

THE PROCESS OF LEADING

INTRODUCTION	1
THE TYPES OF LEAD CLIMBS	1
PREPARING TO LEAD	2
The Belayer Anchor	2
Wearing A Helmet	3
Before “On Belay”	3
The Zipper-Stopper	5
LEADING TECHNIQUES—CLIPPING BOLTS	5
The Mental Game	5
Preparing Your Equipment	6
The Normal Sequence	6
LEADING TECHNIQUES—PLACING AND CLIPPING NATURAL PRO	7
The Mental Game	7
Preparing Your Equipment	7
The Normal Sequence	8
LEADING TECHNIQUES—OTHER PLACEMENT CONSIDERATIONS	9
Frequency of Placement	9
Placing Pro To Overcome Problems	10
Placing Pro With The Second In Mind	10
Place Pro According to Rock Type	10
Placing Slings As Pro	10
LEADING TECHNIQUES—OTHER CONSIDERATIONS	12
Be Aware of Your Body Position	12
Be Aware of Loose Rock	12
Conserve Energy While Leading	12
Simul-Climbing	12
Using Double Ropes vs. Single Ropes	12
HOW TO SECOND	13
HOW TO BACK OFF	14

INTRODUCTION

The process of leading requires a mastery of lead-specific techniques and an understanding of what can and does happen during the lead. Let’s review the **belay chain**, which is the leader’s safety line. All parts of the belay chain must be intact to protect the leader **and** the belayer adequately. The belay chain consists of the belayer anchor, the rope, the belayer and the belayer’s harness, all protection placed by the leader, the leader’s tie-in knot, and the leader’s harness.

The belayer and leader both must agree upon and establish the belayer anchor, and then must check each other out before putting the leader “On Belay.” After the lead starts, the leader must choose when, where and how to place pro, making conscious decisions about running it out or sewing it up. During this time, he/she must conserve energy; be aware of body position relative to the rope, the rock and the last piece of pro; and decide if, when and where to back off. This process can be simple, as in a sport climb with fixed anchors, or be complicated, as in a multi-pitch climb.

THE TYPES OF LEAD CLIMBS

Climbs are often categorized as **sport** climbs, **bolted** climbs, **traditional** or **natural pro** climbs, and **mixed gear** climbs.

Sport climbs are the more recent development, and have been the catalyst for a greatly increased interest in rock climbing and the development of specialized techniques and equipment for “clipping bolts,” or clipping a biner into a bolt hanger on a rock wall. Bolts are generally closely spaced, allowing for more frequent protection, and were often installed with a power drill. The anchors at the top are almost always bolt or “cold shut” anchors, and are increasingly

installed with the intent that the climber can simply clip into the anchor, run the rope through the anchor, and be lowered off or rappel down. Typically, sport climbs are 80' or less to allow for easy top-roping, and many are harder than older bolted routes. The feature that makes bolts easier to utilize is that the leader does not have to identify placements and set pro before hanging a runner or quickdraw.

Older **bolted** climbs often have more space in between the bolts, causing some people to look at these climbs as more “run out.” Although this is not correct in many cases, it is true that the leader will travel more distance between the bolts. Clipping these bolts will generally require the same techniques as sport climbing does. Most of these climbs were established “from the ground up,” meaning that the holes were drilled while climbing and often by hand. This results in a difference in the way the climb feels; there is usually a stance near a bolt that the first ascentist used to stabilize himself while he drilled the bolt hole. This means that today’s leader should be able to find a stance on which to lock off and clip the bolt during the climb. Older bolts were often quarter-inch bolts, which can and do break in lead conditions. Later generations of climbers starting using 3/8-inch bolts for more reliable protection. Also, before the widespread use of bolts, climbers used pitons hammered into the rock as protection placements. Although many were removed by the second during the climb, some were left in place, and are referred to in guidebooks as “fixed pitons.” These should never be removed, as today’s leaders depend on those pieces being there, and it can be dangerous if they are removed. Again, bolts (and pitons) eliminate the need for the climber to identify placements and set pro.

Traditional or natural pro climbs require the climber to identify protection placements, place gear, and then place a runner or quickdraw. Therefore, they take more time, more gear and are scarier for many people. With practice, however, the placements can be quickly made and the leader protected. This results in less impact to the rock, due to no bolt holes being necessary. This form of “clean climbing” developed when climbers recognized the damage being done to the rock by repeated pounding of pitons. Many people are worried that natural placements may not hold as well as bolted placements, and are less sure of their own ability to correctly place pro, which takes more skill than clipping bolts. The reality is probably that more natural placements fail due to improper placement, while more bolts fail due to fatigue or weathering, improper installation of the bolt, too weak a bolt, or bad rock.

Mixed gear climbs utilize both bolts and natural pro.

PREPARING TO LEAD

Read and understand the sections in this manual about how ropes are constructed and used, how they react in a lead fall, and how to avoid cutting or damaging them.

The Belayer Anchor

The **belayer anchor** is almost always mandatory during any lead. The **only case where you may safely decide not to anchor** (a mutual decision between the belayer and leader) is in a single-pitch situation where the belayer can stand or sit directly under the leader (i.e., there is no rockfall danger); there is no chance for the belayer to be pulled off the belay stance and down a hill or cliff; the belayer is not significantly lighter than the leader; and the belayer is experienced at lead belaying. In any other situation, it is dangerous to both the belayer and the leader to omit the belayer anchor.

On a single-pitch climb, if the belayer is not under the climber, he/she is not in the line of action, and can be pulled into the wall, or sideways into something else, like a tree. If this causes the belayer to lose control of the belay, both the climber and the belayer can get hurt. The forces generated in a lead fall are more than enough to jerk the belayer into the line of action. On the other hand, the belayer is safely out of the way of rockfall. A belayer anchor is mandatory in this instance. You may see belayers at popular sport climbing areas sitting in portable chairs well away from the wall, unanchored, just relaxing and enjoying the day. This is dangerous to both climbing team members.

On this same single-pitch climb, if the belayer is under the climber and in the line of action, omitting the belayer anchor allows the belayer to spot the climber easily to the first bolt, allows the belayer to dodge rockfall (if quick enough, which may not be the case), and allows the belayer to provide a “dynamic belay.” This is a belay where the belayer absorbs some of the shock of the fall by being pulled up, or is able to pull in more rope by dropping to the ground than when just using the arms to reel in slack. Many climbers believe that this helps to protect the rope by absorbing more of the shock that would have resulted by being brought up short against the belayer anchor. This normally happens on hard sport routes where the climber is “working” the route. Under these conditions, the belayer is usually directly below the climber, rockfall is (hopefully) a remote possibility, and the climb is overhung, so the climber can’t hurt himself/herself on a lower ledge. In reality, most leader falls are over too fast for a dynamic belay to be effective, but if the leader and belayer mutually agree that this is their intent, it is usually no worse than being anchored directly under the climber. The exception is a leader that significantly outweighs the belayer; the potential for the belayer to lose control is too great.

Another form of dynamic belay you may hear about is the “California running belay,” i.e., turning and running away from the climb while pulling in slack. A “California running belay” might partially work if the climber is well

above the last piece and is going to take a long fall; for most situations, it doesn't work at all, since the lead fall is over so quickly. We don't recommend it, but leaning or jumping backward can pull out at least some of the slack. Also, it should never be used by beginning belayers, or belayers not used to belaying lead climbers, and both the leader and belayer should agree to its use, because it has the potential to injure both members of the climbing team.

If you are not in the line of action, anchor. In a multi-pitch situation, or a belay stance from which the belayer can fall and get hurt, an anchor is absolutely mandatory. This is the most dangerous belay stance possible. We know of an experienced lead team attempting a climb from a ledge about 40 feet above the trail. The leader put in three marginal pieces and fell, pulling them all. The leader bounced off the ledge and continued down the 40 feet to the trail, dragging the belayer down after him. Both ended up in the hospital after hours of rescue work, with severe injuries that required over a year to heal.

The belayer anchor should be constructed so that the belayer is protected from the upward pull of a lead fall; if the belay stance is on a ledge, the anchor must also protect against a downward pull if the leader falls before placing the first piece. Usually, belayer anchors consist of a single sling or placement. This is because the forces on a belayer anchor can almost never be as much as the forces generated in a lead fall; the exception is in a hanging belay or other multi-pitch belay, where if the leader falls before placing the first piece, the belayer anchor must hold belayer and climber in the worst possible fall (factor two fall). In these instances, the belayer anchor and multi-pitch anchor are the same, and should meet all the standards of a top-rope anchor. A typical belayer anchor for a lead climb consists of a single sling around a tree or a boulder, or a single piece placed in a crack with webbing connecting to the belayer's harness. If you deem the placement to be marginal, set a second piece and equalize them; stronger anchors are not wrong, and if you want them, set them. The belayer's body should absorb most of the shock in a belayer anchor, unless the belayer is significantly lighter than the leader.

Hanging belays can be more complicated. A hanging belay constructed of natural pro placements needs to have an additional piece placed below the belayer to resist an upward pull. Since the main anchor pieces that prevent the downward pull are probably directional, a belayer that is pulled upward can pull the pieces up out of their placements and fail the whole anchor. A hanging belay on bolts is multi-directional; it does not need the upward directional, and usually has no place to set one.

Wearing A Helmet

Before you start, make sure you are wearing a **helmet**—a climbing helmet. After you have learned the art of protection, you can make an informed decision about wearing or not wearing a helmet. This is the single most important piece of strictly safety equipment you should have. It is too easy to lose control during a lead fall, either flipping upside down, sideways, or in some other direction, or to swing in a pendulum's arc into the rock from a leaning climb. Head injuries are serious—just ask SOHI, or Survivors of Head Injuries.

There are several reasons people give for not wearing helmets. They are hot. They are sometimes uncomfortable. You can't hear with a helmet on. They are ugly. But the risk of a head injury is too great. Imagine yourself doing a pushup on the sidewalk, with your head about 18-24 inches above the cement. Imagine someone kicking your arms out from under you. You would be seriously hurt from this less-than-two-foot fall. The chances are that a lead fall will be longer than two feet, and it may well swing you straight into a solid rock wall.

Before “On Belay”

Before the leader starts out, he/she must prepare for the lead. Here is a checklist of items to consider.

- If you have windy conditions, set up signals beforehand (long tugs on the rope, whistles, etc.) or consider shortening the pitches to allow you to hear each other.
- Make sure your gear is racked or re-racked. If you have a dihedral or chimney coming up, consider on which side you have gear racked or how to handle a pack.
- Make sure you have enough draws for the lead; one draw used every 15' equals ten draws needed for a 165' pitch, and that may not be enough.
- Make sure you have thought about what gear you may need for the anchor.
- Make sure your rope is flaked properly and not in danger of catching on something or getting snarled.
- Make sure you understand where the route goes, and make sure you are carrying any guides or maps you intend to take.
- Make sure the belayer is anchored, or that both of you are willing to take the risk of not anchoring.
- Both of you should verify that the leader's harness is doubled back, the climbing tie-in knot is correct and through both loops.
- Both of you should verify that the belayer's harness is doubled back, that the rope is through the belay device correctly, and that the locking biner holding the belay device is locked and oriented correctly.
- If possible, the belayer should “spot” the leader until the first piece of pro is placed and/or clipped.

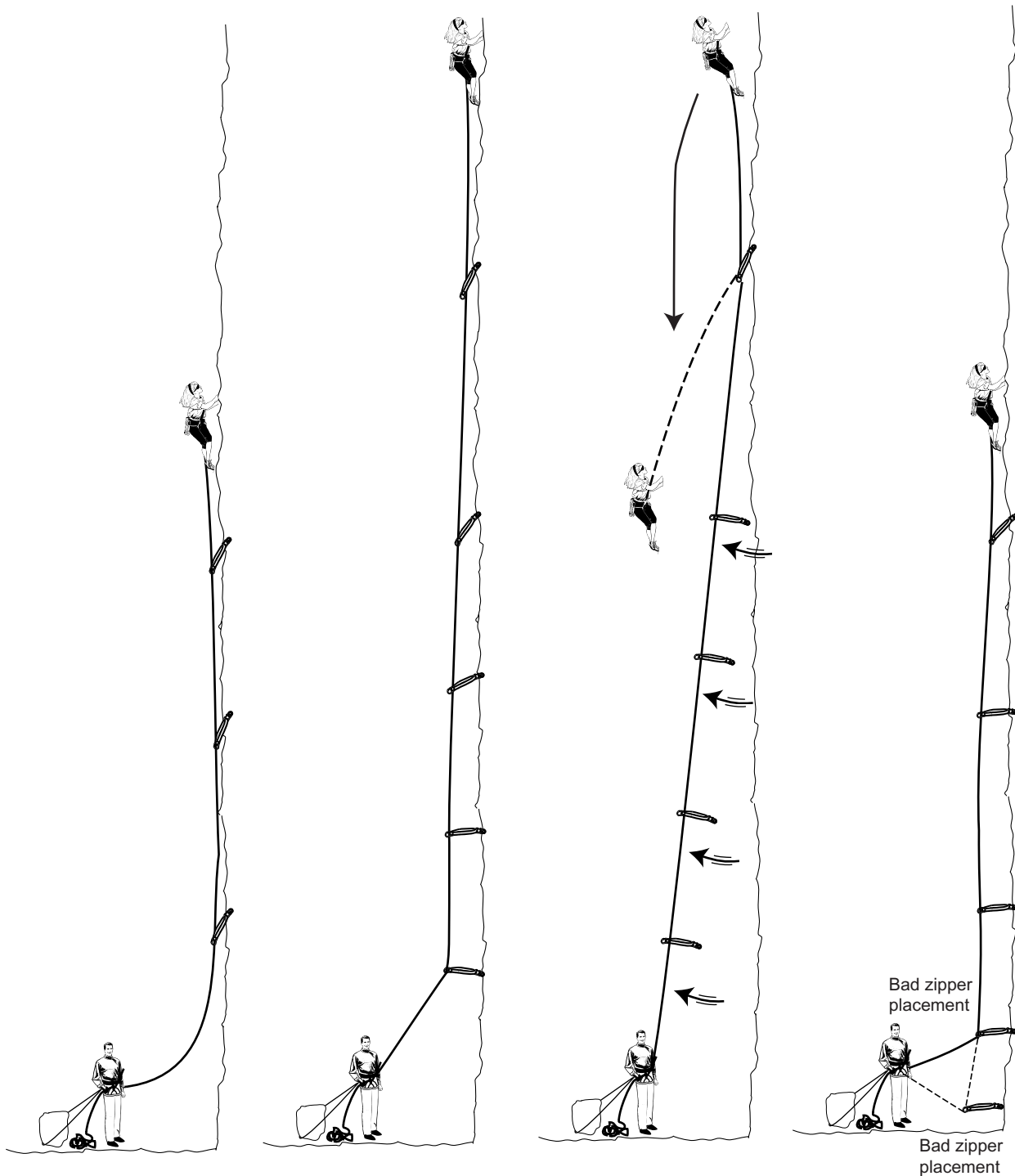


Fig 24-01

Zipper stopper:

1—This is a typical belay stance and a typical loose rope

2—This belay is too tight, but illustrates how the rope attempts to center itself between the climber and belayer

3—When the climber falls, the top piece still holds downward pressure, but all other pieces are lifted up and out of their placements to allow the rope to center between the belayer and the top piece

4—The bottom two “zipper stoppers” are too low; they will cause tremendous drag during the climb. Often, the best zipper stopper is the first piece being set to hold multi-directional force (both down and out)

Only then is the leader “on belay.” In most cases, it is impractical and sometimes dangerous to “catch” the leader. Spot the leader by preventing his/her head from hitting the ground. Sometimes this requires setting a belayer anchor but not clipping into it, then spotting until the first piece of pro is clipped, then clipping into the belayer anchor and putting the leader “on belay.”

The Zipper-Stopper

The term “**zipper**” refers to the action of pulling out two or more pieces of pro. If you take a lead fall, and the top piece and the second-to-the-top piece both pull, you have “zippered” the pro.

A **zipper-stopper** is a piece of pro intended to resist an outward and upward force. A well-placed zipper-stopper will prevent the pieces above it from being pulled out.

To understand this, picture a series of placements in a vertical crack. Picture the belayer standing away from the cliff. This results in a configuration where the rope travels horizontally or at a less-than-vertical angle to the first piece, and then straight up through the pieces. The line of action in this scenario is from the belayer to the highest piece of pro. If the leader falls, the rope will attempt to align itself in the line of action. This will place a horizontal (or slightly upward tending) force on each piece except the top one. Since all the pieces in this scenario are placed to withstand a vertical fall, and not a horizontal one, each one may be pulled horizontally (or slightly upward) and out of its placement, leaving the highest piece the only one remaining. This will happen almost instantaneously, and if the highest piece fails, will result in the leader decking. Also, the force of a lead fall is such that there is a secondary action that occurs. The belayer, away from the wall, is now faced with being pulled into the wall, which may cause him/her to lose control or be injured.

Always place a zipper-stopper as the first piece on a natural pro lead. Bolted climbs do not require zipper-stoppers, since they function as multi-directional placements which resist upward and outward pulls. There should not be enough of an outward force to pull a bolt out, even though that is the bolt’s weakest configuration.

The ideal zipper-stopper is placed somewhat above the belayer’s stance, so that it does not cause drag during the lead. (Imagine a zipper-stopper placed at ground level—the rope runs from the belayer down to the ground and up again to the leader.)

The first piece of the climb is not the only place for a zipper-stopper. Imagine another scenario in which the climb zig-zags, first to the left, then to the right. If the zig-zag is not great, there won’t be a problem. But if there is too much change in direction, first left then right, a leader fall can place right-horizontal force on the left-leaning pieces and left-horizontal force on the right-leaning pieces. A well-placed zipper-stopper is needed at the beginning of each change of direction to prevent zippering. Wedges such as stoppers and hexes are more susceptible to this; SLCD’s can generally handle multi-directional forces better, but it is still better to place a zipper-stopper to protect against specific directional force.

LEADING TECHNIQUES—CLIPPING BOLTS

You have gone through your pre-flight checklist. You must now check to see that you have the right amount, type and assembly of gear. Then you are ready to leave the deck. Let’s discuss how best to protect yourself from injury.

We will study each step of the process in detail. In some of these instances, the “best” or “safest” technique is not clear-cut. This is partially because the factors at work in a lead fall are too varied to reproduce in a laboratory test environment, or the manufacturers would have done the testing. Indeed, much of what we know has come from existing testing as well as the investigation of accidents. There are many more tests the engineers would like to perform, but haven’t been able to figure out how. In those instances where there is no clear-cut consensus in the climbing community as to the safest technique, we will present both views and give the rationale behind them. Some of the considerations we will discuss boil down to personal choice.

Another reason it is difficult to determine the “safest” method is that there are tradeoffs. Sometimes you decide you need to protect against a specific danger and are willing to accept the risk of another danger in doing so. Where there are tradeoffs involved, we will discuss them, and you can make up your own mind. Since part of the game is so mental, it is important that you act to assuage the greatest of your own fears.

Knowing how to put up a quickdraw and clip a rope to it is necessary for all types of climbs. On bolted climbs, the technique consists of clipping one end of a quickdraw into the bolt hanger and then putting the rope into the bottom biner of the draw. With variations, this is the same type of action in working with natural pro.

The Mental Game

Treat the climb as a series of bouldering moves from bolt to bolt. Your entire goal in life after you leave the relative safety of the temporary “top-rope” at the current placement should be to clip the next hanger and then clip the rope in. Anything that distracts or delays you from doing this is potentially dangerous. Most people who fall do so because they can’t hold on any longer. The risk of you falling increases the longer it takes you to make the clip. And the

risk of getting hurt is vastly greater from falling than from not falling.

Think two moves ahead. Be ready to clip each bolt as you come to it. Know which way the route continues after this bolt. This may sound like too much to stay on top of, but think about driving. You often plan how to change lanes on a busy freeway by looking to the front, side, and rear before making the change, and you plan those lane changes based on the exit you need to take.

Preparing Your Equipment

Count your draws before you leave the ground. It is wise to carry at least one more draw than you have bolts, in case you drop one or miscount the bolts on the climb. It is also a good idea to carry some on the right and some on the left, to allow you to unclip one from your harness with either hand.

A quickdraw has a “top” biner and a “bottom” biner. It is better to have an asymmetrical D as the top biner. It is harder to cross-load an asymmetrical D in a bolt hanger since it doesn't have parallel sides; the biner tends to self-orient correctly. It is typical to have either a bent gate or a wire gate on the bottom; both are asymmetrical and thus resistant to cross-loading. A bent gate helps to capture the rope, making the clip faster; the wire gate has no mass in the gate, therefore eliminating the gate flutter problem. The top biner should be free to rotate in the quickdraw to absorb motion, but the bottom biner should be fixed to the quickdraw with a rubber stiffener or tape to reduce the chance of rotating. The top biner should be oriented nose up and the bottom biner oriented nose down for racking on your harness. The gates should face the same way. (Never use an oval in draws or runners intended for leading.) The top biner should be the one clipped into your harness. The direction of clipping (gate away or gate toward you) is a personal choice.

The Normal Sequence

Find the stance you want to use. “Lock off” with one hand and both feet on the rock (three-point contact). Remember that on many older bolted climbs, the first ascentist had a stance from which to drill. Find this stance instead of trying to clip from a more tenuous position. Stabilize yourself.

Choose and remove the right length draw from your harness. Many people carry different length quickdraws, even for bolted climbs. The length of the quickdraw is a two-edged sword. A shorter draw limits the length of the fall, but a longer draw is less likely to twist or rotate the upper biner and open its gate as the climber moves upward. Use the shortest draw you safely can, but do not “gang” biners (connect biners directly to each other) or use only one biner to reduce the length of fall.

The webbing that connects the two biners acts as an independent suspension. As you move upward, you may pull the rope-bearing biner up with you, pulling the draw up as well. If you are moving to the side, you will definitely pull the rope-bearing biner toward you, along with the draw. Generally, the more tension there is pulling the draw, the more likely there is to be a problem with the upper biner as it rotates in the bolt hanger. If you are going straight up, there will be less tension, and you can use a shorter draw. If you are traversing to the side, you will cause more tension, and you may want a longer draw. However, if you are approaching the limit of your climbing ability and are more worried about falling, use a shorter draw to limit the length of the fall. There is a tradeoff between the two, and you must decide which gives you more confidence in the placement.

Clip the upper biner into the bolt hanger in the proper direction. Keep track of the direction of the climb so you can properly orient the biner gates. Aim both gates in the opposite direction of the route. If the climb is vertical, it doesn't matter. You will see why when clipping the rope, as discussed below.

Reach down and pull up rope. If you don't get enough rope in the first grab to clip the draw, lightly bite the rope and hold it in your teeth while you reach down and grab more. Be aware that people have occasionally fallen with the rope in their teeth, which can cause severe injury. If the hanger is near your chest, you may be able to bring up enough rope with one grab. Some people prefer to work the rope up with their fingers until they have enough, but this is awkward and time-consuming. Pulling up rope will be easier near the bottom of the pitch because it doesn't have as much rope weight.

Clip the rope into the rope-bearing biner. Practice this so that you always clip the rope through the biner in the proper direction (from the rock through the biner to you). There are four ways to clip: right-handed, with the gate facing right; right-handed, with the gate facing left; left-handed, with the gate facing right; and left-handed, with the gate facing left. The hand you use will be dictated by the holds available for locking off; if you have to hold on with your left hand, you clip with the right and vice versa. It sounds simple, but you need to be proficient in all four orientations. Remember, a measure of your skill (and a safety requirement) is that you are efficient in your actions. The leader who clips easily in one motion can save energy and return to the climb after clipping; the leader who fumbles the clip will burn out more quickly, and may be limited to easier climbs. Near the top of the climb, use the weight of the rope to help make the clip; oftentimes, you can lift the rope to the gate and let it roll off your fingers into the biner, letting the clip happen. Practice, practice, practice.

The rope-bearing biner should always be oriented nose down and gate away from the rock (down and out). Most of the time, this biner will lie flat against the rock, or parallel to the rock. Never clip a hanger so that the biner's gate aims at the rock. This will reduce the possibility that the nose of the biner can get hung up and significantly weaken the placement.

Check the condition of bolts and pitons as you clip them. This should be automatic and can be done almost instantaneously as you add the draw. The only bolt conditions you can remedy on lead are orienting the hanger correctly and tightening the nut. Broken hangers, protruding bolts, and broken rock are not repairable on lead. The best you can do is to recognize the problem. You will have to decide if you are going to continue the lead. Some times, it is safer to continue than to try and bail. One bad bolt on the whole pitch is not necessarily a reason to bail, but you may want to reconsider if it looks like there may be more. Do not delay clipping in order to check the bolt; examine it more thoroughly after the rope is safely clipped in. Even a bad bolt is better than no bolt at all, and a bolt that breaks may absorb some of the fall forces and lessen the impact on the next lower piece of pro. If you find a bad bolt or piton, don't pull it out.

Pitons may require some special consideration. In general, pitons are older than bolts and have survived more weather. As long as they are properly placed, utilize them by clipping a biner through the eye hole or ring. If the piton is protruding from the rock, clipping the eye hole may lever it over an edge and cause the piton to fail by coming out or breaking. You should "tie it off short." This means you should take a short draw with no biners, or a short sling, and girth-hitch it around the piton as close to the rock as you can. Then clip the rope-bearing biner into the girth-hitched sling.

LEADING TECHNIQUES—PLACING AND CLIPPING NATURAL PRO

Placing natural protection takes longer and is a technique for traditional or natural pro climbs and mixed climbs (read the "Protection" chapter). It requires that the leader identifies where and what kind of pro should be placed, makes the placement, adds a draw (if necessary), and then clips the rope.

Once again, we will study each step of the process in detail, and in some of these instances, the "best" or "safest" technique is not clear-cut. In those instances where there is no clear-cut consensus in the climbing community as to the safest technique, we will present both views and give the rationale behind them. Some of the considerations we will discuss boil down to personal choice. Where there are tradeoffs involved, we will discuss them, and you can make up your own mind.

Many people shy away from natural pro climbs because of the extra technical skill required and because they don't have the confidence in their ability to place pro safely. It may help to practice these skills in top-roped simulated lead conditions before deciding it is not for you.

The Mental Game

All of the considerations needed for clipping bolts are necessary in placing natural pro, but with more choices and variations. Again, treat the climb as a series of bouldering moves. Remember, your entire goal in life after you leave the relative safety of the temporary "top-rope" at the current placement should be to complete the next placement and clip in. Think ahead. Remember that it takes longer to make natural pro placements than to clip bolts, so efficiency and speed are even more important. Look at the direction of the climb so you know where the rope will lie.

Preparing Your Equipment

Determine what pro you need to carry before you leave the ground. You will need runners and enough pieces to handle all the placements and anchors. Since you may not be able to determine exactly which pieces you may need—you may look up and not be able to tell if you need two #3 cams and three #2 cams or vice versa—you will need to carry extra gear. There is a tradeoff between carrying everything you might need versus carrying a stripped-down selection. In one case, you have more weight, in the other, you risk running out of pieces.

Use runners instead of quickdraws. Although you can use quickdraws for natural pro, it is better in most cases to use runners that do not have the stiffness of quickdraws. Bolt hangers are rigid and resist the force placed on them by the movement of the quickdraw. Natural pro is different. It is easy to move natural pro by placing moderate forces on it. The longer, non-stiffened runners tend to absorb this movement. In addition, you can double or triple longer runners for a smaller profile on your harness, and have the extra length if you need to extend the runner to reduce drag. It is also common for leaders to carry a selection of longer runners. These will help when the climb moves back and forth.

A runner should have a "top" biner and a "bottom" biner. It is generally better to have the same types of biners in the runner as in the quickdraw because the resistance to cross-loading and the ease of clipping the rope are still valuable features. Therefore, it is better to have an asymmetrical D as the top biner and to have either a bent gate or a wire gate on the bottom. Both biners in a runner are usually free to rotate, but it is not a bad idea to fix the lower one with tape to reduce its chances of rotating. The top biner should be oriented nose up and the bottom biner oriented nose down for

racking on your harness. The gates should face the same way, although they won't be held in place as the runner twists. (Never use an oval in draws or runners intended for leading.) The top biner should be the one clipped into your harness. The direction of clipping to your harness (gate away or gate toward you) is a personal choice.

The Normal Sequence

Identify your choice of placement carefully and quickly. Identifying the placement depends on many factors: the distance from the last piece, the pieces available, etc. (See the next section for considerations of how often to pick a placement.)

Evaluate each and every placement. This also depends on many factors. Natural pro climbs utilize cracks or other features of the rock. This diversity of rock surfaces has the potential to cause problems, as described below. There are more edges to push biner gates open, or to catch a biner nose. There are potentially more surfaces against which the biner can slap and open the gate. It takes a more practiced eye to evaluate the relative safety of the natural pro placement. In any case where you feel there is a danger of the gate being pushed open, adjust how the biner is placed to minimize the danger.

Find the stance you want to use. “Lock off” with one hand and both feet on the rock (three-point contact). Stabilize yourself.

Choose and remove the piece from your harness that you want to place. As you get more experience at choosing pieces, you will be able to pick the right one and plug it in. To get good at it, try correlating pieces to your fingers and hands. For example, if a #1 Camalot™ is the same size as the heel of your hand, you know you can pick that piece any time you have a hand jam that size.

Smaller pieces such as wired nuts may be more difficult to size. Some people rack several nuts on the same biner. Ovals work best for this purpose. To place the nut, pull the biner holding the probable correct size and hold the nuts up to the placement. Select the right one, place it, and set it. Don't unclip the gear biner with the rest of the nuts and replace it on your rack until you have clipped the rope.

Place the piece to resist the direction you believe a lead fall will take. Even though moderate force from tension on the runner may change the orientation of the piece, start it out right. Evaluate the placement and think about a way to resist this re-orientation.

Decide whether or not you want to place a runner on the piece. Most pieces will have a biner already attached that was used to hold the piece on your harness; wired nuts may not. If the climb is vertical and there will be limited tension on the piece, clip the rope into this biner. This becomes the rope-bearing biner. As long as the climb does not traverse from side-to-side too much, the piece should stay put. If the climb weaves or traverses significantly, you may need to add a runner to the piece.

Choose and remove the right length runner from your harness. Most people carry different length runners for natural pro climbs. Pick one that you believe will reduce the tension on the piece most effectively but also limit a potential lead fall. Again, the length of the quickdraw is a two-edged sword. A shorter draw limits the length of the fall, but a longer draw is less likely to twist the piece as the climber moves upward.

Clip the runner's upper biner into the piece in the proper direction. There are two considerations here. One is that unlike bolt hangers, pieces do not always hold a runner's biners parallel to the rock. For example, an SLCD placed in a horizontal crack will hold a biner perpendicular to the rock, but an SLCD placed in a vertical crack holds the biner in the same parallel orientation as a bolt hanger. If the biner will be perpendicular to the rock, make sure the gate is facing away from the rock—clip the piece's cable or sling from the back. If the biner will be parallel to the rock the same as it would be in a bolt hanger, you will need to keep track of the direction of the climb so you can properly orient the biner gates the same way you do with a bolt hanger. Aim the gate away from the path of the route. If the climb is vertical, it doesn't matter. Keep in mind also that as the leader moves upward past the placement, he/she often pulls on the runner that this upper biner is attached to. The weighting and unweighting process sometimes rotates the biner the wrong way.

In every case, read the rock. Look for irregularities, edges, horns, or any other feature that you believe will potentially open the gate, hook the gate notch or lever the biner over an edge. If you see a problem, adjust the biner by turning it so the gate will not push against the irregularity.

If there is no obvious problem, there are two schools of thought as to how to orient the upper biner:

The “clip and flip” proponents believe that rotating the biner nose down is safer in most cases and they flip all biners nose down unless they can verbalize a reason not to. They believe that a biner that is oriented nose up is more likely to catch on the rock and break (biners that open and hang up on the nose can break under 300-400 pounds of force). The disadvantage is that it takes longer to clip the rope if you flip the biner first, thus increasing the chance of falling, which increases the chance of getting hurt or killed. And, if you flip every biner after clipping the rope, it takes more time overall to finish the lead, and it takes even more time for the second to “un-flip” each biner and clean the route. This leads to longer pitches and increases the possibility of getting caught on the wall at dark, which is more dangerous than climbing in daylight.

Proponents of the second school of thought simply leave the biner as clipped unless they see a reason to flip it due to the irregularities in the rock. They argue that this minimizes the chance of falling and of being stuck on the rock after dark. The upper biner doesn't always stay in the original orientation when the leader goes up past the placement. When this happens, the biner is nose up when the runner is released anyway.

There is no hard and fast rule that has developed in the climbing community to address this orientation issue. Three out of four U. S. "biner professionals" (Omega Pacific, REI, and Black Diamond—BlueWater was not contacted) recommend against default "clip and flipping," opting instead to recommend that the climber let each placement determine the orientation. They also generally recommend speed and efficiency and getting off the rock before dark.

Reach down and pull up rope. If you don't get enough rope in the first grab to clip the runner, lightly bite the rope and hold it in your teeth while you reach down and grab more. Be aware that people have occasionally fallen with the rope in their teeth, which can cause severe injury. If the placement is near your chest, you may be able to bring up enough rope with one grab. Some people prefer to work the rope up with their fingers until they have enough, but this is awkward and time-consuming. Pulling up rope will be easier near the bottom of the pitch because it doesn't have as much rope weight.

Z-clipping is a danger with natural pro, but not with bolted climbs. Sometimes a leader will place a piece and clip the rope to it, then decide to place another one above but very close. After the higher piece is placed, the leader reaches down for rope, grabbing it by feel instead of being able to see it underneath the gear hanging from his/her harness. The correct rope to grab is the rope that comes out of the previous placement's rope-bearing biner and runs to the leader's tie-in. If the leader grabs the rope that is between the previous biner and the next piece farther down, the rope ends up in a "Z" configuration that stops the leader cold due to drag.

Clip the rope into the rope-bearing biner. Clip the rope into the proper direction just as on a bolted climb (from the rock through the biner to you). There are four ways to clip: right-handed, with the gate facing right; right-handed, with the gate facing left; left-handed, with the gate facing right; and left-handed, with the gate facing left. The hand you use will be dictated by the holds available for locking off; if you have to hold on with your left hand, you clip with the right and vice versa. It is even more important when using natural pro for the leader to clip efficiently in one motion and return to the climb because the placement takes longer to begin with. Again, near the top of the climb, use the weight of the rope to help make the clip; oftentimes, you can lift the rope to the gate and let it roll off your fingers into the biner, letting the clip happen. Practice, practice, practice.

The rope-bearing biner should always be oriented nose down and gate away from the rock (down and out). Most of the time, this biner will lie flat against the rock, or parallel to the rock. Never clip a hanger so that the biner's gate aims at the rock.

LEADING TECHNIQUES—OTHER PLACEMENT CONSIDERATIONS

The last section described the general sequence of clipping bolts and placing natural pro. Now let's look at other factors in the decision to place pro. Bolted climbs make the decision for you; you usually can't place anything in between the existing hangers. When using natural pro, however, you have to decide when and where to place. This decision is based on several factors, and is unique to every route. These are some general points to consider.

Frequency of Placement

On bolted climbs, the frequency of placement is determined for you. On natural pro and mixed leads, however, you need to decide how often you should protect. Placing pro at safe intervals or more often is sometimes referred to as "**sewing it up**." To begin with, consider how long the pitch is. A full 165' pitch, protected every ten feet, requires at least 15 pieces, with a draw possibly necessary on each one. However, good placements may not be available every ten feet, or on any kind of a regular basis. Therefore, you usually end up taking more pro than you need.

If you lead long enough, you will be faced with the question of whether or not you should "**run it out**," or climb higher than you feel comfortable without protection. This is not always an easy question, and depends on many factors. Sometimes it is too late to bail out by the time you determine you are in trouble. You may not be able to downclimb to the last piece and back off.

Here are some considerations to think about during the lead.

- If you fall on the belayer you may affect his/her ability to hold your fall. If you fall on the belay anchor, you may alter or damage it. Place your first piece off the belay stance as soon as you can, and place pieces closer together near the bottom until you are safely above this danger zone.
- On a multi-pitch climb, a fall before the first piece of a pitch is placed can result in a factor two fall. This is another reason to pro early and often.
- Place a zipper-stopper as soon as possible above the belay. If you can, place one from the belay stance.
- If you think you may be coming to a section that won't take pro, double up on pro before you come to it. This is sometimes referred to as a "double-stitch."

- Consider setting two equalized pieces before entering the crux to hold a fall better.
- After you go through the crux, avoid the temptation to finish without setting more pro. Some people neglect this after the adrenaline buzz subsides.
- What is your skill level? If this climb is easy for you, you can afford to take more chances.
- What is the rock quality? Even if you are an excellent climber, manky rock is dangerous.
- How far are you from your last piece? How can you limit the length of your fall right now?
- Do you have enough gear to protect the rest of the climb? Do you need to start rationing your gear?
- Can you find a good placement off-route to one side?

Placing Pro To Overcome Problems

- Place a directional piece to run the rope around natural disasters (pinching cracks, cactus, sharp edges, and overhangs).
- Bends induce rope drag. Plan pro to reduce drag. Extend runners as necessary.
- Try not to take up the best handholds with pro.
- Try to place pieces as high as you can from your current stance (but keep the second in mind). Placing a piece at thigh or knee level requires that you start looking for another placement earlier than you may want to.

Placing Pro With The Second In Mind

- How far does he/she have to reach from the stance? Measure your second's highest reach on your own body and try to place pieces where they can be reached easily. However, remember that it is more important to keep the leader safe—the second can hang and work the piece at leisure if necessary.
- How well set is the piece? Avoid jamming the piece if possible, which will require the second to hang while working with a nut pick.
- Protect the second on a traverse by placing pieces on the horizontal part if possible. A traverse can be more dangerous for the second than the leader, depending on where the pendulum swing will take the second.
- Talk to your second on the way up if there are potentially dangerous places, tricky sections or special instructions on pulling pro. You may need them to be especially watchful on the belay or you may need to tell them how you protected a particular spot.

Place Pro According to Rock Type

Keep in mind the type of rock you are climbing on. There are hard, medium and soft rock types. Basalt (Oak Creek Overlook, Paradise Forks), dacite (Mt. Elden), granite (Granite Dells, Granite Mountain, McDowell Mtns., Yosemite, Tahquitz), quartz monzonite (Joshua Tree), and granite gneiss (Mt. Lemmon) are very hard rocks, and don't drill easily or break easily, although you can find rotten or crystallized forms that crumble easily. Placements in these rocks are usually very reliable. Basalt allows you to place cams near the edge of the crack without fear of chipping any off.

Medium hard rocks like rhyolite (Queen Creek, Superstitions), quartzite (Promised Land) and limestone (The Pit, Jack's Canyon) are usually bolted. Natural pro will normally work well, but take extra caution, as pieces such as cams can dig in and cause holes or slip out of this rock.

The softest rock—sandstone—requires the most care. Even the hardest sandstone like the Wingate at Indian Creek will allow slippage of cams. Red Rocks sandstone near Las Vegas is usually reliable, but much of it is bolted. The softest sandstone, like Sedona's Schnebly Hill or the formations at Arches, are considered iffy at best. Cams placed in sandstone cracks need to be placed well back in a crack, as a fall can easily break off the edge. Tri-cams™ are often used with the sharp end aimed to dig a hole in the rock as part of the stopping power. Small stoppers can gouge a groove in the placement and fail; it is better to use larger wedges. Stories are told of early ascents in the canyon country where bolt holes were drilled and the bolts could be immediately pulled by hand. This lessened reliability may dictate more frequent placement—or it may mean that the placements are all psychological and that the climbing team is essentially free-soloing.

Placing Slings As Pro

Slings also can be placed on natural pro climbs. Girth-hitched or slip-hitch slings around chickenheads and rock tunnels. In some instances you may be forced to wrap a "shallow" rock projection, such as a horn only a couple of inches high. It may look to you like you will lift the sling off the top of the placement. Add a heavy object such as a water bottle or heavy cam to help keep it in place. Also, knotted slings can be used in a pinch as a "wedge." Just tie the knot and place it in a constriction like you would a nut, but make sure it is not contacting sharp surfaces.

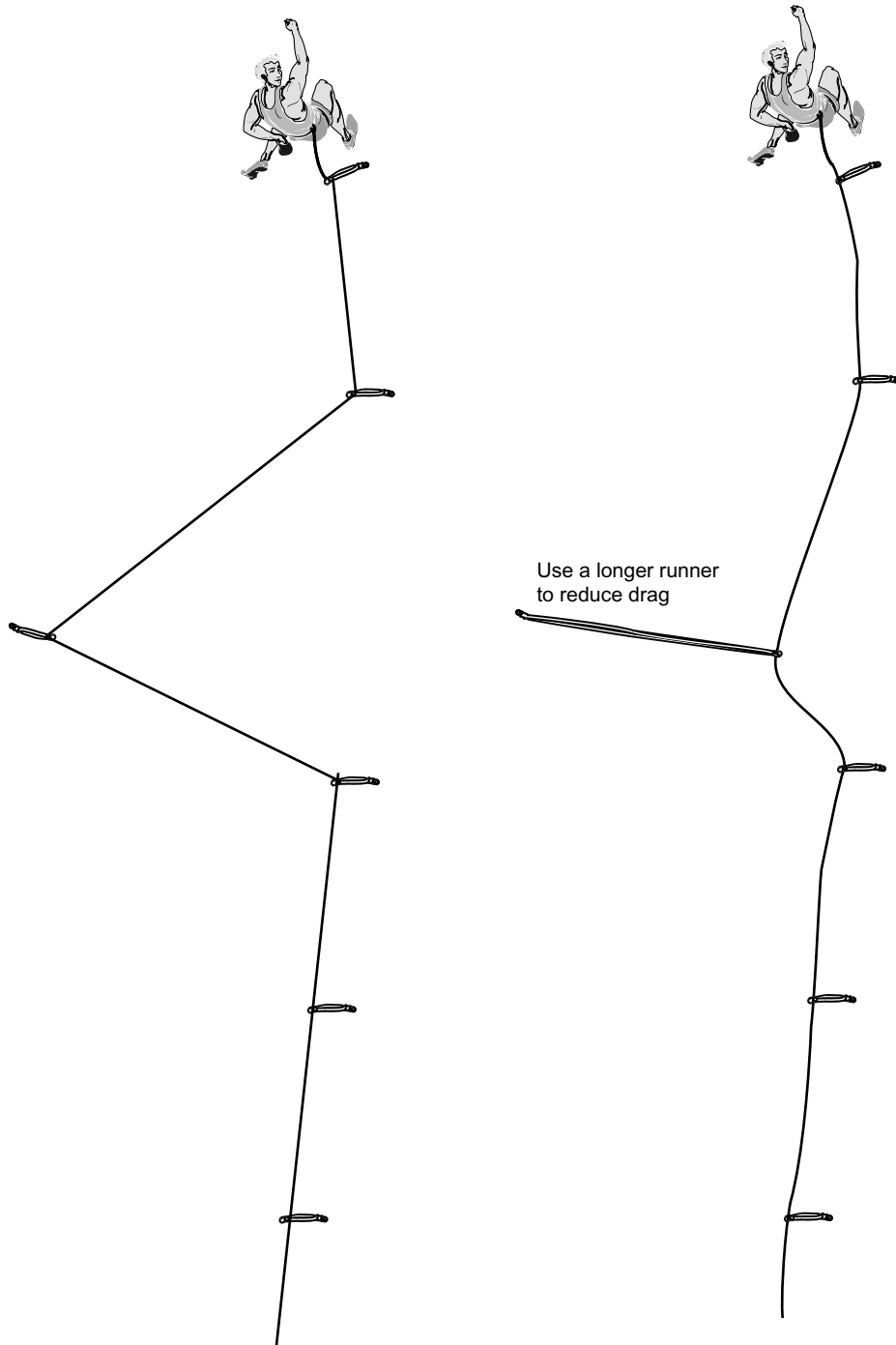


Fig 24-02

Be careful of drag. Many trad climbs wander back and forth. Using quickdraws or runners that are too short can result in debilitating drag. It is often wise to carry a small selection of long runners to reduce this extra drag.

LEADING TECHNIQUES—OTHER CONSIDERATIONS

Be Aware of Your Body Position

Be aware of your body position relative to the rope, the rock and the last placement. Be very careful of pulling a piece out as you move past it by lifting the quickdraw with your foot or getting the biner stuck in your gear. You can also get the rope stuck in your gear. Be aware of where you are going to fall—watch out for ledges, chickenheads, and pendulums. They can be just as much of a “grounder” as the belay stance. Be aware of where the rope is in relation to the rest of your body—generally, you want it off to one side, not between your legs. Many people are injured when tripped by the rope. **Your chance of being seriously injured increases** when you don’t “land on your feet.”

Be Aware of Loose Rock

Loose rock is a common hazard, dangerous to both the climber and the belayer. Test carefully for loose rock before committing weight to it. Think twice about putting pro behind loose flakes or other loose rock. The placement may break the rock off, dumping it on the belayer. Bad enough rockfall can fail the whole team, injure the leader, or cause other unpredictable events. Some rock can be successfully negotiated by handling it gently, and in the proper direction. For example, loose flakes are sometimes encountered, which if pulled in a horizontal direction, can break off, but if pulled in a vertical direction, are solid. It’s a good idea to keep three points of contact in case something breaks off, especially in known loose rock areas such as the Superstition Mountains.

Be cautious when standing on rock you think is loose.

If you find loose rock, warn your belayer. You may run into loose rock that dislodges when you touch it, and you may be forced to hold it in place until the belayer can get out of the way and you can allow the rock to drop. Be aware that most rocks will shatter, sending shrapnel in every direction. Also, rocks tend to bounce outward from the wall. If there is no other shelter, it is best to hug the wall off to the side and let the rock bounce out. The belayer should not look at the rock when it is dropped. Shrapnel can be blinding. If you pull off loose rock onto the rope, inspect it at the first opportunity for damage, even to the point of having the belayer check it immediately while you wait—it may force you to back off the climb.

Conserve Energy While Leading

Efficient leaders are usually safe, successful leaders. Saving energy and not succumbing to a pumped-out feeling is safer than taking falls, although sport climbers working a route will willingly take falls to better their skills. On natural pro and mixed leads, and on some bolted leads, the danger from falling is far greater than the danger of anything else. You should plan on efficient movement and quick execution to move past this danger of falling. Learning how to conserve energy will make you a better leader. Efficiency includes conservation of energy, quickness, and practiced technique.

Treat the route as a series of bouldering moves to the next “top-rope” situation. Each time you clip a piece or bolt, you are “on top-rope” temporarily until you move past the clip. Use this time to rest and relax if needed.

Find rest stances that do not require hanging, such as a big ledge or big footholds. When you are resting, shake out your forearms to rid them of lactic acid, the substance that causes fatigue. Remember that you have held your arms up in the air, and the blood has probably not circulated properly in them for the duration of the climb. Shaking out your arms will help restore this blood flow.

Place gear from good stances instead of in the middle of a move. Remember that on older bolted routes, the first ascentist probably had to stand on something to drill the hole. Try to place a cam in a crack when you have good feet, not when you are hanging from a lieback position.

Hang from pro if you don’t think you can make the crux (a “hang” technically nullifies a free lead; this is a safety tradeoff decision you have to make for yourself). “Hang-dogging,” or working the route, is an excellent tool for improving your abilities, but there is no reason to get hurt doing it.

Study the route beforehand to estimate where your rests and placements may be.

Simul-Climbing

Simul-climbing is a technique where the belayer removes the belayer anchor and climbs in tandem with the leader. It is usually used on easier ground, where the likelihood of falling is reduced. In some cases, the leader needs to climb a little further to get to the belay stance, and both team members agree to simul-climb. The theory is that a leader fall will be held by the top piece, and the belayer will arrest the fall by body weight. The danger is that if all pieces pull, there is no ultimate belay, so it is significantly more dangerous than when the belayer is anchored.

Using Double Ropes vs. Single Ropes

You should always take at least two ropes on a multi-pitch climb. Many require double-rope rappels to descend, and it is wise to have an extra rope if one should get damaged. See the “Descent” chapter for a thorough discussion. Carrying two ropes means carrying more weight, so some people carry an extra, smaller diameter rope. One alternate technique is to use double ropes.

Rope weights are approximately as follows:

11 mm	8.5 pounds
10.5 mm	7.7 pounds
9 mm	5.6 pounds
8 mm	4.6 pounds
7 mm	4.1 pounds

The more common rope combination weights are as follows:

10.5 mm + 10.5 mm	15.4 pounds
10.5 mm + 8 mm	13.3 pounds
10.5 mm + 7 mm	11.8 pounds
9 mm + 9 mm	10.2 pounds

Regardless of the chosen combination, the extra rope has to be taken up the rock. Some people choose to carry the extra rope in a pack, but the extra weight makes the pack heavier. Some people trail the extra rope, but the rope is more susceptible to snagging in cracks and on horns. Double ropes can solve both of these problems.

First, let's look at what a double rope is. Rope manufacturers make single ropes, half ropes and twin ropes. **Single ropes** are recommended for all uses. The rope is strong enough to absorb all climbing forces. **Half ropes** can be used as a single rope when the fall factor is less than one, as in single-pitch climbs. In the event of a serious fall, the necessary safety factors can only be achieved when the rope is used as a double. In the “half-rope” double-rope technique, each strand can be clipped separately through different runners. The greatest advantage of this technique is it provides less risk of total rope system failure. **Twin-ropes** provide a good safety margin in the event of a fall, but must be used together as one rope. In this technique both ropes are clipped together through the same biners and act as a single rope.

If you use double ropes, you have two options—treat them as a single rope or as two separate ropes. When you treat them as a single rope, any pair of ropes will work. When you opt for the half-rope technique of using two different lines of protection, you must use at least half ropes or two single ropes. Most half and twin ropes are different colors to make working with them easier.

To use both ropes as one, put both in the belay device, tie into both ropes as the leader, and clip both ropes through all pro. You will find that one rope usually runs a little faster through the belay device than the other, but not enough to make a difference in restricting the length of the pitch. Rope management is a little more complicated. If you flake the ropes carefully into a pile, you should be able to treat it as a normal flaked rope, even to the point of re-flaking it to another pile if one person is doing all the leading.

Double ropes used as separate lines of protection can reduce rope drag by protecting pieces that “zig” and “zag” a lot, such as in twin cracks that offer alternating pro placements. The only difference in using the ropes this way is the clipping of separate pro placements.

There are two other nice options the leader has in either double rope system. The first is that the leader can pull up and clip one rope at a time if he/she desires. Keep in mind that any time you pull up rope to clip, you are extending the length of a potential lead fall. If you pull up one rope at a time, the other rope will serve to limit the lead fall.

The other option involves traverses and pendulums. When the leader finishes the pitch, he/she can set an anchor on the belay ledge with one rope that is more in line with the second, limiting the pendulum fall on a traverse.

HOW TO SECOND

The second is the person climbing after the leader. The second will belay the leader and pull the pro when following the leader (except in cases where the leader raps off and cleans the pro on the way down).

The second may not know how to lead or be able to lead this particular climb, but to be a safe second, he/she should know certain skills. These include belaying, rappelling, prusiking, self-rescue (including tying off and escaping the belay; and in multi-pitch situations, lowering systems, raising systems, and pick-off techniques), anchor-setting, placing protection, aid climbing, and lastly, climbing. While this may seem an excessive listing of skills for the non-leader, the second must be able to self-rescue if the leader becomes incapacitated or risk becoming stranded on the wall. This does not mean that the second needs to be able to lead out of a situation, but the second should be able to stabilize a situation and go for help.

When pulling pro on the way up, try to avoid unclipping the piece from the rope first. Remove the pro from its placement and clip part of it to your gear loops, then unclip the piece from the rope. This will prevent you from losing it should you drop it. If you can't stop long enough to pull the pro and place it on your harness because of the difficulty of the climb, leave it on the rope until you reach a rest stop.

On multi-pitch climbs, as you pull the gear, try to rack it on your harness or gear sling so that when you get done with the pitch, the leader can retrieve the gear and move on efficiently.

If you can't pull the piece (an over-extended stuck cam or a jammed stopper the leader fell on and wedged tightly in the placement), you may need to stop and use both hands to pull it. On overhanging or leaning climbs, your body weight may pull you away from the piece you are working with, making it difficult to unweight and pull the piece, or making it impossible to reach the piece. Use a previously pulled piece to anchor yourself above the stuck piece and unweight it. Then work on the stuck one.

Know how to use a nut pick, and practice pulling stuck cams with it before you second. Leaving gear behind because you don't know how to extract it can result in an expensive trip. Keep the nut tool clipped to the rope or tether it to your harness.

If there are climbers following you, remember to leave directionals for them if necessary.

HOW TO BACK OFF

When you make a decision to back off a climb, you must determine how to do it safely. Backing off a **bolted climb** is a process that is mandated by the bolt placement. It is easiest to leave one biner at the highest clipped bolt and slowly have the belayer lower you, cleaning the pro on descent.

It can be safer to back off **natural pro climbs**, but more expensive in terms of lost gear. Set a solid, equalized, redundant anchor and have the belayer lower you to the ground, again cleaning the pro on descent. You may have to make a decision on which pieces to leave, and it may be costly, but pro is replaceable—you are not.

In setting a lower-off anchor, do not lower off through a sling—always use hardware. Don't lower off through a rap ring—it is too thin and wears through. The safest (and probably cheapest) way if you have a good anchor is to tie yourself off and set a rappel on a “runaway” or “bail-off” sling, a piece of webbing you will leave behind. (But remember, most rappel fatalities are anchor errors—double-check that your runaway is properly set.)

If the leader is over half a rope up, you can drop him/her accidentally while lowering if the end of the rope goes through your belay device; it's a good idea for the belayer to tie in to the other end of the rope before the leader starts the pitch.

It is often possible to downclimb and use the already-placed pieces to protect the downclimb just as they protected the lead, although downclimbing is usually harder.