

Chapter 6

LANDING TECHNIQUES



LESSON PLAN OUTLINE

PROGRAM: SMOKEJUMPER

LESSON: LANDING TECHNIQUES

OBJECTIVES: Trainees shall perform correct parachute landing falls (PLF) according to approved techniques outlined in this training lesson. Given the proper techniques for PLF's, the trainee will be able to perform parachute landing falls forward, quartering, and backwards facing both right and left, without error, to the satisfaction of the instructors.

INTRODUCTION: The parachute landing fall is a very important phase of parachute training. Most injuries to smokejumpers result from improper parachute landings. Smokejumpers must learn to land with the correct degree of relaxation, and perform a proper landing fall to insure a maximum distribution of shock over their entire body upon contact with the ground. Distributing the shock is a critical element in the prevention of jump injuries.

I. PARACHUTE LANDING FALLS

A. PLFs can be made either to the left or right, forward left or forward right, depending on the body position when the jumper makes contact with the ground.

1. Preparing to land.

a. Have an instructor demonstrate a roll utilizing the approved techniques of the parachute landing fall.

A flight suit with a strip sewn over the points of contact can aid in illustrating proper procedures. A roll matching the strip to a straight line laid out on the ground would cover all the contact points in one smooth motion.

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- b. Keep body erect, toes pointed in the direction of the PLF, knees slight bent, body relaxed, hands on toggles. Keep eyes ahead and down 45 degrees and arch the hips in the direction of the roll. (Figure 1)



Figure 1

2. Execution of the parachute landing fall.

- a. The parachute landing fall is performed in one smooth, fluid motion. There should not be any excessive shock on any one part of the body.
- b. Initial contact with the ground will be made on the balls of the feet, knees slight bent and thrown in the direction of travel. At the same time, tuck the elbows into the chest and rotate the body to expose the latissimus dorsi muscle. (Figure 2)



Figure 2

3. Initial contact

The 5 contact points of the body should touch the ground in this order:

- Feet
- Calf
- Thigh
- Buttocks (Figure 3)
- Diagonally across the back



Figure 3

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- 4. At this point, the jumper is lying on one side, legs together, elbows pinned to the chest, and grasping the toggles (Figure 4)**



Figure 4

5. The jumper's feet are brought across the body in the direction of momentum. (Figure 5)



Figure 5

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B. Key Points to Emphasize during PLF Instruction

1. The parachute landing fall must be performed in one smooth and continuous motion.
2. Jumpers should not look directly at the ground when preparing to land. They should look out in front at approximately a 45 degree angle, to determine forward speed, and should not anticipate contact.
3. The actual PLF should be done instinctively. A jumper should not have to think each step of the PLF through.
4. Hands will remain on the toggles during entire execution of the PLF. Dropping the arms for support or contacting the ground with the elbows or hands will not be allowed.
5. Hands, arms, and elbows must be tucked into the chest from braking position as soon as you contact the ground. Hands should be crossed below the reserve for a full brake or reverse flight landing.
6. Landing on the sides of the feet will not be allowed.
7. Excessive shock on the feet and legs will not be allowed.
8. Feet and legs must be kept together.
9. Making ground contact directly on the knees will not be allowed.
10. Avoid a direct backward PLF, instead twist the body in the direction of the PLF.
11. The head must be tucked down for protection as initial contact is made.

C. Practical Training Outline

1. Unit Period #1
 - a. Instructor will explain and demonstrate the proper parachute landing fall.

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- b. Practice backward PLFs. Start the jumpers from the standing position at first.
 - c. Practice forward PLF (left or right). Start from the standing position. Rolling down a slight incline will aid the jumper to complete the PLF.
 2. Unit Period #2
 - a. Practice backward and forward PLFs from a standing position with the gear on.
 - b. Practice forward PLFs off of the low ramp.
 3. Unit Period #3
 - a. Practice forward and backward PLFs off a low ramp with gear on.
 - b. Practice forward and backward PLFs from the high ramp. Practice forward PLFs on a landing simulator.
 4. Unit Period #4
 - a. Practice forward and backward PLFs on the high ramp.
 - b. Practice forward and side PLFs on the landing simulator.
 5. Unit Period #5
 - a. Practice forward and backward PLFs on the high ramp.
 - b. Practice forward, side, and backward PLFs on the landing simulator.
 6. Unit Period #6
 - a. Practice forward and backward PLFs on the high ramp.
 - b. Practice all variations of PLFs on the landing simulator.

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7. Unit Period #7
 - a. Practice all variations of the PLF on the landing simulator.
 - b. Final evaluation period.

All trainees must consistently be able to perform a proper PLF, forward, quartering, and backwards to the right and left, before being permitted to make a parachute jump.

Extra training may be scheduled for those trainees who cannot perform all correct techniques of the six basic PLF positions.

Returning jumpers must also be able to perform a proper PLF, forward, quartering, and backwards to the right and left, before making a refresher/re-qualifying jump. Training sessions should be consistent to allow for the trainee to perform the six basic PLF positions correctly.

II. PARACHUTE LANDING FALL EVALUATION PARAMETERS

A. Final evaluation

1. Trainees will correctly apply the accepted techniques of the parachute landing fall consistently during training.
2. For final evaluation (Unit #7), trainees will demonstrate performance of the six basic PLF positions following all correct procedures.
3. During training, practice, and refresher jumps; jumpers will consistently demonstrate the ability to apply the correct techniques of the parachute landing fall. Each landing will be evaluated.
4. All parachute jumps and landing falls should be critiqued to monitor performance and correct improper procedures. This is very important.

III. WATER LANDINGS

INTRODUCTION: While infrequent, water landings present a potential hazard in smokejumping. The dangers can be reduced by providing each jumper with the knowledge and skills necessary to deal with major predicaments.

A. Prior to Water Landing

1. Steer for the most accessible land.
 - a. Wind direction may make the far shore more accessible.
 - b. Don't discard any gear – keep steering.
 - c. Seek an alternative spot such as a sand bar, island, or shallow water.
2. Inform your jump partner that you are in trouble.

B. Landing

1. Turn into the wind.
2. Land in the water as if on solid ground.
 - a. The water may be shallow.
 - b. There may be hidden obstacles beneath the water surface.
 - c. Perform a standard PLF.
3. In running water, attempt to make the parachute land downstream from you.
4. In high winds or in running water, release the capewells immediately upon completing the PLF.

C. Water Impact

1. Equipment Response

- a. A fully suited jumper will float indefinitely, do not jettison jump gear! Gloves may be discarded if they are slippery.
- b. Estimate flotation times for components:

Main Canopy	3-6 Minutes
Reserve	3+ Minutes
Shroud lines	0-1 Minutes
Jump Suit	Indefinitely

- c. Low porosity main canopy will retain trapped air once in the water. Maintain an air bubble around your helmet throughout the clearing procedure to reduce the chance of claustrophobic panic or asphyxiation.
- d. Reserve Knife

The hook type reserve knife is very difficult to use on canopy material and cannot be considered an alternative method of clearing the chute itself. The knife is very effective with shroud line entanglement.

2. Jumper Response

- a. Avoid Panic.
- b. Water will rush into helmet.
- c. Canopy may settle over the jumper causing claustrophobia. Helmet and mask will provide an ample air supply under a wet canopy for the jumper to clear the parachute.
- d. Beware of entanglement in the shroud lines or anti-inversion net.

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- e. Running water may cause buffeting.
 - f. The jumper may land face down in the water. If being towed face down by the wind, roll over on your back as quickly as possible.
 - g. Remember: The best defense is always calm, deliberate action.
3. Float and swim on your back.
 - a. Arm and leg movement is restricted by jump gear.
 - b. Water in helmet may make breathing difficult.
 4. Get clear of the canopy, the shroud lines, and anti-inversion net. If the canopy does settle over you:
 - a. Keep legs together, arms close to chest.
 - b. Reach over your head and draw canopy or lines over your body to your stomach.
 - c. Look at canopy and determine the shortest direction to skirt.
 - d. FS-14 – Follow radial seam to skirt.
 - e. Gather the parachute until out from under canopy.
 - f. Swim clear from the parachute and lines.
 5. Release the capewells if still attached, but hold onto the risers.
 6. Parachute retrieval.
 - a. It should be emphasized to the jumper that the jumper's safety will supercede any attempt at parachute retrieval. If the jumper feels their life is in jeopardy, due to cold water temperature, distance from shore, or they are just uncomfortable in the water; the parachute should be ditched, allowing the jumper to focus on swimming as quickly as possible to shore.

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- b. Throw risers onto the canopy, hook the apex of the parachute over the toe of the boot and swim to shore with the parachute.
 - c. Or grasp a portion of the parachute near the apex and swim to shore with parachute.
 - d. Or attach the let down rope to the parachute or riser and swim ashore playing out the rope as you go.
 - e. Snags on the bottom or water temperature may determine which method you choose.
7. High winds and/or running water increase the danger of being entangled or towed.
- a. Release the capewells immediately upon completion of PLF.
 - b. Be ready to use the reserve knife, if necessary.
 - c. In rapids, keep your helmet on and float feet first downstream to ward off obstacles.

IV. ICE LANDINGS

- A. Generally, ice is scarce and thin during jump season and a jumper will go through it and into the water.
- B. Perform a good PLF. Thick ice is a particularly hard surface.
- C. If you break through the ice, crawl onto the ice surface as quickly as possible, yell for help, release the canopy, and crawl toward shore.

V. WATER LANDING SIMULATION

- A. Simulation can be done during rookie training. Every jumper should go through a water landing simulation at least once. Subsequent refresher training should consist of a review of the lecture material in a classroom or at the training units.
 - 1. Equipment and resources needed.

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- a. Deep pool with a high diving board (or similar environment. A large fold-a-tank can be substituted if a water source is not available).
 - b. First aid equipment and resuscitator.
 - c. Swim fins and masks for 3-4 assistants.
 - d. Full set of jump gear (including a PG bag), a packed reserve parachute and a dry main canopy for each jumper.
2. Review previous discussion for water landings.
 3. Demonstrate.
 - a. Have one instructor jump into the water with full jump gear. This will show floatation qualities of the jump suit and proper floatation and swim attitude in the water.
 - b. Show proper movements of arms and legs in clearing canopy and lines over jumper.
 4. Individual practice.
 - a. Position a jumper in jump gear at the end of the diving board.
 - b. Hook canopy to the capewells.
 - c. Use an assistant on the board behind the jumper to hold the shroud lines clear as the jumper jumps into the water, making sure that all lines are clear of the board.
 - d. Use assistants to cover the jumper with the canopy so that there is moderate entanglement.
 - e. Allow the jumper to free themselves, following approved procedures and techniques. (Figure 6)



Figure 6

- f. Assistants in water should monitor progress and insure for jumper trainee safety.
- g. Following each practice session, critique the performance of each trainee.
- h. Repeat the process for each trainee.

VI. WATER LANDING PRACTICE JUMP

- A. A water landing practice jump is at the option of each jump base. While good experience, the knowledge gained from a live jump versus pool practice is negligible and requires a great amount of logistical support in equipment and personnel.
 - 1. Equipment needed at the jump spot (lake).

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- a. A minimum of three instructors with masks and fins, and one or two rafts or boats with minimum one jumper each.
 - b. There should be at least one qualified EMT present.
2. Procedures for instructors.
 - a. Stay near each jumper as they clear canopies and shroud lines. Do not offer assistance unless trouble develops.
 - b. If the exercise does not include chute retrieval procedures, instructors in the boats can retrieve them.
 3. Procedures for the trainees.
 - a. Follow closely the techniques and procedures for landing in water. Pay attention to clearing of lines and material of the canopy.
 - b. Follow closely the retrieval procedures if it is included in the water landing live jump.
 4. Critique and Discussion.

VII. LANDING TECHNIQUES REVIEW

The mechanics of the parachute landing fall are very simple; however, certain natural instincts or reflexes must be overcome to perform the PLF satisfactorily.

These are:

- Taking the shock entirely on the feet and legs when landing.
- Reaching to the ground with the arms and hands for support.
- Spreading feet apart for support and balance when contacting the ground.
- Looking straight down at the spot when you anticipate contact with the ground.

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-Keeping the body and muscles flexed and rigid in anticipation of contact with the ground.

The parachute landing fall has six variations which allow the jumper to perform a safe landing under all conditions affected by terrain, wind, parachute oscillations, etc., when jumping into timber and mountainous country. The parachute landing fall must be performed in one smooth motion from initial contact with the ground until the entire PLF is completed.

The correct and safe landing of a parachute is one of the most important techniques in smokejumping. The jump can be safely completed in conditions that are at the upper environmental limits of the system, if the jumper can master the proper landing techniques and can perform a good PLF. The last 10 ft. of any parachute jump will generally mean the difference between safely landing or incurring injury to the jumper.