds. Formation skydiving is practiced in groups of 4, 8 or 16 participants who perform specific figures and are usually video-recorded by another skydiver. The current world record is a 400-way formation set in Thailand in 2006. Formation skydiving is a sport with specific rules – each figure the participants perform is worth certain amount of points and these points are used to calculate the ranking in the competition. Formation skydiving is considered the most popular parachuting discipline.
New School Disciplines

Skysurfing
In skysurfing, a jumper attaches a board, similar to a snowboard or wakeboard but made specifically for skydiving, to his feet and performs aerial acrobatics in freefall, including flips and spins. While skysurfing is visually appealing and has been included in events like ESPN’s X Games, few jumpers still pursue this challenging discipline. It is very difficult to maintain control in flight and the timing for releasing the board before landing is difficult and dangerous to master so many skydivers do not even try.

Freestyle
Freestyle skydiving combines the dynamics of gymnastics with the elegance of dance in an aerial performance starting 13,000 feet above the ground. The freestylist executes precise acrobatic maneuvers, including loops and twists, poses and spins, while falling at speeds up to 150 mph! A freestyle skydiving team consists of the freestylist and a camera flyer who wears a video camera mounted on his/her helmet. The camera flyer maneuvers in close coordination with the freestylist during the freefall from 13,000 feet down to 3,000 feet to capture the 45-second routine on video and provide a means to display it to the audiences on the ground.
Freeflying
Jumprers fly in all orientations—most commonly upright or upside-down—and can fly over, under and around each other. Vertical formation skydiving is a branch of freeflying that involves jumpers building a series of formations in a mix of upright and head-down orientations. Another common form is “sit-flying” where the jumper remains in and flies around in a sitting position. Free flying can be practiced alone or in groups. This is a relatively new discipline which is getting fairly popular within the last 10 years.

Canopy Piloting
In canopy piloting, often called "swooping," skydivers fly high-performance canopies that can generate high vertical and horizontal speeds. By performing speed-inducing maneuvers, these very experienced skydivers can glide inches above the ground for hundreds of yards at speeds approaching 75 mph. This is an extreme version of skydiving that has caused many injuries and deaths. This is considered to be the second most deadly form of skydiving next to BASE jumping.

BASE Jumping
BASE is an acronym for Buildings, Antennas, Spans (bridges), and Earth (cliffs). This is the most deadly form of skydiving but is beloved by avid BASE jumpers. This form of skydiving is also illegal in many countries. This is the ultimate thrill seeker’s sport but is not recommended under any circumstance.
Wingsuit Flying
Wingsuit flying is one of skydiving’s newest disciplines. A wingsuit is a specialized jumpsuit that uses fabric to create arm and leg wings on the jumper. The wings allow the jumper to cover large horizontal distances across the sky while maintaining a very slow descent rate. Most drop zones will require a D license before allowing a jumper to wingsuit fly. This is not a particularly dangerous discipline but does require a very high level of skill.

Atmonauti
Atmonauti is a human flight technique, body free, invented by Marco Tiezzi in 1998. Developed and perfected with the help of Gigliola Borgnis, it was presented for the first time in 2000 at the World Freestyle Competitions. The technique consists of flying diagonal with a determinate relation between angle and trajectory speed of the body, to obtain an air stream that permits lift and a precise control of flight.

Each skydiving discipline has its own community. Each discipline has its own risks. Skydiving is an inherently dangerous sport but if you follow all of the safety procedures and commit yourself to perfecting your craft it can be the most rewarding hobby on or above the earth. I was once asked “Why do you jump from a perfectly good aircraft?” My response is simple “Because I can.” The next question is always “What do you get out of it?” My most common response is “If I have to explain it to you, you won’t get it.” Skydivers are a tight community and we all understand each other. Hopefully, this manual points you in the direction to come and join us.
Bibliography

Text information provided by websites listed here. All information was accessed between November 28, 2012 and December 2, 2012.

http://safeskydiving.com/the-variety-of-skydiving-disciplines-you-can-enjoy/
http://www.skydiveburnaby.com/experienced-skydiver/disciplines.html#8
http://www.skydivespacecenter.com/coaching.html
http://www.basejumper.com/
http://www.winddance.com/Freestyle/Frame_Freestyle.html

All pictures found at websites listed below. All pictures accessed between November 28, 2012 and December 2, 2012.

http://www.skypedubai.ae/
http://limwallaceskydiving.com
http://article.wn.com/view/2012/08/31/Aff_2012_Lineup_So_Far_Superheroes_Flight_and_a_Disaster/
http://www.yumping.co.uk/skydiving/skydive-st-andrews--e16037
http://www.flickr.com/photos/kasparssprogis/4643534361/
http://www.air-supply.co.uk/index.php?page=learntoskydive
http://skydivesandiego.com/tandem-skydive/
http://www.redsevenexperiences.co.uk/search.php?CategoryID=4
http://vn.com/Accelerated_Freefall_Level_7#/videos
http://www.dropzone.com/photos/Freeflying/ATMONAUTI_ATP_AIRSHOW_119035.html
http://blueksiesmag.com/tag/wisconsin/
http://www.skydivelangar.co.uk/default.aspx?id=26c5c12c-7878-4330-a61b-fd98110b6f5e
http://www.skydiveworld.com/english/swooping.htm
http://www.selini.co.uk/speedkix/
http://iloveskydiving.org/view/photos/skydiving-photos/swooping-over-glass-at-skydive-elsinore/
http://www.vigil.aero/skydiving-style
http://armygk.armylive.dodlive.mil/category/competition-team/style-accuracy/
http://www.ereleases.com/pr/author/united-states-parachute-association
http://indiatoday.intoday.in/story/first-all-women-sky-diving-team-to-debut-on-iaf-day/1/153992.html
http://jerryjumps.com/uspa.html
http://flickriver.com/photos/collingwoodbarry/7490455302/
http://tuscaloosaregionalairshow.com/golden-knights.html
http://www.raf.mod.uk/falcons/gallery/galleryraffalconparachutedisplayteam.cfm?viewmedia
http://www.guardian.co.uk/media/2012/oct/15/felix-baumgartner-skydive-youtube
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