



Category E Training Aid

All training to be conducted by instructors of the:



Learning How to Spot, One Jump at a Time

Before earning a USPA A-License, you are expected to learn to spot in routine conditions. "Spotting" simply means choosing the opening point and guiding the pilot to the correct position over the ground for exit. You can calculate the spot from a winds-aloft report. FAA Flight Service provides these reports, which you can get from the pilot. Start Skydiving posts these reports outside of manifest daily.

When you are in the door before exit, spotting starts with determining exactly what is straight down and how the plane is moving across the ground. A good spotter's training never ends.

Here are some tips for beginners:

1. **Be familiar with the DZ and surrounding area**, including the correct exit and opening points for the day's conditions. The USPA Instructor will simply tell you at first and then show you how to figure it for yourself later.
2. **Look out of the aircraft**, obviously done best with the door open and your head all the way outside. Small aircraft give you more opportunities to practice spotting. In larger aircraft, your instructor will arrange some door time. First, just get comfortable looking out. Put your head all the way out into the wind stream.
3. **Identify the DZ**, the climb-out point, and the exit point from the open door of the aircraft. Point them out to your instructor or coach.
4. **Look straight down**, using horizon reference points. Avoid using the aircraft as a reference. On jump run, the plane is often climbing, banking, skidding, or crabbing.
5. **Determine the track of the aircraft**. Once you can identify two points straight below the plane on jump run, you know the actual path of the aircraft across the ground. If you see that it will take you too far to the left or right, suggest a correction to the one supervising your jump, who will relay your corrections to the pilot.
6. **Allow enough time (distance)** for your climb-out and setup to separate you from other jumpers. Learn when to climb-out.

Soon, you will give directions to the pilot under supervision. After a while, the USPA Instructor or Coach will not interfere unless your spotting appears unsafe.

Your spotting training will require several jumps, and the staff will log your progress. Spot as often as you can during your training as a student so you will feel confident later when you are on your own.



Category E

Two Jumps with One USPA AFF Instructor and One Self-Supervised Jump

This is the last category that distinguishes between students of different disciplines. Once you have demonstrated the ability to regain stability and control within five seconds after initiating a disorienting maneuver, a USPA AFF Instructor may clear you to jump without instructor supervision in freefall. At that point, any USPA Instructor may perform gripped exits with you, as well.

From Category E on, a USPA Instructor makes sure you are properly trained and supervised on each jump. In Category E, you practice unpoised (door) exits and aerobatics to increase your confidence, awareness, and control in freefall. By now, you should be jumping from the highest altitude available at your drop-zone. Under canopy, you will practice for softer landings by looking for the "sweet spot" in the flare stroke that provides the best lift for that canopy. The goal is to flare your canopy to fly as flat as possible until you begin to touch down. The USPA Instructor will also remind you of your responsibility (and every jumper's responsibility) to observe and avoid other canopies.

By the end of Category D, you should have been able to land within 165 feet of the target with minimal assistance. In Category E, you should be able to do it on your own. Part of the emergency procedure review includes a detailed discussion on preventing premature openings in freefall and more detailed procedures for two open canopies. A rigger or USPA Instructor will introduce you to the open parachute system to identify its key components, along with the FAA's rules for packing parachutes. Supervised packing begins in Category F.

You will discuss weight, balance, airspeed, jump run procedures, and aircraft emergency procedures, usually with a jump pilot. A jump pilot or USPA Instructor also shows you how to read a winds-aloft report. From that information, you will learn to calculate the best opening point over the ground. In Categories E through H, you are expected to select and prepare your equipment for jumping (with the supervising USPA Instructor's advice), including obtaining all recommended pre-jump equipment checks. You are also learning to spot, where to sit in the aircraft, and to allow enough distance between the jumpers exiting before you. You should know the surface winds and plan the appropriate landing pattern.

In order to be cleared to student self-supervision by a USPA Instructor, you must have obtained the following skills and knowledge:

1. Demonstrated the ability to regain stability and control in freefall within five seconds after initiating a disorienting maneuver.
2. Demonstrated sufficient canopy control skills to land safely in all expected conditions.
3. Demonstrated the knowledge needed to select and inspect gear before use.
4. Shown knowledge of spotting needed to make reasonable judgment about suggested exit points.
5. Shown knowledge of both normal and emergency aircraft procedures for all aircraft types in common use for skydiving.

Learning and Performance Objectives

- Unpoised (door) exit
- Recovering stability and awareness
- Freefall aerobatics
- Canopy stalls
- The canopy's "sweet spot"
- Two canopies deployed (review)
- High-wind landings
- Reserve static line
- Open parachute orientation
- Parachute packing and supervision
- Wind limits for students
- Aircraft briefing
- Aircraft emergency procedures
- Selecting the opening point



Rules and Recommendations

Review and discuss the USPA BSR 2-1.G on wind restrictions for students:

1. **Students are limited to 14 mph (ten mph for round reserves).**
2. **A USPA Safety and Training Advisor may file a waiver for students to jump in higher winds.**
3. There are no wind limitations for licensed skydivers. Licensed jumpers must exercise judgment.

Note: Start Skydiving is waived to 16 MPH for ram-air canopies.

Read BSR 2-1.G and FAR 91.211.a.3 regarding oxygen requirements for jumps:

No person may operate a civil aircraft of U.S. registry at cabin pressure altitudes above:

1. 12,500 feet (MSL) up to and including 14,000 feet (MSL) unless the pilots and required minimum flight crew are provided with and use supplemental oxygen for that part of the flight at those altitudes that is of more than 30 minutes duration;
2. 14,000 feet (MSL) unless the pilots and required minimum flight crew are provided with and use supplemental oxygen during the entire flight time at those altitudes; and
3. **15,000 feet (MSL) unless the operator provides each occupant of the aircraft with supplemental oxygen.**

Review and discuss (preferably with an FAA rigger) the rules for the periodic inspection and repacking of the main and reserve parachute system published by the FAA in FAR Part 105.43.a and .b:

No person may conduct a parachute operation using a single-harness, dual-parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a single-harness, dual-parachute system, unless that system has at least one main parachute, one approved reserve parachute, and one approved single person harness and container that are packed as follows:

1. **The main parachute must have been packed within 180 days before the date of its use by a certificated parachute rigger, a non-certificated person under the direct supervision of a certificated parachute rigger, or the person making the next jump with that parachute.**
2. **The reserve parachute must have been packed by a certificated parachute rigger:**
 - a. **Within 180 days before the date of its use, if its canopy, shroud, and harness are composed exclusively of nylon, rayon, or similar synthetic fiber or material that is substantially resistant to damage from mold, mildew, and other fungi, and other rotting agents propagated in a moist environment or**
 - b. **Within 60 days before the date of its use, if it is composed of any amount of silk, pongee, or other natural fiber, or material not specified above.**
3. If installed, the automatic activation device must be maintained in accordance with manufacturer instructions for that automatic activation device.



Open Parachute Orientation

Attend the Category E Open Parachute Orientation (below) to prepare for packing lessons.

A rigger or USPA Instructor will introduce you to the parachute system when it is unpacked.

You will learn the common points of parachute wear and maintenance requirements during Category G.

Assembly and maintenance of the three-ring release is covered in Category H.

1. Packing is a function of identifying and organizing the parachute.
2. Identify:
 - a. Pilot-chute, bridle, and collapsing system
 - b. Deployment bag or other device
 - c. Pilot-chute attachment
 - d. Top skin and discuss the different characteristics of F-111 (0-3 cfm) and zero-P fabric.
 - e. Packing tabs
 - f. Bottom skin
 - g. Leading edge (nose)
 - h. Trailing edge (tail)
 - i. Center of tail (warning label or tab)
 - j. Stabilizers
 - k. Manufacturer's label (to identify end-cell)
 - l. Slider stops
 - m. Loaded and unloaded ribs
 - n. Cross-ports
 - o. A, B, C, D, and brake lines
 - p. Line cascades, including brake lines
 - q. Slider and slider grommets
 - r. Connector links and link protectors
 - s. Risers and brake system



Equipment

1. Typical characteristics of elliptical canopies, compared to rectangular canopies of the same size and material:
 - a. Flatter glide for same airspeed
 - b. Faster turns
 - c. Greater loss of altitude in a turn
 - d. May continue to dive after stopping control input following a turn
 - e. Slower, less predictable opening (some models)
 - f. Shorter toggle stroke for flare (some models)
 - g. Quicker, more abrupt stall (some models)
2. The stall speed of any wing increases with higher wing loading:
 - a. More suspended weight
 - b. Sudden maneuvers, such as flaring hard after a dive
3. Read and discuss USPA recommendations on the use and limitations of the reserve static line, or RSL:
 - a. A reserve static line attaches to a main canopy riser to extract the reserve ripcord pin immediately and automatically after separation of the main risers from the harness.
 - b. An RSL is recommended for all experienced jumpers.
 - (1) The RSL backs up the jumper by extracting the reserve ripcord pin after a cutaway.
 - (2) The RSL:
 - (a) must be routed and attached correctly to function
 - (b) when misrouted, can complicate or prevent a cutaway
 - (3) RSLs can complicate certain emergency procedures:
 - (a) cutaway following a dual deployment
 - (b) cutting away from an entanglement after a collision
 - (c) unstable cutaway, although statistics show that chances are better from an unstable reserve deployment than delaying after a cutaway
 - (d) unstable cutaway with a helmet camera or other protruding device
 - (e) cutaway with a surfboard (although an RSL may have prevented two fatal skysurfing accidents)
 - (f) cutaway on the ground in high winds
 - (g) broken riser on the RSL side (results in reserve deployment); prevention:
 1. inspecting and replacing worn risers
 2. packing for soft openings (tight line stows; see manufacturer's instructions)
 3. stable deployment at slow speeds
 - (4) If temporarily disconnecting an RSL, care must be taken so it does not interfere with the operation of the parachute system, consult a rigger.
 - c. When using a reserve static line device, the skydiver must not depend on the static line device and must manually pull the reserve ripcord immediately after the cutaway.
 - d. An RSL may not be desirable when attempting linked canopy formations.
 - e. Unless the manufacturer's instructions state otherwise, a connector device between the left and right main risers should not be used.



Aircraft Briefing

Attend the following aircraft briefing presented by an experienced jump pilot or AFF instructor for Category E students outlined below that covers the interaction between the jumpers, the aircraft, and the pilots.

1. Sufficient airspeed is necessary for flight; without it, the aircraft wing stalls.
2. Weight
 - a. Aircraft weight limits are specified in the aircraft owner's manual and other documentation and, by law, may not be exceeded.
 - b. Weight includes:
 - (1) Fuel
 - (2) Occupants
 - (3) Skydiving equipment
 - (4) Other (jump seats, oxygen systems, etc.)
 - c. The weight must be calculated for each load.
3. Weight distribution (center of gravity)
 - a. The load in an aircraft must be distributed within center of gravity limits to fly.
 - b. Limits are published in the owner's manual and other documentation.
 - c. The pilot must calculate and monitor weight distribution for each flight.
 - d. Jumpers moving around the aircraft can place the load out of limits.
 - (1) In aircraft with a door in the rear, some jumpers must remain forward as groups congregate near the door.
 - (2) Large groups planning to exit together should inform the pilot.
4. Seat belts must be worn when the aircraft is moving below 1,000' including taxi, takeoff, & landing to:
 - a. Prevent injuries in an emergency
 - b. Maintain the load within the center-of-gravity limits
5. Jumpers outside the aircraft:
 - a. Can block air flow to the control surfaces
 - b. Add drag that makes it harder to maintain the necessary airspeed
 - c. When floaters (outside the aircraft) are out, jumpers must exit quickly to reduce the effect of drag.
6. Apply the concept of weight, balance, and drag to aircraft at the DZ.
7. Review all possible aircraft emergency procedures with an AFF Instructor. All students should take direction from his or her instructor(s) who will help prepare you for one of four actions:
 - a. In an aircraft emergency below 1,500 feet, everyone must prepare to land with the aircraft:
 - (1) The door must be closed and everyone must have his or her helmet and seatbelt on & fastened.
 - (2) Assume the proper crash position and brace yourself for impact by bringing your knees to your chest and clasping your hands behind your head to reinforce your neck.
 - (3) After the aircraft has come to a complete stop, immediately, yet orderly, locate the nearest exit and get out of the aircraft if you are able.
 - (4) Do not touch anything as you exit the aircraft.
 - (5) Walk at least 100 feet away from the aircraft.
 - (6) Never go back to the aircraft for any reason.
 - (7) Go get help if you are able.
 - b. In an aircraft emergency above 1,500 feet, but below 3,500 feet:
 - (1) Exit solo, giving at least three seconds between exits, count to three, and deploy your reserve.
 - c. In an aircraft emergency above 3,500 feet, but below 5,500 feet:
 - (1) Exit solo, giving at least three seconds between exits, count to three, and deploy your main.
 - d. In an aircraft emergency above 5,500 feet:
 - (1) Perform a routine exit with or without instructor assistance and deploy your main as planned.
 - e. After an emergency exit and once under an open canopy:
 - (1) Look for the instructor's parachute and follow it to a clear, open landing area.
 - (2) If you cannot find an instructor, follow any other experienced jumper or select any clear area.
8. Discuss all of the different sections of FAR 91 provided in Section 9-1 of the Skydiver's Information Manual with an experienced jump pilot; only the sections pertinent to skydiving are included there.



Spotting

(An experienced jump pilot or an AFF Instructor must cover this section with you.)

1. How to read a winds-aloft report
2. True versus magnetic heading
3. Jump-run procedures
4. Spotting corrections
 - a. Manual (hand signals, shoulder taps)
 - b. Electronic (spotting buttons and lights)
 - c. Verbal
5. The effect of winds during canopy descent:
 - a. A canopy descends at approximately 1,000 feet per minute.
 - b. Divide the opening altitude by 1,000 feet to determine time of descent, e.g., 3,000 feet = three minutes of descent.
 - c. Estimate in miles per minute the amount of drift during descent, as in Table E.1:

MPH Miles per Minute Drift from 3,000 feet		
60	1 mile per minute	3 miles
30	½ mile per minute	1.5 miles
20	1/3 mile per minute	1 mile
15	¼ mile per minute	¾ mile
10	1/6 mile per minute	½ mile
5	1/12 mile per minute	¼ mile

Table E.1 – Convert miles per hour to miles per minute and multiply times three minutes (approximately 1,000 feet of descent per minute) to estimate drift under canopy from 3,000 feet based on wind speed.

6. Calculate the drift under canopy from 3,000 feet, based on the average of the known winds and a canopy descent rate of 1,000 feet per minute, to choose the correct opening point. Example below:

Winds (forecast and observed):

Altitude	Heading	Speed (mph)
3,000' AGL	280	20
Surface	260	10
Average	270	15

Use Table E.1 above to estimate the canopy's drift during a 3-minute descent in winds averaging 15 mph:

Drift:

Open	Time	Distance	Heading
3,000' AGL	3 minutes (x ¼)	¾ mi	from 270°

Average the wind direction and velocity to estimate drift after opening at 3,000 feet above the ground.

- a. Canopy descent time from 3,000 feet (at 1,000 feet per minute): three minutes
- b. Total (uncontrolled) drift at ¼ mile per minute: ¾ mile
- c. Ideal opening point: ¾ mile due west



Alternate Method for Calculating Freefall and Canopy Drift

Example for Calculating Freefall Drift:

Altitudes	Heading Speed (in mph)	
3,000 feet	250°	15 mph
6,000 feet	260°	18 mph
9,000 feet	270°	20 mph
12,000 feet	290°	25 mph
<i>Average</i>	<i>270°</i>	<i>19.5 mph</i>

To simplify the process, convert mph to mile per minute (mpm) (assuming a one-minute freefall)

$$\frac{19.5 \text{ mph}}{60 \text{ min}} = 1/3 \text{ mile per minute (mpm)}$$

Freefall drift is equal to 1/3 mile at 270°.

Example for Calculating Canopy Drift:

Altitudes	Heading Speed (in mph)	
Surface	180°	12 mph
3,000 feet	200°	18 mph
<i>Average</i>	<i>190°</i>	<i>15 mph</i>

$$\frac{15 \text{ mph}}{60 \text{ min}} = 1/4 \text{ mile of uncontrolled drift per minute under canopy}$$

Assume 4,000 feet opening altitude (i.e. four minutes under canopy):

$$1/4 \text{ mile of uncontrolled drift per minute} \times \text{four minutes under canopy} = \text{one mile @ } 190^\circ$$

7. Observe and ask jumpers on a previous load about the wind conditions and spot.
8. Jumper procedures during jump run
 - a. The pilot determines when the door may be opened (red light will illuminate) and may prefer to operate the door.
 - b. Look below to:
 - (1) Check for clouds
 - (2) Check for aircraft
 - (3) Verify the jump run is correct
 - c. When the pilot gives the OK to jump (green light near door will illuminate), verify that the aircraft is the desired distance from the drop-zone and begin exit procedures.
9. Be sure to establish communications for spotting corrections with the pilot prior to flight.



Exit and Freefall

1. Stable door (unpoised) exit:
 - a. Position for the best launch.
 - b. Present the front of your hips to the relative wind.
 - c. Exit in a neutral position with your legs slightly extended (better stability).
 - d. Maintain your arch as the relative wind changes from ahead to below after exit.
2. Recovering from exit and freefall instability:
 - a. Altitude, arch, legs, relax, correct turn (review).
 - (1) Know the altitude by reading the altimeter or counting from exit (depending on exit altitude).
 - (2) Arch at the hips to improve belly-to-wind stability.
 - (3) Check your leg position and adjust as needed (probably extend to 45 degrees).
 - (4) Relax by taking a breath and letting go of unwanted body tension.
 - (5) Recognize any heading drift and correct it to maintain heading.
 - b. If you are above your assigned deployment altitude & falling stable in a back-to-earth orientation, roll to one side to recover to belly-to-earth. (half-barrel roll, aka roll-out-of-bed technique)
 - (1) Check altitude.
 - (2) Arch.
 - (3) Look over your right shoulder towards the ground to the right.
 - (4) Briefly bring your right arm in across your chest.
 - (5) As your body rolls to the right side and you recover, returning to facing the ground, bring your right arm back to the freefall position.
 - (6) Check altitude.
3. Barrel rolls, back loops, and front loops (instructor's preferred technique):
 - a. Try barrel rolls first, because they have a built-in recovery component from back-to-earth.
 - b. Any two disorienting maneuvers with recovery and reorientation within five seconds qualify you for self-supervision in freefall (the same one may be used twice).
 - c. Demonstrate full control by completing all three maneuvers within 60° of the initial heading.
4. Rolls, loops, and other freeflying maneuvers result in faster and erratic fall rates; check altitude often.

Read and discuss USPA recommendations on altimeters in SIM Section 5-3.J

Visual altimeters, especially when chest-mounted, may be unreliable during inverted positions.

Some examples of altimeter types and locations include:

1. Visual altimeter worn on the wrist:
 - a. Easy to read in a variety of freefall positions
 - b. Wrist is usually unaffected by burbles
 - c. Difficult to read while tracking
2. Visual altimeter worn on the chest or main lift web:
 - a. Reference for others in a group, particularly when belly flying
 - b. Readable during tracking
 - c. Subject to error and erratic readings while back-to-earth
3. Audible altimeter, typically worn against the ear:
 - a. Audible altimeters provide a good reference to key altitudes near the end of the planned freefall
 - b. Extreme background noise of freefall and a jumper's attention to another event can render audible altimeters ineffective.
 - c. Students should use audible altimeters only after demonstrating a satisfactory level of altitude awareness.



Emergency Procedure Review

1. Preventive measures for two open canopies:
 - a. Deploy the main parachute at the correct altitude to avoid AAD activation.
 - b. Initiate malfunction procedures high enough to cutaway safely and avoid AAD activation.
 - c. Maintain and correctly operate hand-deployed pilot-chutes, especially collapsible pilot-chutes.
 - d. Protect your equipment before exit to prevent pins or handles being knocked loose.
 - e. Some AADs, particularly those used for student jumping, will activate under a fully open parachute when controlled too aggressively at lower altitudes.

2. Various scenarios can result in having both parachutes deploy with one of the following outcomes.

3. Review detailed procedures for two canopies out as they pertain to experienced jumpers found below.
 - a. One canopy inflated and another deploying:
 - (1) If the reserve is inflated & the main is in a stage of deployment, disconnect the RSL & cutaway.
 - (2) If the main canopy is fully inflated & the reserve is in a stage of deployment, shake the reserve risers to aid its deployment. Then be prepared to take action on the resulting configuration.
 - (a) The two open canopies typically settle into one of three configurations: biplane, side-by-side, or down-plane.
 - (b) Trying to force one configuration into a more manageable configuration is typically futile and can be dangerous.
 - b. Stable biplane:
 - (1) Do NOT cutaway!
 - (2) Leave all toggles stowed on both canopies. If a toggle releases itself or breaks off during deployment, then only unstow the other toggle of that canopy & leave all other toggles stowed.
 - (3) Gently steer the front canopy by smoothly pulling on the rear-risers of the front canopy only.
 - (4) Use minimal input to steer the front canopy only as necessary to maneuver for a safe landing.
 - (5) Land both canopies without flaring. Perform a parachute-landing fall (PLF) on landing.
 - c. Stable side-by-side with directional control:
 - (1) Do NOT cutaway!
 - (2) Leave all toggles stowed on both canopies. If a toggle releases itself or breaks off during deployment, then only unstow the other toggle of that canopy & leave all other toggles stowed.
 - (3) Gently steer the dominant canopy (larger and more directly overhead, typically the main) by smoothly pulling on the rear-risers of the dominant canopy only.
 - (4) Use minimal control input to steer the canopy only as necessary to maneuver for a safe landing.
 - (5) Land both canopies without flaring. Perform a parachute-landing fall (PLF) on landing.
 - d. Down-plane or pinwheel:
 - (1) Disconnect the reserve static line (RSL) if altitude/time permits (above 1,000 feet).
 - (2) Immediately cutaway the main canopy, regardless of altitude.
 - (3) Steer the reserve to a normal landing & flare. Perform a parachute-landing fall (PLF) on landing.
 - e. Main-reserve entanglement:
 - (1) Do NOT cutaway!
 - (2) Do everything possible to attempt to clear the entanglement of the two canopies by pulling on the risers and/or toggles of the canopy with the highest chance of inflating.
 - (3) Once one canopy is fully inflated, start trying to inflate the other canopy by pulling on the risers and/or toggles. If possible, retrieving the less-inflated canopy may help clear the canopies.
 - (4) NEVER give up! Perform a parachute-landing fall (PLF) on landing.

4. Procedures for high-wind landings:
 - a. Before landing, disconnect the RSL as a precaution in case a cutaway becomes necessary to prevent being dragged.
 - b. Choose a point to the side or well downwind of any obstacle that may generate turbulence.
 - c. Land using a PLF and pull one toggle in as quickly as possible until the canopy collapses.
 - d. After landing, cutaway if necessary.



Canopy

1. Types of stalls:
 - a. An aerodynamic stall is a stable, steady-state stall, or sink, with decreased glide and increased rate of descent:
 - (1) Associated with older designs and specialized accuracy canopies
 - (2) May not be achievable with newer, flatter-gliding canopies, which often fly flatter almost until a full stall
 - b. A dynamic stall occurs at the end of a flare when the jumper begins to rock back under the canopy and the canopy begins to nose forward:
 - (1) Associated with a sharp dive
 - (2) May signal a full stall
 - c. A full stall occurs when the trailing edge (tail) is pulled below the leading edge (nose) and the canopy begins to fly backwards:
 - (1) Collapses the canopy
 - (2) May result in unrecoverable line-twist in smaller, more highly loaded wings stalled with the toggles (a rear-riser stall may be more controllable)
 - (3) May be contrary to the manufacturer's recommendations
 - (4) May result in entanglement with the jumper if released too abruptly
 - (5) May result in injury if done too low
2. Raise the controls smoothly after any stall to avoid diving and partial collapse.
3. Proper flare technique:
 - a. Keep your feet and knees together to maintain heading during the landing flare (level harness).
 - b. Flare with the hands in front to provide visual feedback for level control.
4. Discovering the best landing flare ("sweet spot") for the canopy being jumped (nine practice flares):
 - a. From full glide, flare to a mid-point in the toggle range:
 - (1) Approximately the bottom of the rib cage
 - (2) At a medium rate of flare
 - b. Feel the amount and duration of lift before the stall.
 - c. Return gently to full flight for at least ten seconds.
 - d. Repeat to the same depth:
 - (1) Once at a faster rate
 - (2) Once at a slower rate
 - e. Compare the strength and duration of the lift before the stall.
 - f. Flare at three different speeds to a point deeper in the toggle stroke, approximately at the hips.
 - g. Flare at three different speeds to a higher point in the toggle stroke, approximately the shoulders.
 - h. Compare the flares to determine the stroke rate and depth that produces the maximum combined strength and duration of lift for that canopy.
5. Best flare height above the ground:
 - a. Use the best flare procedure (discovered during the nine practice flares) upon landing, beginning one body height above ground.
 - b. Flare to minimum descent (or flat) and hold that toggle position when the glide begins to flatten.
 - c. Smoothly continue the toggle stroke to maintain the flat glide.
 - d. If the canopy begins to stall and drops several feet, begin the flare that much lower next time.
 - e. If you do not achieve the flattest glide before landing, begin to flare slightly higher next time.
 - f. If you flare too high, never return your canopy to full flight. Raise your hands to waist height & PLF
6. Review of traffic avoidance procedures:
 - a. Watch for other traffic, especially upon entering the landing pattern.
 - b. The most dangerous point of the pattern occurs when two jumpers on opposite base-leg approaches turn to final approach.
 - c. The lower canopy has the right of way, but a jumper should not fly to assert right of way over it.
 - d. It takes two people to have a collision, but only one to avoid it.



Category E Quiz

(Must be passed before Category E-1 jump.)

1. **What happens to a jumper's fall rate when performing rolls, loops, or freeflying maneuvers?**
 - a) Increases
 - b) Decreases
 - c) Stays the same
2. **What happens to a visual altimeter when it is in the jumper's burble?**
 - a) Reads unreliably
 - b) Nothing
 - c) Reads high
3. **What is the best way to recover from a canopy stall to full glide?**
 - a) Quickly counteract with toggle input.
 - b) Pull legs up into a tight ball.
 - c) Smoothly raise the controls.
4. **Describe an aerodynamic stall as it applies to a ram-air canopy;**
 - a) Sudden state of increased glide and increased rate of descent
 - b) Stable state of decreased glide and increased rate of descent
 - c) Stable state of increased glide and decreased rate of descent
5. **When does a dynamic stall occur?**
 - a) When the front risers are pulled down quickly
 - b) At the end of a flare when the jumper begins to rock back under the canopy
 - c) At the beginning of a flare
6. **What happens after a dynamic stall if the tail is held lower than the nose?**
 - a) Recovery
 - b) Continued dynamic stall
 - c) Full stall
7. **What is the best way to determine a canopy's optimum flare speed and depth for landing?**
 - a) Practice different rates of flare entry at different depths of flare.
 - b) Divide exit weight by the canopy's square footage.
 - c) Contact the manufacturer.
8. **Describe your procedure for landing in high winds:**
 - a) Stay well downwind of any obstacle, face into the wind early, disconnect the RSL, land with a PLF, pull one toggle down completely, and after landing, cutaway if necessary.
 - b) Do not attempt a stand-up landing; PLF
 - c) Enter the downwind leg at $\frac{3}{4}$ brakes and smoothly continue to full brakes.
9. **How many A-lines does a nine-cell canopy have?**
 - a) Nine
 - b) Ten
 - c) Eleven
10. **To what part of the canopy do the steering lines (brake lines) connect?**
 - a) Nose or leading edge
 - b) End-cells
 - c) Tail or trailing edge



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- 11. What lines go through the rear slider grommets?**
- a) A, B, and C
 - b) C, D, and brakes
 - c) A, C, and D
- 12. Where does the main pilot-chute bridle attach to the canopy?**
- a) Rear center
 - b) Top center
 - c) Front center
- 13. Who may pack a main parachute?**
- a) FAA rigger, person jumping the parachute, person under rigger's supervision
 - b) Drop-zone certified packer, FAA rigger
 - c) Anyone
- 14. How often do the main and reserve parachute need to be packed?**
- a) Every 120 days
 - b) Every 180 days
 - c) Every 90 days
- 15. Who is in command of the aircraft?**
- a) FAA
 - b) TSA
 - c) Pilot
- 16. What are two purposes for wearing seat belts in an aircraft?**
- a) To conform to federal regulations and protection in a crash
 - b) To prevent items from getting loose and maintain the correct balance
 - c) To maintain the correct balance and protection in a crash
- 17. Who is responsible for determining if the aircraft is in condition for safe flight?**
- a) The aircraft owner
 - b) The pilot
 - c) FAA
- 18. Above what altitude MSL is the pilot of an unpressurized aircraft required to breathe supplemental oxygen?**
- a) 14,000 feet
 - b) 15,000 feet
 - c) 18,000 feet
- 19. Above what altitude MSL are all occupants of an unpressurized aircraft required to be provided with supplemental oxygen?**
- a) 14,000 feet
 - b) 15,000 feet
 - c) 18,000 feet
- 20. In an aircraft with the exit door near the back, what must jumpers do to maintain the balance during exit procedures?**
- a) Remain forward until it is time for their group to exit.
 - b) Follow the pilot's instructions on each jump.
 - c) Remain as close to the pilot as possible.



21. What is the biggest danger to a jumper when flying the canopy pattern?

- a) Other canopies
- b) Turbulent wind
- c) Canopy malfunction

22. What is the best way to avoid a canopy collision?

- a) See and remain clear of other jumpers.
- b) Spiral quickly so that you are the first jumper landing.
- c) Stay in brakes so that you are the last jumper landing.

23. How does the RSL work?

- a) Activates a small explosion that cuts the reserve closing-loop
- b) Prevents main canopy from being cutaway
- c) Forms a separable link between the main riser and reserve ripcord so that cutting away the main activates the reserve, if the RSL is hooked up

24. What would happen if the main riser attached to the RSL breaks?

- a) The reserve deploys into the main.
- b) The reserve deploys with the main still attached by the other riser.
- c) The main remains attached, creating a two-out situation.

25. What is the best way to prevent risers from breaking?

- a) Inspection and maintenance; correct packing, tight line stowage, and stable deployment.
- b) Replace risers every year.
- c) Remind your rigger to inspect at every reserve inspection and repack.

26. What is one way to prevent a dual deployment?

- a) Initiate malfunction procedures high enough to cutaway safely and avoid AAD activation.
- b) Deploy the main parachute at or above the AAD activation altitude.
- c) De-activate AAD under canopy above AAD activation altitude.

27. What is generally the best action to take in the following two-canopy-out: Biplane?

- a) Release the RSL (if time) and cutaway.
- b) If stable with directional control, leave the toggles stowed on both canopies and steer the dominant canopy gently using the rear risers of that canopy only; no flare on landing and PLF.
- c) Leave the toggles stowed on both canopies and steer the front canopy gently using the rear risers of that canopy only; no flare on landing and PLF.

28. What is generally the best action to take in the following two-canopy-out: Side-by-side?

- a) Release the RSL (if time) and cutaway.
- b) If stable with directional control, leave the toggles stowed on both canopies and steer the dominant canopy gently using the rear risers of that canopy only; no flare on landing and PLF.
- c) Leave the toggles stowed on both canopies and steer the front canopy gently using the rear risers of that canopy only; no flare on landing and PLF.

29. What is generally the best action to take in the following two-canopy-out: Down-plane?

- a) Release the RSL (if time) and cutaway.
- b) If stable with directional control, leave the toggles stowed on both canopies and steer the dominant canopy gently using the rear risers of that canopy only; no flare on landing and PLF.
- c) Leave the toggles stowed on both canopies and steer the front canopy gently using the rear risers of that canopy only; no flare on landing and PLF.



Category E Dive Flows

One USPA AFF Instructor on E-1 & E-2. Self-Supervised on E-3 w/ an AFF-I on the Plane.

E-1 Freefall Dive Flow

- Assist instructor with spotting.
- Stable, solo door (unpoised) exit without grips.
(Must be stable within five seconds of exit to pass.)
- Find a reference point on the horizon (a heading).
- Determine the position of the instructor.
- Perform a full Circle of Awareness.
- Ask permission to perform maneuvers (head nod).
- Receive reply from instructor (head nod).
- Perform a L barrel roll (must be w/in 60° to pass).
- Perform a short Circle of Awareness.
(Altitude, Arch, Legs, Relax, Correct Turn if needed)
- Ask permission to perform maneuvers (head nod).
- Receive reply from instructor (head nod).
- Perform a R barrel roll (must be w/in 60° to pass).
- Perform a short CoA in between each barrel roll.
- With instructor's permission each time, continue to perform barrel rolls (within 60°) until 6,000 ft.
- Initiate no new maneuvers below 6,000 feet.
- Shake head, "No more maneuvers!" at 6,000 feet.
- Complete final maneuver by 5,000 feet, no lower.
- Lock on at 5,000 feet (must be altitude aware).
- Wave-off at 4,500 feet (must do so to pass).
- Pull by 4,000' (must do so solo & stable to pass).

E-2 Freefall Dive Flow

- Assist instructor with spotting.
- Stable, solo door (unpoised) exit without grips.
(Must be stable within five seconds of exit to pass.)
- Find a reference point on the horizon (a heading).
- Determine the position of the instructor.
- Perform a full Circle of Awareness.
- Ask permission to perform maneuvers (head nod).
- Receive reply from instructor (head nod).
- Perform a back loop (must be w/in 60° to pass).
- Perform a short Circle of Awareness.
(Altitude, Arch, Legs, Relax, Correct Turn if needed)
- Ask permission to perform maneuvers (head nod).
- Receive reply from instructor (head nod).
- Perform a front loop (must be w/in 60° to pass).
- Perform a short CoA in between each maneuver.
- With instructor's permission each time, continue to perform the required aerobatics to meet the standards (within 60°) to pass until 6,000 feet.
- Initiate no new maneuvers below 6,000 feet.
- Shake head, "No more maneuvers!" at 6,000 feet.
- Complete final maneuver by 5,000 feet, no lower.
- Lock on at 5,000 feet (must be altitude aware).
- Wave-off at 4,500 feet (must do so to pass).
- Pull by 4,000' (must do so solo & stable to pass).

E-3 Freefall Dive Flow

- Perform a solo door (unpoised) exit.
(Must be stable within five seconds in order to pass)
- Practice falling stable and performing turns with precision while maintaining correct body position and altitude awareness throughout the skydive.
- **Solo student aerobatics are NOT permitted!**
- Stop all maneuvers by 6,000'! Lock on at 5,000'!
- Wave-off at 4,500'! **Deploy by 4,000', no lower!**

Canopy Dive Flow

- (Same dive flow for all three Category E jumps.)
- Check altitude, air traffic, & position over ground.
 - Correct any common canopy problems.
 - Release brakes, conduct a canopy controllability check, and move to the holding area.
 - Check altitude, air traffic, & position over ground.
 - Flare to chest at a medium speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to chest at a quicker speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to chest at a slower speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to hips at a medium speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to hips at a quicker speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to hips at a slower speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to shoulders at a medium speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to shoulders at a quicker speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Flare to shoulders at a slower speed and hold.
 - Recover to full flight for ten seconds.
 - Check altitude, air traffic, & position over ground.
 - Complete all maneuvers above 1,000 feet.
 - Evaluate the most effective flare according to the strongest sustainable lift ("sweet spot").
 - Initiate best flare at head height above ground.
 - Continue to flare to maintain a flat glide to land.
 - Evaluate flare height according to landing results.

Advancement Criteria

Equipment

- Complete open parachute system orientation
- RSL orientation

Spotting and Aircraft

- Correct calculation of the opening point given simple wind conditions
- Active participation with spotting procedures on jump run

Exit and Freefall

- Cumulative two successive disorienting maneuvers with stability and altitude awareness recovered within five seconds
- Cumulative one barrel roll, one back loop, and one front loop
- One self-supervised freefall

Canopy

- Unassisted landing within 165 feet of target

Note: Once these requirements have been met and you have received the endorsement of a USPA AFF Instructor, your training may be supervised by any USPA Coach or Instructor. You may then self-supervise in freefall, but remain under USPA Instructor supervision. A USPA instructional rating holder should accompany you in the aircraft to verify the correct spot, clearance from clouds and aircraft, exit separation, and your position in the aircraft exit order.

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