

Chapter 10: Descending/Ascending

Scope: This chapter serves as an introduction to descending and ascending techniques and the use of descent control devices.

Terminal Learning Objective (TLO): At the end of this chapter, the student will be aware how to complete a slow, steady descent and then ascend under controlled conditions.

Enabling Learning Objectives (ELO):

1. Describe ascending and descending techniques
2. Demonstrate how to construct a fixed line for a rappel
3. Demonstrate how reeve a figure eight descender and brake bar rack
4. Demonstrate a rappel and lock-off using a figure eight descender and brake bar rack
5. Demonstrate how to ascend a fixed line and escape jammed friction devices

Descending

Descending, or what is more commonly referred to as rappelling, is a seldom used element of low angle rope rescue. In most situations, it is better to lower rescuers to an incident; however, on occasion, a rescuer needs to rappel to access the site. For instance, a fixed (rappel) line may be necessary when multiple rescuers are needed quickly at the bottom of a slope. Rappelling is a valuable skill that teaches the use of different rescue equipment and builds confidence in the rescuer's ability, equipment, and team capability. Rappelling is a dangerous activity, however, and must be completed under controlled conditions. A proper rappel is a slow, controlled walk down the slope. A slow, steady descent is much easier on ropes and anchors and prevents serious heat buildup from friction that can damage nylon ropes. A fast, bounding rappel has no place in the rescue service and only serves to overheat the descent control device (DCD) and shock load the anchors and their components.

Types of Descent Control Devices (DCD)

Figure Eight Descender (Eight Plate)



10-1: With Long Ears



10-2: With Short Ears

Brake Bar Rack

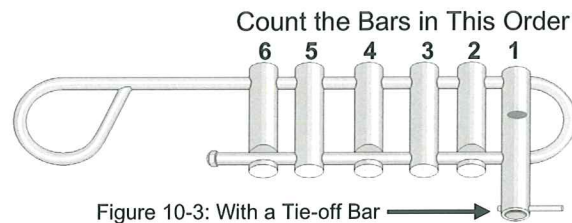


Figure 10-3: With a Tie-off Bar

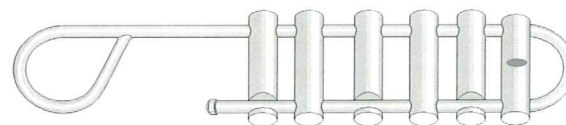


Figure 10-4: Without a Tie-off Bar

Rigging a Fixed Line

- Attach a RPM to a suitable anchor.
- Always tie a figure eight stopper knot in the end of any rappel line.
 - This reduces the potential for rappelling off the end of the line.
- Pay out enough line to reach the desired location.
- Reeve line through the DCD on the RPM.
 - Maintain a minimum 20-foot tail in the fixed line.
 - Lock-off the DCD (illustrated later in this chapter).
 - Form a figure eight on a bight with the tail near the DCD and clip onto the open hole of the anchor plate using a separate carabiner, maintaining 2 feet of slack.

Belay/Safety Line

- The anchor must be located inline with the main line.
 - This prevents a pendulum action if the main line fails.
- Construct a belay/safety line system.

Line Attachments

The rescuer dons a pelvic harness, positions a safe distance from the edge, and faces the anchor with the fixed/rappel line on the right side. The belay/safety line and DCD should attach to separate carabiners at the rescuer's harness.

- Belay/safety line.
 1. Tie a figure eight on a bight in the end of the belay/safety line.
 2. Attach the figure eight on a bight to the rescuer's harness.
- Fixed/rappel line.
 1. Reeve DCD.
 2. Ensure DCD is secured to the rescuer's harness.

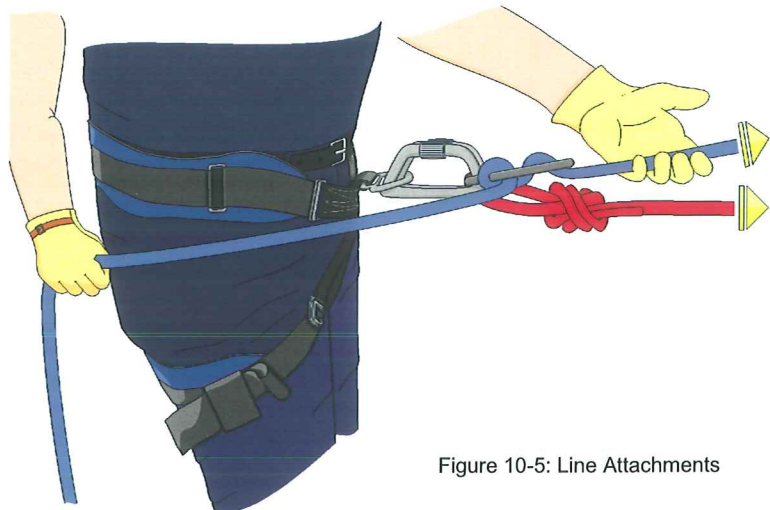


Figure 10-5: Line Attachments

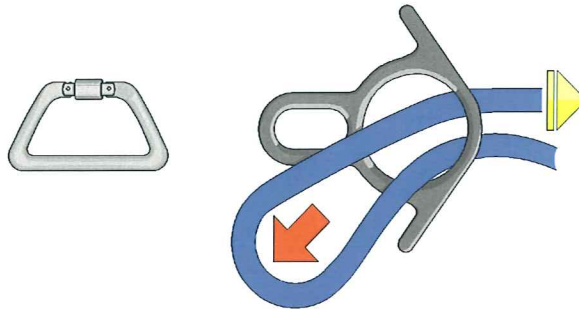
Figure 10-5 depicts the rescuer with main line and belay/safety line attachments. The remaining graphics have the belay/safety line omitted for clarity.

Reeve the Figure Eight Descender

The figure eight descender is shown being reeved for right-handed operation. For a left-handed rescuer, the belay safety line carabiner must be attached to the right side of the figure eight carabiner. Attention must be given to keeping the belay/safety line running clear of the main line. It is because of this potential problem that some agencies encourage or require right-handed operations in rappelling evolutions.

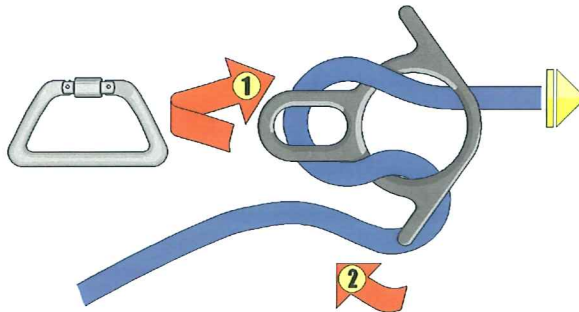
1. Form a bight in the fixed line and pass it toward you through the large hole.
 - Some agencies may choose to pass the bight through the opposite direction. This will affect the lock-off procedures described later in this chapter.

Figure 10-6: Step 1



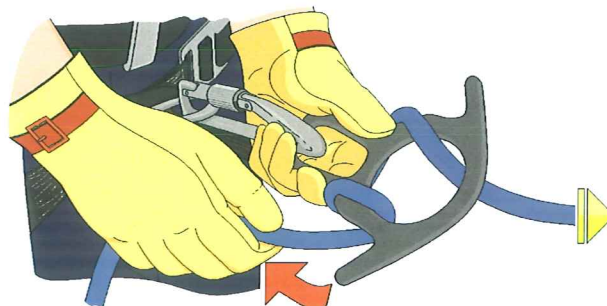
2. Pull the bight through and pass it over the smaller portion of the descender.

Figure 10-7: Step 2



3. Attach the figure eight descender to the harness with a carabiner.

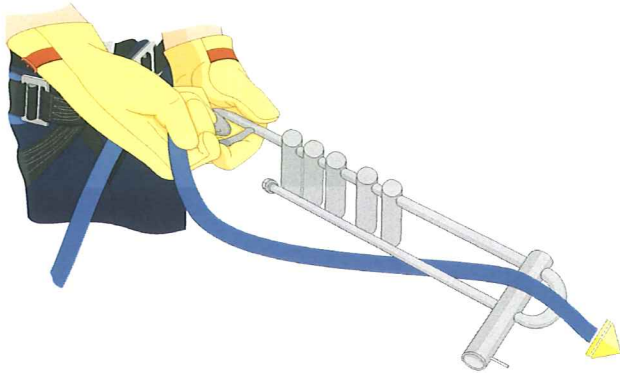
Figure 10-8: Step 3



Reeve the Brake Bar Rack

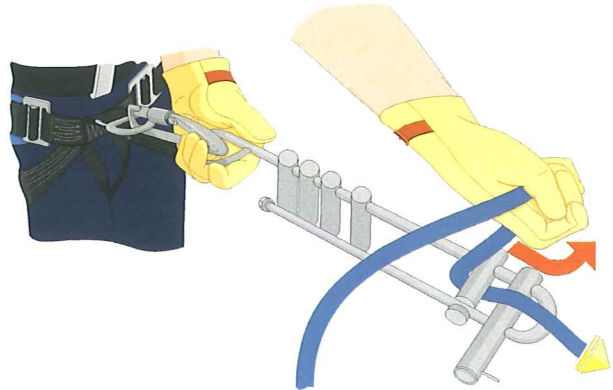
1. Attach the brake bar rack to the harness with a carabiner.

Figure 10-9: Step 2



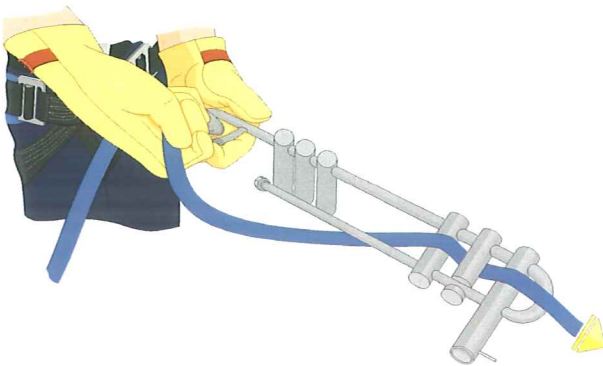
2. Lay the fixed line in the groove on the first bar on the rack.
 - Allow the line to pass through the opening of the rack.

Figure 10-10: Step 3



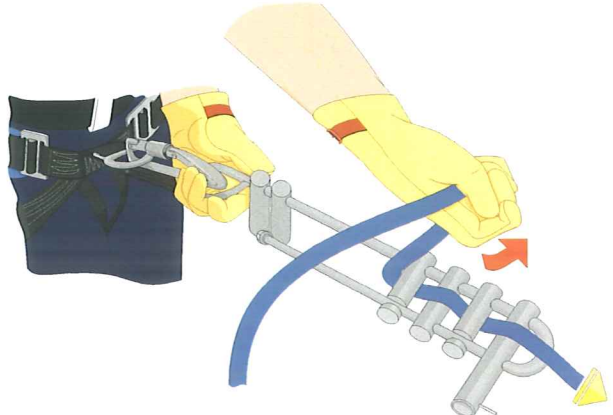
3. Flip the second bar over and snap it onto the rack with the line between the first and second bars.
 - Pull the line back through the opening of the rack, wrapping the second bar.

Figure 10-11: Step 4



4. Flip the third bar over and snap it onto the rack with the line between the second and third bars.
 - Pull the line back through the opening of the rack, wrapping the third bar.

Figure 10-12: Step 5



5. Repeat until the desired amount of bars/friction has been achieved.
 - Friction may be adjusted during the descent by adding or removing bars.
 - Four bars minimum for one (1) person.
 - Five bars minimum for two (2) or more people.

Rappel Position

The rescuer's lower body should always be perpendicular to the slope, with both feet flat on the surface, in order to maintain footing and tension on the system. This perpendicular position needs to be maintained if there is any change in the angle of the slope during the descent.

Hand Position

The hand position changes depending on the DCD.

Figure Eight Descender

- Brake hand.
 - Grasps the rope.
 - Pulls it tight around the hip.
 - Holds it tight with the fist positioned at the buttocks.
- Control hand.
 - Positioned either in front of the descender or just below it to help control the body posture.
 - This is considered to be the full brake position.
 - The friction can be decreased by moving the braking hand away from the buttocks and hip while stepping backwards until the desired speed is achieved.

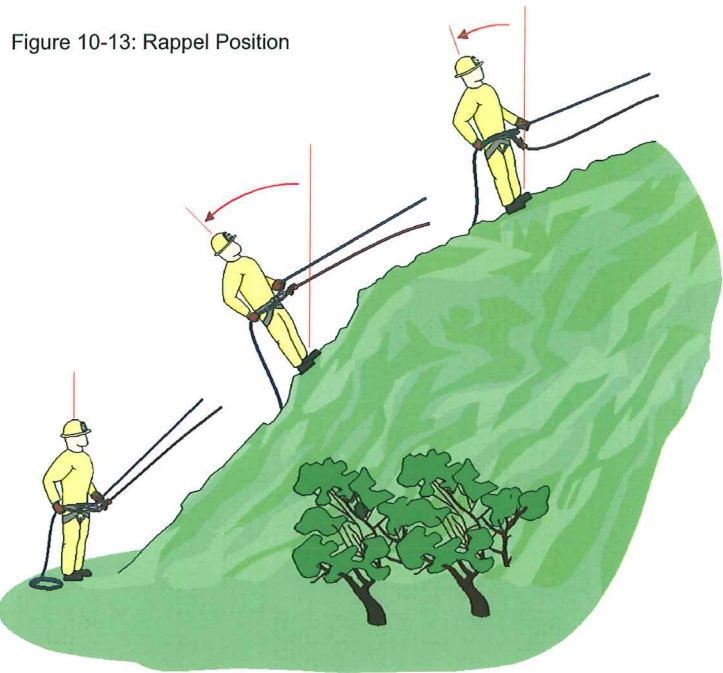


Figure 10-13: Rappel Position



Figure 10-14: Hand Placement for a Figure Eight Descender

Brake Bar Rack

- Brake hand.
 - Grasps the rope where it comes out of the bottom of the rack.
 - Wraps it around either the 4th or 5th bar.
 - Depending on the weight of the rescuer and the angle of the slope.
 - It is always better to begin a rappel with more bars and remove them if necessary rather than not enough.
 - The brake hand is kept in the twelve o'clock position above the rack.

- Control hand.
 - Positioned underneath the rack cradling the bars.
 - This is considered to be the full brake position.
 - Friction is varied by moving the braking hand from the twelve o'clock to the five o'clock position and spreading out the bars on the rack with the control hand while stepping backwards.

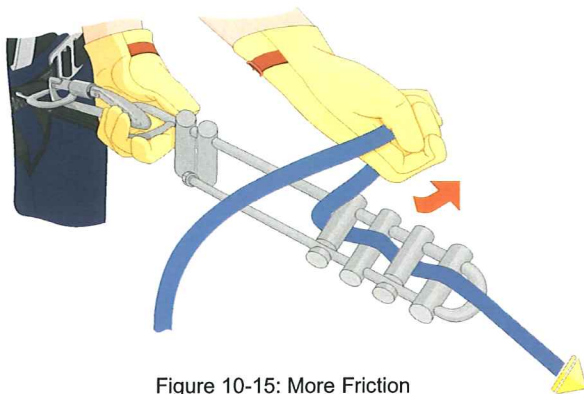


Figure 10-15: More Friction

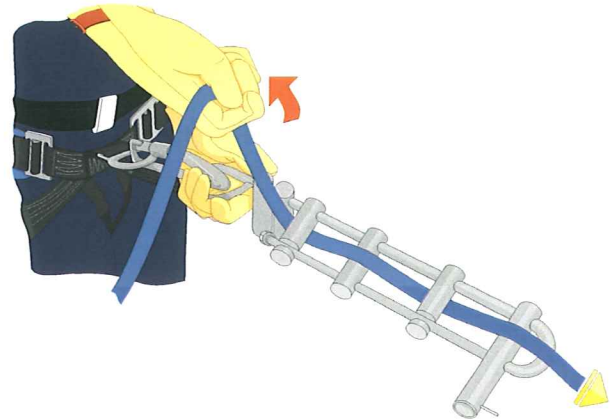


Figure 10-16: Minimum Friction

- The friction can be varied by adding or removing bars until the desired speed is achieved.
- Once the desired speed has been achieved, the control hand may be positioned either in front of the descender or just below it to help control the body's posture.

Departure

Once in the rappel position, the rescuer needs to communicate with the belayer to ensure readiness. Once on belay, the rescuer begins walking backwards to the edge. The rescuer maintains the rappel or full brake position with his or her hands. The rescuer also maintains tension on the fixed/rappel line when walking backwards. Another rescuer can assist the rappeller's transition over the edge by pulling on the line between the rappeller and the anchor to remove any slack and provide tension. This maneuver is known as a "vector pull." When the rappeller is ready to depart over the edge, the rescuer conducting the vector pull eases the rope forward until all the tension in the line has been released. The rappeller is now ready to adjust the friction and begin rappelling.

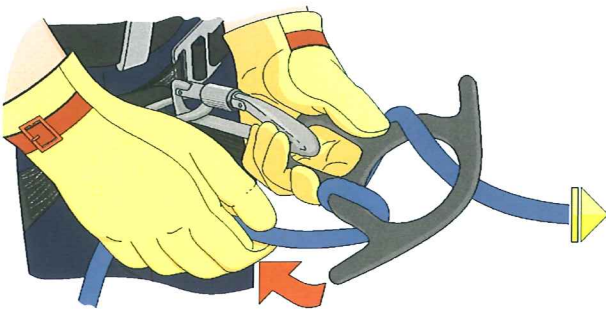
Lock-off

During a rappel, it may be necessary for the rescuer to stop the descent to perform work, package a victim, or to rest. It is necessary to lock-off the descender, whether it is a figure eight descender or a brake bar rack, until the rescuer is ready to continue the descent. Locking-off enables the rescuer to hang suspended on the main line and have the hands free to perform a function with a degree of safety. When the rescuer is ready to descend, he or she simply reverses the lock-off procedure and continues the descent.

Figure Eight Descender with Long Ears Lock-off with Two Half Hitches

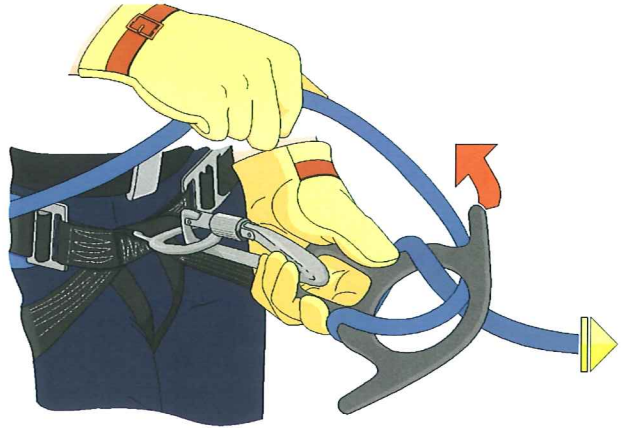
1. Allow the brake hand to move from the back of the hip to the front and hold tight when the desired lock-off point has been reached.

Figure 10-17: Grasp the Connection Point



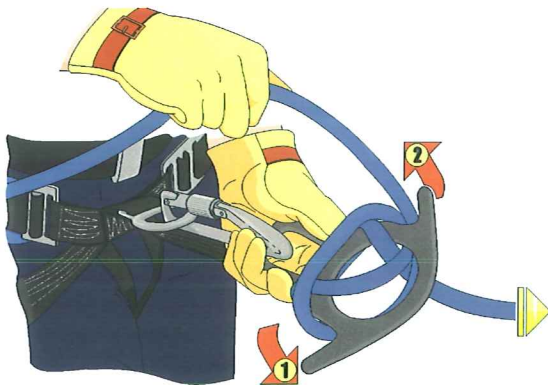
2. Grasp the connection point where the descender meets the carabiner with the control hand and rotate the descender towards the brake hand.

Figure 10-18: Pull the Running End of the Rope



3. Pull the running end of the rope up and across the back of the descender between the standing part and the descender with the brake hand until it pops between the large hole in the descender and the main line.

Figure 10-19: Wrap the Running End



4. Wrap the running end for a second time around the front of the descender below both ears and repeat the step above until it pops between the large hole in the descender and the main line.

Figure 10-20: Continue Wrapping



5. Continue wrapping the running end across the front of the descender, under the right ear to form a long bight across the standing part of the line.

6. Use the long bight to form two half hitches on the standing part of the line. (Figures 10-21 through 10-24)

Figure 10-21



Figure 10-22



Figure 10-23



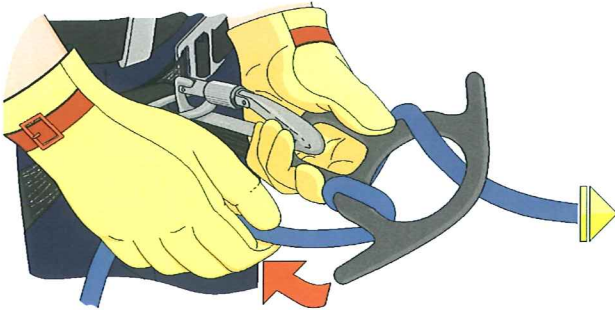
Figure 10-24



Lock-off with a Girth Hitch

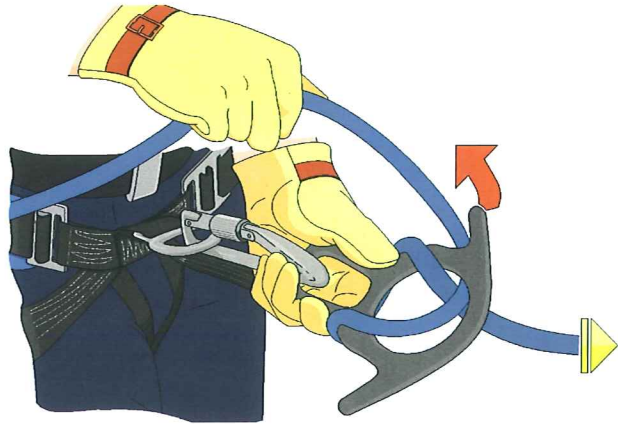
1. Allow the brake hand to move from the back of the hip to the front and hold tight when the desired lock-off point has been reached.

Figure 10-25: Grasp the Connection Point



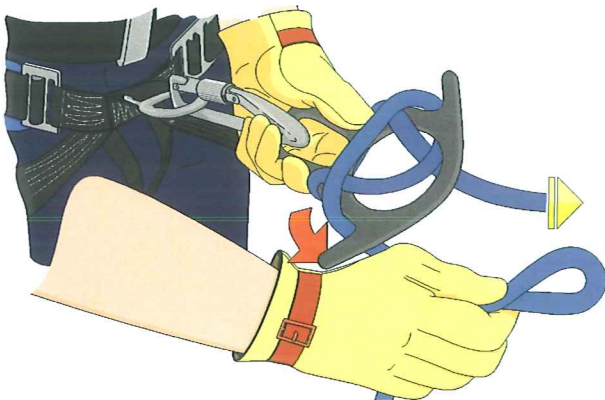
2. Grasp the connection point where the descender meets the carabiner with the control hand and rotate the descender towards the brake hand.

Figure 10-26: Pull the Running End of the Rope



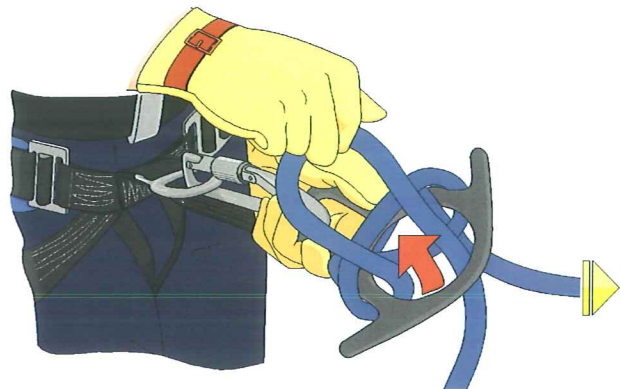
3. Pull the running end of the rope up and across the back of the descender between the standing part of the rope and the descender with the brake hand until it pops between the large hole in the descender and the main line.

Figure 10-27: Continue Wrapping



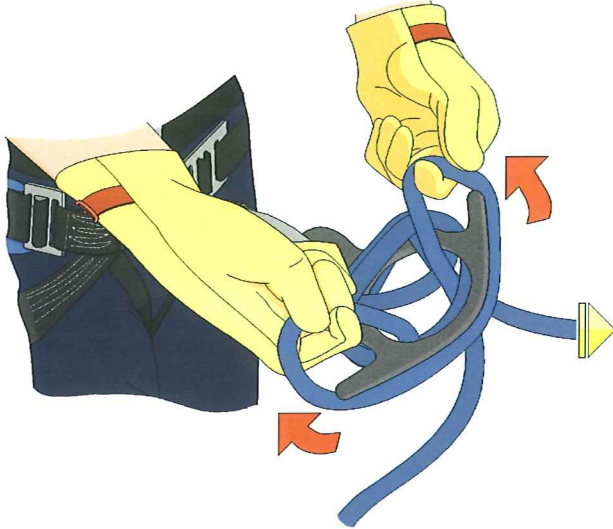
4. Continue wrapping the running end around the front of the descender below both ears and form a short bight along the standing end of the line.

Figure 10-28: Pass the Short Bight



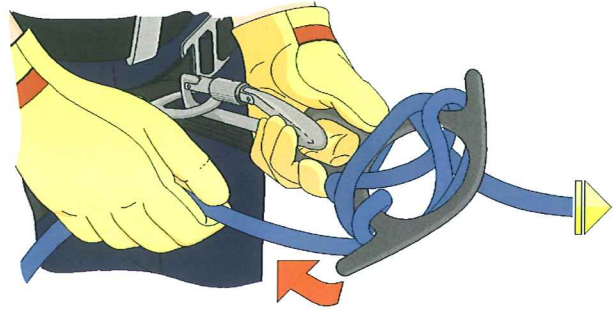
5. Pass the short bight through the back of the descender toward the rappeller.

Figure 10-29: Pass the Bight over the Rope



6. Pass the bight over the top of the descender forming a girth hitch around the descender.

Figure 10-30: Pull the Running End to Tighten

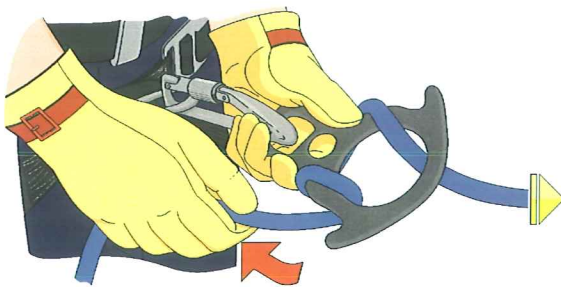


7. Pull the running end to tighten the girth hitch.

Figure Eight Descender with Short Ears

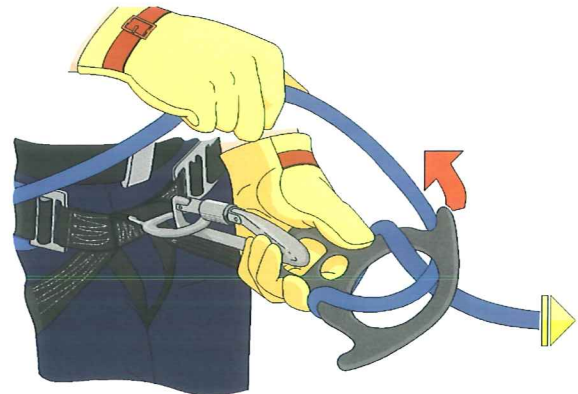
1. Allow the brake hand to move from the back of the hip to the front and hold tight when the desired lock-off point has been reached.

Figure 10-31: Grasp the Connection Point



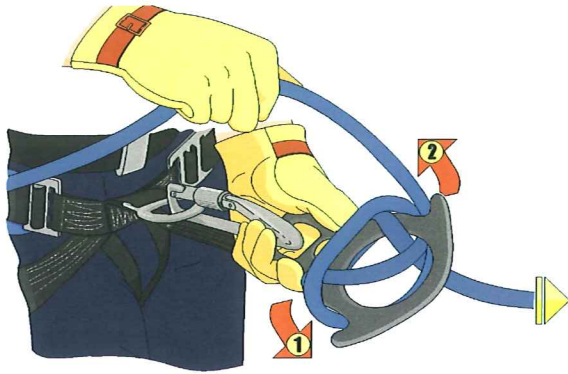
2. Grasp the connection point where the descender meets the carabiner with the control hand and rotate the descender towards the brake hand.

Figure 10-32: Pull the Running End of the Rope



3. Pull the running end of the rope up and across the back of the descender between the standing part of the rope and the descender with the brake hand until it pops between the large hole in the descender and the main line.

Figure 10-33: Wrap the Running End



4. Create a second wrap around the descender by repeating Step 3. Pull the line firmly to set both wraps.

Figure 10-34: Pull the Line to the Right



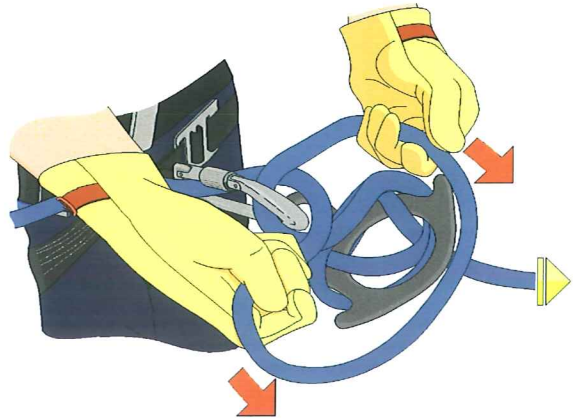
5. Pull the line to the right, across the neck of the DCD, and through the carabiner from right to left to form an 8"-10" bight.

Figure 10-35: Twist the Bight Clockwise



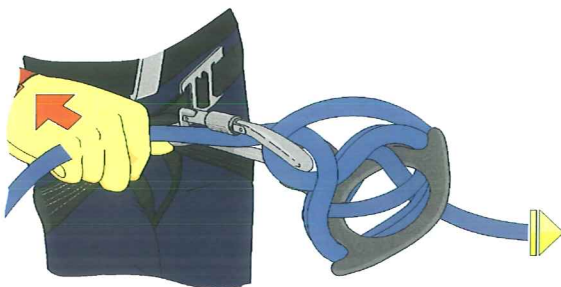
6. Twist the bight as shown to form a loop.

Figure 10-36: Pass the Loop over the Top



7. Pass the loop over the top of the descender.

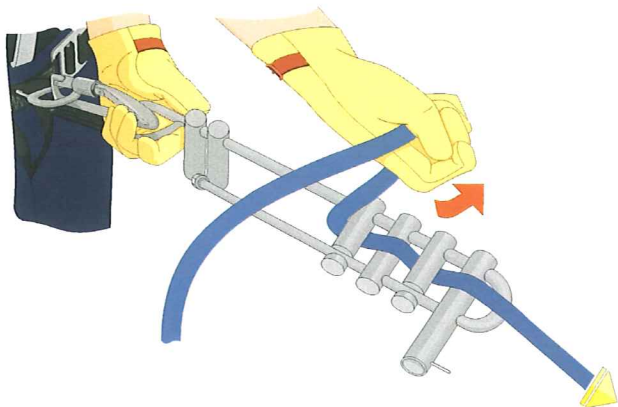
Figure 10-37: Pull the Running End to Tighten



8. Pull the running end to tighten the loop.

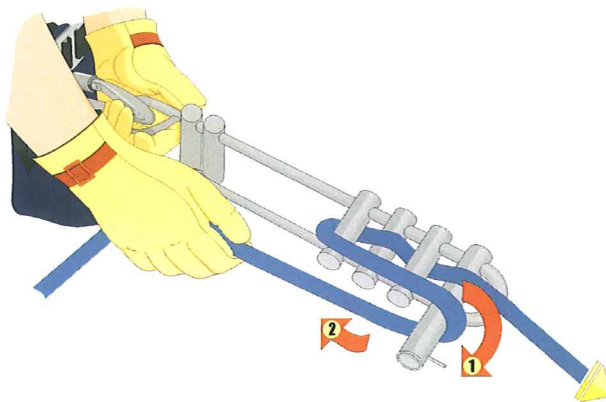
Brake Bar Rack with a Tie-off Bar

Figure 10-38: Position Hands



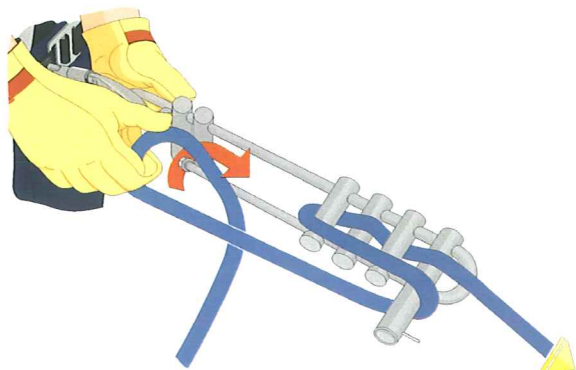
1. Position hands in the full brake position.

Figure 10-39: Wrap the Running End



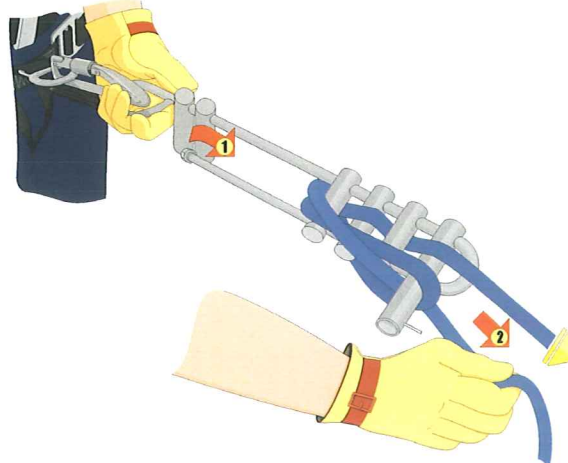
2. Wrap the running end around the tie-off bar with the brake hand.

Figure 10-40: Form a Half Hitch



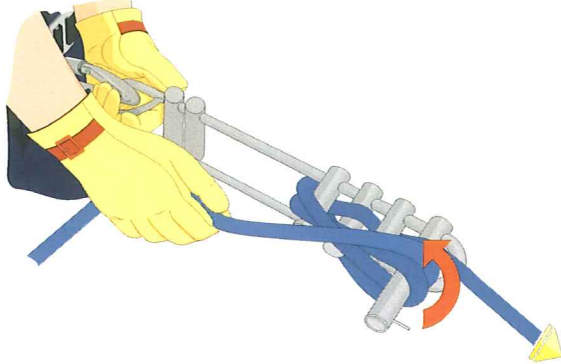
3. Form a half hitch in the running end near the opening of the rack.

Figure 10-41: Place over the Open End



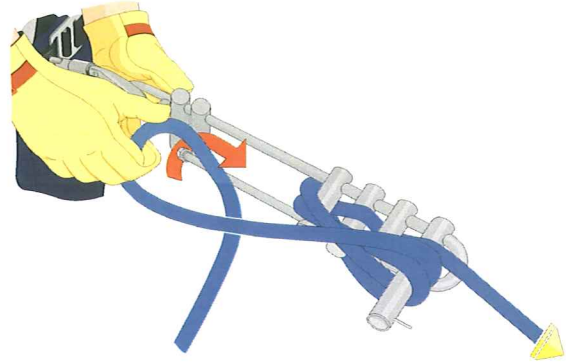
4. Place the half hitch over the open end of the brake bar rack and pull on the running end to tighten the half hitch.

Figure 10-42: Wrap the Running End



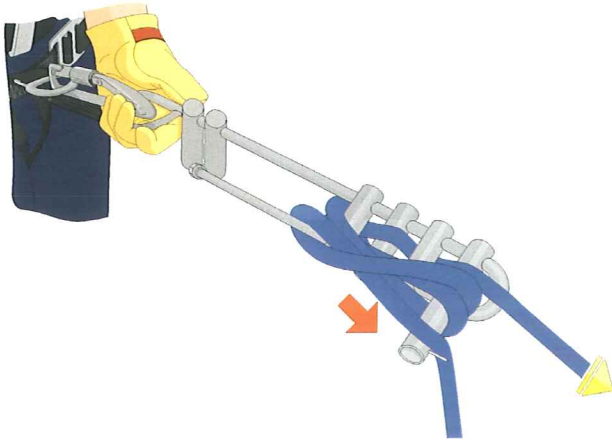
5. Wrap the running end around the tie-off bar a second time, but in the opposite direction.

Figure 10-43: Form another Half Hitch



6. Form another half hitch in the running end and place it over the open end of the rack.

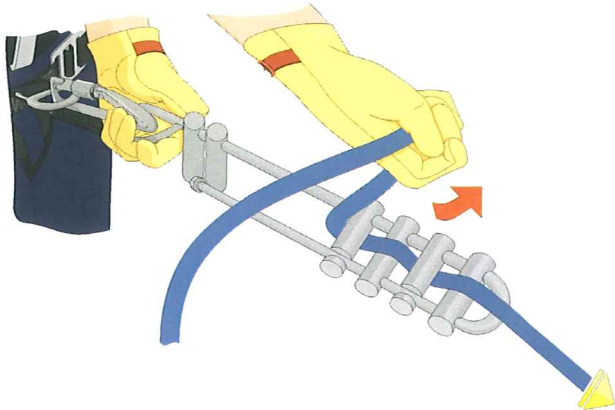
Figure 10-44: Pull the Running End to Tighten



7. Pull the running end to tighten second half hitch and place over the tie-off bar.

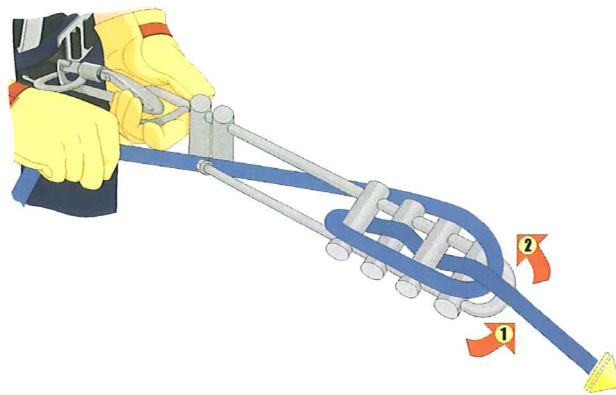
Brake Bar Rack without a Tie-off Bar

Figure 10-45: Position Hands



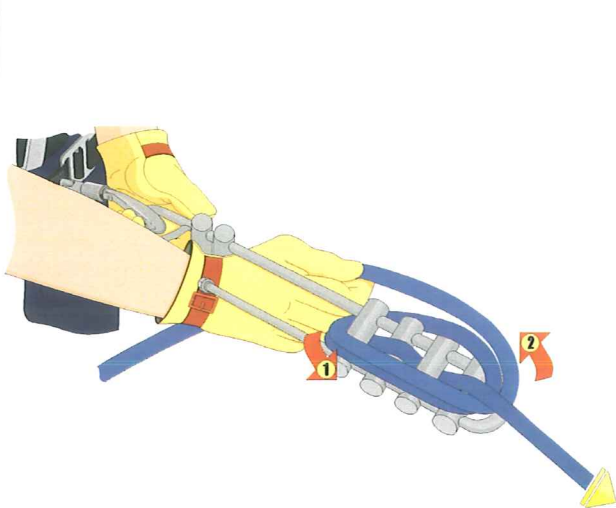
1. Position hands in the full brake position and rotate the rack towards the left.

Figure 10-46: Pull the Running End of the Rope



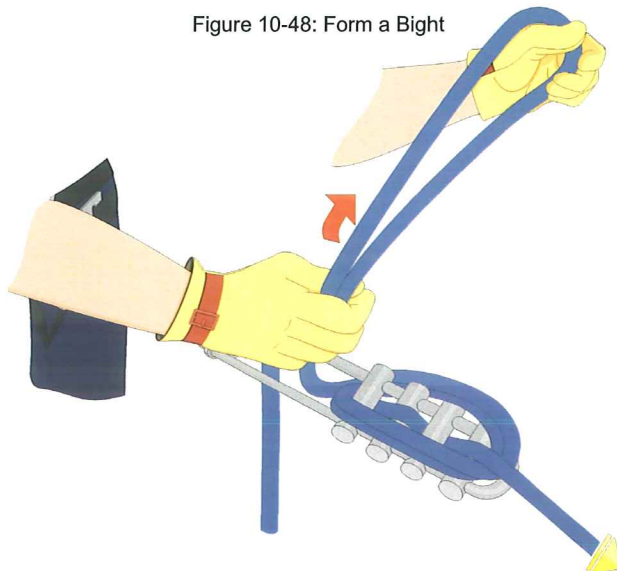
2. Use the brake hand to pull the running end of the rope across the top of the rack between the standing part of the line and the rack, continue wrapping the running end around the rack from top to bottom, come through the opening of the rack, and pull tight ending with the line above the first bar.

Figure 10-47: Make a Second Wrap



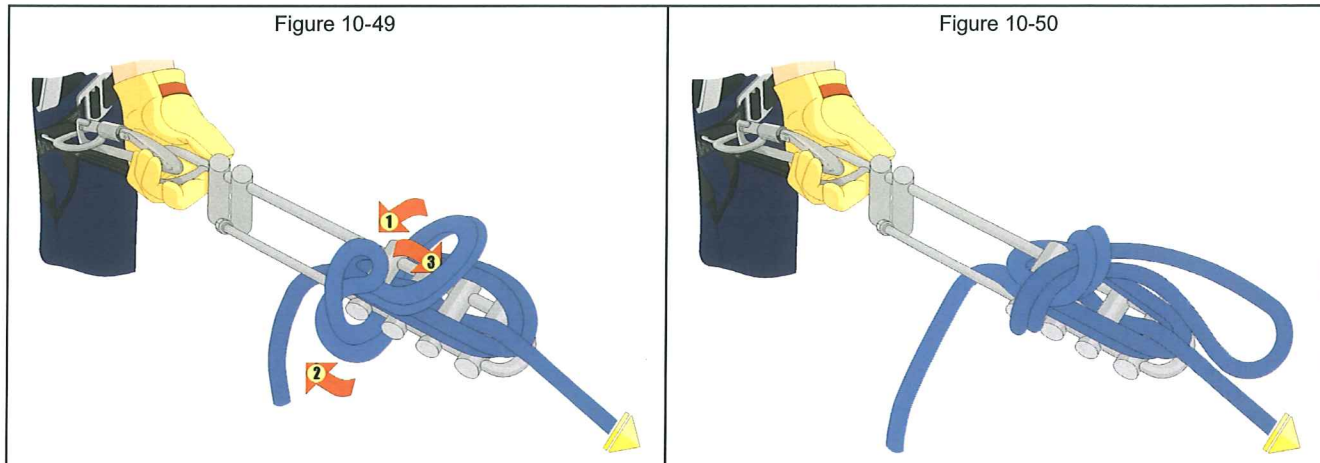
3. Make a second wrap by repeating Step 2.

Figure 10-48: Form a Bight



4. Form a bight in the running end.

5. Tie an overhand knot around the body of the rack. (Figures 10-49 and 10-50)



Ascending

Ascending is a very strenuous activity that is seldom used. On the occasions when it is required, it must be accomplished under controlled conditions or the outcome could be catastrophic. In most situations, it is better to bring rescuers up using a raising system from the top. In some instances, a rescuer needs to climb back to the point of origin after a rappel or for a self-rescue in the event of becoming jammed because of clothing or equipment caught in the rappel device during a rappel.

Equipment

One key to successful ascending, whether it is to return to the point of origin or for self-rescue, is to be equipped with the necessary equipment before the descent. The minimum equipment necessary for low angle ascending includes one (1) long prusik loop and one (1) extra carabiner.

Ascending for Positioning or Returning to Departure Point

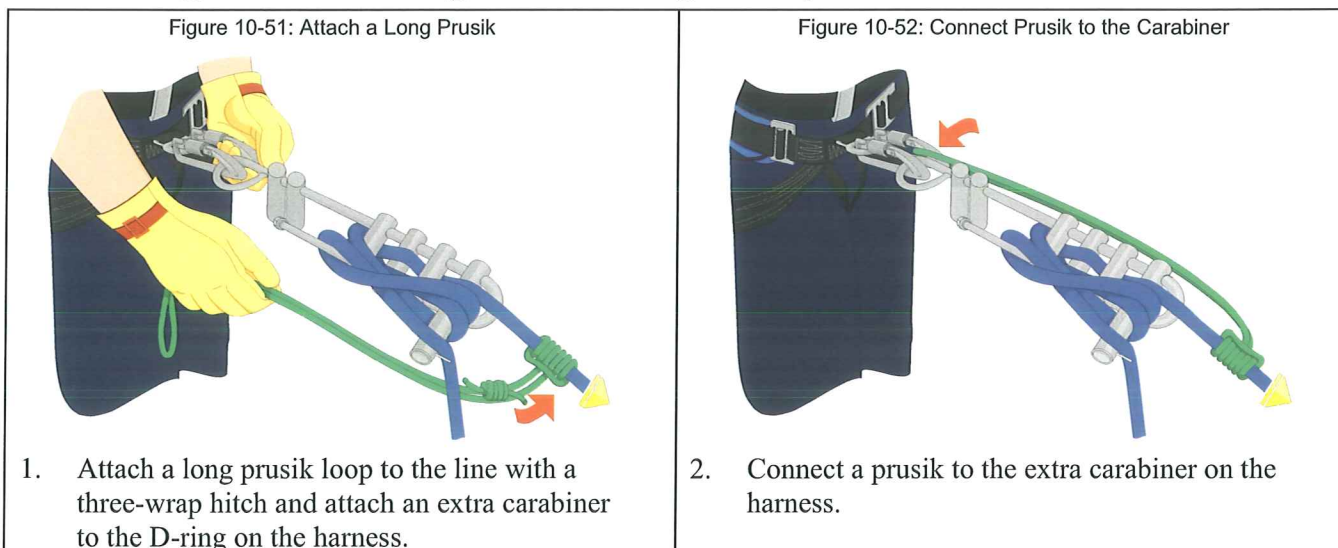


Figure 10-51: Attach a Long Prusik

Figure 10-52: Connect Prusik to the Carabiner

1. Attach a long prusik loop to the line with a three-wrap hitch and attach an extra carabiner to the D-ring on the harness.

2. Connect a prusik to the extra carabiner on the harness.

Figure 10-53: Slide Prusik Hitch up the Line



3. Slide the prusik hitch up the line with one hand while pulling the running end taut with the other hand. (Figure 10-53)
4. Simultaneously step forward.
5. Remember to keep the lower body perpendicular to the slope.
6. Disconnect the main line from the brake bar rack.
7. Repeat Steps 3-5 until the desired location has been reached.

How to Escape from a Jammed DCD

Topside Recovery Option

- Rescuer
 - Attaches a long prusik loop to the line in front of the DCD and connects it to the extra carabiner on the harness.
 - Slides prusik forward and leans back in order to tension/load the prusik.
- Topside Crew
 - Changes the fixed line over to a raising system and raises the rescuer to the top or a safe location to unjam the DCD.

Self-rescue Option

1. Attach a prusik loop to the line in front of the DCD and connect it to the harness with a second carabiner.
2. Ensure the Belayer is ready for raising belay.
3. Slide prusik hitch up the line with one hand while pulling the line taut with the other hand located between the DCD and the prusik hitch.
4. Simultaneously step forward.
5. Remember to keep lower body perpendicular to the slope.
6. Repeat these steps until there is enough slack to unjam the DCD.
7. Unjam the DCD.
8. Take slack out of the rappel line.
9. Lock the DCD.
10. Lean forward.
11. Remove the prusik.
12. Unlock the DCD.
13. Continue the rappel.