9

	CLIMBING TECHNIQUE
INTRODUCTION	
BODY POSITION	
FACE CLIMBING	
Smearing	
Edging	
Movement on rock: The Feet	
Handholds	
CRACK CLIMBING	
Foot jams	
Hand jams	
Body Width Cracks	
Liebacks	
COMMON ERRORS BY BEGINNERS	
CRACK GLOVES	

INTRODUCTION

You watch the leader above you, deftly stepping from hold to hold, placing protection en route. You see the smooth transfer of weight, the sure-footed placement of each foot, the quick recognition of a good handhold. You admire the ease with which the leader tops out and sets up your belay. You start to climb, and you thrash and grunt and whine your way to the top, gasping as you anchor in and collapse. There has to be a better way.

BODY POSITION

There are three secrets to successful climbing: feet, feet, and feet. While the typical beginner struggles with handholds and pull-ups, the experienced climber wanders upward on many climbs with no more effort than hiking up a steep hill. Try answering the following questions:

Question #1: Wrap your right hand around the middle of your left biceps. Then wrap your right hand around the middle of your thigh (quadriceps). Which is bigger: (a) your arm or (b) your leg?

Question #2: When you walk across your living room, do you walk on (a) hands, or (b) feet?

Question #3: Which can you do longer: (a) hang from your arms or (b) stand straight up on your legs?

If your answer to any of these questions was (a), then you are a medical marvel who will revolutionize climbing as we know it today. If you are like the rest of us, you use your legs for the heavy-duty work and your arms for balance.

Climbing is merely an extension of the ability to walk, with the difference being that we walk up increasingly vertical surfaces. We again use our arms and hands for balance, but the majority of the work should be done with the legs and feet. Many of the same "techniques" we use in walking are used for climbing.

During the class, we will constantly remind you to keep your weight over your feet, or keep "nose over toes," or to avoid leaning in to the rock. It is typical of beginners to hug the rock for security, but this only causes problems; after all, you don't hug your living room floor when walking, do you? Hugging the rock puts you off balance, making your arms work harder and reducing friction for your feet.

There are two main types of climbing that we will discuss: face climbing and crack climbing. They have some techniques in common, such as using your feet, but there are also specialized techniques that can be used in each type. We will discuss face climbing first, which is the most similar to normal walking.

Face climbing is usually on the face of a rock, just as the name implies. Cracks are openings in the rock that can be anywhere from the size of your smallest finger to a size in which you can fit your entire body. Sometimes you may use a crack for handholds but use the face for your feet, or stem on a face climb, combining crack and face techniques.

FACE CLIMBING

We will discuss two main types of footholds when climbing faces: smearing and edging. Smearing is the use of friction, while edging is the use of small ledges on the face. Next, we will discuss how to move from foothold to

foothold, then add handholds, which are mainly used to assist in keeping your balance (until you start climbing overhanging faces.)

Smearing

A smear hold is one in which you place as much of the shoe rubber on the rock as possible. The rubber covers and holds on to every irregularity possible. Your weight over the shoe overcomes the force of gravity pulling you off the rock. Although you don't think about it, smearing is what you do when you walk on rolling or angled surfaces. If the rubber did not "stick," gravity would pull you down any incline. *Friction is the force that makes you stick*.

There is one important thing to keep in mind about friction: it is controlled by the force of your foot pushing into the rock. This is called the *normal force*. Increase the normal force, increase the friction. In climbing, this means that you must stand on your foot to apply friction to the bottom of the shoe. Just pushing the shoe on to the rock will not apply friction.

Exercise: Stand on a level concrete surface with all your weight on one foot. Place the other foot six inches away and, without putting any weight on it, see if you can move the foot across the concrete. It should be pretty easy. Now, move all your weight on to the other foot. Now, try to move the foot with the weight on it. You can't, because it has more normal force on it.

The same principle applies to climbing. A beginner will typically place a foot on a good smear hold and "test it" before moving weight on to it. The foot will always come off when "testing." If, on the other hand, he/she would shift all the weight to the that foot, the rubber on the shoe will usually stick to the rock. The more you get your body weight over your feet, the higher the normal force (and therefore friction).

Anyone can smear on rock up to about a 75 degree angle. With practice, climbers can smear on steeper rock, which takes much better balance, as any slight movement may cause the foot to "pop." Other factors such as the quality of the rubber, climber weight, and temperature start to count more heavily on steeper rock, also.

To smear, turn your toes outward a little, place the ball of your big toe over the hold, straighten your leg and lower your heel. The foot can be rotated outward or inward from this basic position, but this is generally the strongest and most stable orientation.

Edging

An edging hold is one in which you stiffen the foot (usually turned outward to the side) and use it as a lever to keep the rest of the body standing above a ledge or protrusion on the rock. The protrusion can be any length: a mere point of rock or a ledge that runs longer than the foot. Place the ball of the foot or the big toe directly on the protrusion. It takes more effort to use the toe, but the toe is more sensitive to the ledge. A typical edge might be parallel to the ground, but only a quarter-inch to a half-inch wide.

Exercise: Stand on the edge of a porch or sidewalk, with your feet turned outward. Gradually move your feet backward so you are supported by only a small portion of the shoe on the edge. Use the inside edge of the big toe on each foot. See how little of the shoe you can keep on the edge and still be standing. Now try it using the front tip of your climbing shoe to cover the same amount of area (a lot harder, right?). Use a post or wall to help keep your balance.

While basic edging is fairly easy, variations of it require more skill. Edges often slope outward, and may require a combination of smearing and edging ("smedging"). Many climbers can edge on protrusions that are less than an eighth of an inch wide; however, smaller edges require greater strength and, possibly, specially designed edging shoes, with stiffer soles and sides around the ball and toes of the foot.

Movement on rock: The Feet

Proper movement on rock has many variations, but, just like in walking, most people do it roughly the same way. The best way to think of it is to divide it into three components: Place, Shift, and Stand.

Place the foot in the desired position on the rock. Don't move it around a lot, testing various placements. Look at the foothold you want to use; don't just stick it somewhere without seeing what to stand on. Remember—the foothold will not work without weight on it.

Shift all of your weight onto the foot. This may require you to move quickly to avoid popping off the back foot, but usually is best accomplished by smoothly moving your weight so that it ends up on the hold, not past it. Jerky or sudden movements will often pull you off, also.

Stand straight up on the newly placed foothold. You will immediately get your weight off the muscles and onto your bones, which do not get tired. Also, by having your weight directly on the foot, you will be applying the greatest amount of friction.

Exercise: Stand straight up on level ground with all your weight on your left foot. Place your right foot about six inches away, on the ground, but with no weight on it. This is the "Place" part. Next, shift all of your weight to the right foot WITHOUT letting your left foot leave the ground. When all your weight is on the right foot, you have now

completed the "Shift." Now, pick up your left foot and "Stand" directly on the right foot, with your right leg locked. This is an exaggeration of the climbing process, but it helps to understand the components of the move.

Exercise: Walk around your living room using a three-step process for each movement. First, with all weight on one foot, **place** your other foot, **shift** your weight to it, and **stand** on it, picking up your trailing foot only when there is absolutely no weight on it. This is the basic movement on the rock, although, again, exaggerated. Concentrate on the feeling you get when your weight is directly on one foot or the other—this is the feeling you want when you move over the rock.

Handholds

If feet are so important, what part do hands play? Use your hands and arms when you climb just like you do when walking—for balance. When you are on uneven terrain, you put your arms out. If you are climbing a steep ladder, you place your hands on front of you on the rungs of the ladder. If you are climbing on a narrow bridge with handrails, such as a catwalk, you put one hand on either side to steady yourself.

Use handholds in climbing the same way. Don't use handholds to do pull-ups; use them to hold your body steady as your feet and legs do the work. If you do use your arms to do pull-ups, you will tire and cut short your day. While the handholds are primarily for balance, there are different kinds that are more useful in certain situations.

Exercise: Put a ladder on the side of your house and climb up. Use one finger on each hand to keep you from falling backward. Climb up, stepping with only one foot on each rung and stopping to note how much weight you have on that foot when you are climbing and how little weight you have on each hand. The only way you can climb with only one finger is to keep your weight over your feet and use your fingers for balance only. This is the combination you are striving for when first learning to climb. It will save you from "pumping" yourself out too early in the day.

Edges. The most common kinds of handholds are edges. These can be the edges of cracks or the remaining edges of broken or eroded rock. For whatever reason, there is a piece of rock you can place your fingers over and use to help you balance. How precarious your balance is and how far you have to move in a given step will determine how powerful your handhold needs to be. Edges can be horizontal, requiring a downward or upward pull, or somewhat vertical, offering a sidepull. There are many terms for edges that you may hear the instructors use: crystal, nubbin, edge, knob, xenolith, chickenhead, bollard, bucket, ledge, and bomber ledge.

On horizontal edges, put your fingers on top of the edge, with the fingers packed closely together. The fleshy pad on the "fingerprint" part of your fingers is the best part to use for edges. If the edge is large, you will be able to get a good solid hold. If the edge is small, you may have to "help" your fingers by crimping the thumb over their tips. After climbing for awhile, you may be able to do pull-ups with finger holds, but as a beginner, there is no need for it. Be warned: doing fingertip pulls can cause tendinitis, even with the best of conditioning. On sharp edges, you may be restricted from putting too much weight on the hold. But remember, the usual purpose of a handhold is to help keep your balance while you work your legs and feet, so you shouldn't need as much power in your handhold.

On more vertical edges, grab the handhold the same way. You will only be able to use the hold to pull to one side or the other, but that will usually be enough to help you steady yourself.

Palming. Palming is hand-smearing, usually at waist level. On smooth, rounded rock you will often find small bulges on which you can place your whole hand or shallow pockets called "dishes" into which you can press your hand. They may not feel as secure as a chickenhead (a positive hold you can get your whole hand around), but remember that you don't necessarily need a positive hold, just something to help you keep your balance as you move with your feet.

Turn your wrist toward the rock, fingers down and palm to the rock, and place the meaty part of your palm onto a bulge or dish. Apply your weight, on a straight arm, down on the palm to generate friction. Large bulges can be surmounted using one hand to palm down and the other hand placed higher to pull down on an edge.

Manteling. Manteling involves placing the hands on a ledge (in front of you) below shoulder level. Your elbows must be up (as in a pushup position). Transfer your upper body weight over your hands, and then use your hands and your feet to push your body up. When your arms are extended, place one foot on the same ledge your hands are on. It is a very balanced movement, requiring some practice to master.

CRACK CLIMBING

Crack climbing involves a somewhat different set of skills from face climbing, except that balancing over your feet is still the best way to avoid burnout on any climb. Instead of edges, you have a crack in which to place hands and feet in a variety of positions. These positions, called jams (because you "jam" portions of hands, arms, legs or feet into the crack to fill it up), can range from very secure body-weight holds to delicate balance holds with one or two fingers.

The vast majority of cracks are uneven in their width. This means that they have narrower and wider portions. The easiest way to use a crack is to place something inside that rests on a constriction. For example, a tightened hand placed downward into a constriction can support body weight, often with no pain. Sandstone cracks are often one width for quite a ways, requiring extra strength to climb. Some cracks may flare, or grow larger horizontally from back-to-front or vice versa.

Page 9-4 • Climbing Technique

We will describe crack techniques from small to large, for feet and then hands. A small crack can take a cammed foot jam; as the crack gets larger, it can take a toe or foot jam, then a heel-toe jam. The smallest hand cracks can take only one fingertip. As the crack gets larger, it can take all fingers, then hands, then fists (hands turned sideways), then arms, shoulders and elbows. Larger body-width cracks need "chimney," "stem" or "bridge" techniques. In addition, there are other techniques that are partially crack and partially face, such as the lieback technique.

Foot jams

There are three commonly used foot jams: the vertically placed foot, the straight-in toe or foot jam, and the horizontally placed foot jam. Foot jams tend to hurt when applied, especially the vertically placed foot. Since you climb with your weight on your feet, these jams must be more secure than hand jams.

Cammed foot jam. Imagine standing in front of a crack about two inches wide. Pick up your right foot and turn it so the sole faces left, with your knee pointing to the right. Place the toe into the crack. Once in, rotate your knee back up to the normal position, forcing the foot to "cam" into the sides of the crack. This effort creates friction on both sides of the crack. The friction is enough to allow you to stand up on the jammed foot. This is (usually) a painful position, and not one that you want to keep your foot in for long. Also, this can be difficult to remove if you try to move too high without removing the foot first.

Toe or foot jam. Again imagine the crack, which narrows to about three inches. Use the narrowing portion as a toe or foot support, placing the foot directly into the crack, sole down.

Heel-toe jam. If the crack is somewhat less than the length of your foot, you can turn your foot to the side and place it inside the crack, forcing the heel and toe to touch on opposite sides. This creates enough friction to allow you to stand on it. It is tricky when using both feet because it is awkward to get both feet in, and it will often work better when the second foot is used on the face.

Hand jams

There are several types of hand jams. Again, they are used mostly to maintain balance, not to do pull-ups on. Some will feel so secure that pull-ups are easy to do.

To make the most of hand jams, you must insert whatever you can and "fatten" it to fill up the crack and cause friction on both sides of the crack. You do this either by camming (twisting) fingers or hands, cupping your hand or making a fist.

Finger jams. Imagine a crack slightly larger than your fingers, but too small for your whole hand. If the jam placement is above your head, insert your fingers with the thumb down. If it is below your shoulder, insert your fingers with the thumb up. If the crack leans to the right, it is easiest to insert the fingers on your right hand thumb down and on your left hand thumb up; in a left-leaning crack, reverse the hands. If your thumb is on the up-side, you lose strength as you approach the jam.

There are two variations of the finger jam depending on how the thumb is used. Place the fingers of your right hand in the crack with the thumb down and the palm outward to the right, and rotate your hand to the right side. For a finger-only jam, place the thumb against the left-hand side of the crack to strengthen the camming action, or against the face if there is no room in the crack. For the ring jam, place your thumb inside the crack below your fingers, forming a "ring."

Cammed hand jams. This is the same as a finger jam, except with more of your hand in the crack. Insert your right hand, thumb down, and turn it to the right side. Again, camming works best when it moves in the same direction as the pull. If the crack leans to the right, it is easiest to insert your right hand thumb down and your left thumb up; in a left-leaning crack, reverse the hands.

Cupped hand jams. Now imagine a crack slightly larger than the width of your hand. Place either hand in the crack, thumb up or down. Squeeze your thumb into your palm, expanding the size of your hand in the crack. Now the back of your hand and the thumb-pad are creating friction on both sides of the crack. This can be an extremely secure hold that you can do pull-ups on. The wider the crack gets, the less secure it is and the more power you need to make it stick. If it gets so wide that tensing your hand won't work, move on to a fist jam.

Fist jams. These can hurt, and most of us don't like them. Nevertheless, they are valuable when you run into a crack that is too wide for the previous jams. Look at your hand from the side, thumb toward you. Make a fist. Notice that the thumb side and back of your hand are wider than your wrist. If your fist will fit sideways into the crack and rest on a constriction, it will work just fine in helping you to keep your balance. If you turn your fist so that your closed palm is facing you, you will notice again that your fist is wider than your wrist, offering a wider jam than the fist turned sideways.

Off-width jams. Cracks wider than fist jams but less than body width are called off-width cracks (OW). In an offwidth, it is possible to use the forearm, elbow or a combination to fill up the crack. An arm-bar is useful because you aren't hanging on muscles, just bones. Put your whole arm into the crack. Press the heel of your hand against the front wall and allow your elbow to push against the back wall.

Body Width Cracks

Larger cracks come in three types: squeeze chimneys, regular chimneys, and larger chimneys. Regular chimneys allow you to support yourself by placing your back on one wall and your feet on the opposite wall. If the chimney is too wide, and you cannot reach the other side, stemming or bridging is required. If the chimney is too small to push straight on the opposite side, it is a squeeze chimney.

Squeeze chimney. A squeeze chimney requires you to squirm in a very undignified manner up the climb, using whatever works for the hands, arms, feet, legs, back and butt. Step into the crack, with back and butt against the back wall. Pull up your knees and turn them out. Do heel-toe jams with your feet. Turn your palms out, fingers down and press against the front wall and downward. Alternate between pushing with your arms/back and your feet/knees. It will turn your knees and back into hamburger if you fail to wear sufficient clothing.

Normal chimney. Climb a normal chimney by placing your back against one wall, one foot on the wall underneath your butt and the other foot on the opposite wall. By pushing with your feet against both walls simultaneously, you can create enough friction to counteract gravity. To advance, stand up with both feet pushing against opposite walls and your hands pushing your torso away from the wall. At the top of the movement, lean your torso back against the wall and bring the foot under your butt up to the opposite wall higher than the first foot. Move the lower foot up to just under your butt. Stand up again. By repeating this process, you can safely advance up the chimney.

Stemming. In cracks too large for a chimney ascent (and in dihedrals, or "books"), you can "stem" between two faces. Push out with both feet on opposite walls. In order to move, you have to have a way of supporting yourself while you are not stemmed. The best way to move the right foot is to push on the right wall with the right hand and the left wall with the left foot while moving the right foot up and vice versa; it may be necessary to use the left hand on the right wall to help support, also.

Bridging. In cracks too wide for stemming, "bridge." This may work well in slot canyons and any place where the walls are 5–7 feet apart. Your feet are on the back wall and your hands are on the front wall. You should use this method only when you have NO face holds on either wall. As soon as you reach good holds for your feet or hands, transition to face climbing.

Liebacks

In liebacking, you pull with your arms and push with your feet in the opposite direction, while moving both hands and feet up. It is an extremely strenuous technique, especially when sustained. You stay somewhat horizontal thru the technique, so all your weight is on your arms as well as your legs. The key to liebacking is to keep your feet fairly close to your hands, and keep your arms straight. If your hands move too high relative to your feet, the normal force on your feet decreases (and so does the friction) and you fall. Move up by shuffling your hands and feet up together.

There are many more techniques available, from stacking hands in cracks (Leavittation) to heel hooks. All of these techniques build on the basics. As you progress, you will discover some yourself and learn others from people you climb with. You will learn how to mix and match the techniques described above, trying variations that fit certain circumstances. Practice these basic moves and perfect them. They will always serve you well.

COMMON ERRORS BY BEGINNERS

It is easy to tell a beginner on the rock. Typically, the body is leaning too close to the rock, pawing the rock trying to find the "bomber" foothold, and slipping off the rock quite often. The following are common errors beginners exhibit.

Leaning in to the rock. You don't lean forward when standing on a level surface, do you? Vertical rock is the same.

Exercise: Stand on a level surface. Lean forward WITHOUT bending at the waist. Even with two feet placed securely on the ground, you can't lean very far without "falling off your feet onto the ground." Try leaning to the side, and backward WITHOUT bending at the waist. Again, you can't lean very far before you fall. Once your weight is no longer on your feet, i.e., "leaning in," you cannot stay upright; you have no choice but to fall. Gravity will win. The same principle applies on the rock, but you have even less distance that you can lean before you fall because the foothold will be smaller.

Stepping too high or too far. When you step forward on level ground, you push weight forward and bring your other foot underneath you to accept the weight. If you step too far forward, your weight cannot be transferred successfully to the other foot. Likewise, when you step too high on a less-than-vertical face, you have to lean forward too much to transfer the weight. This translates to "leaning too far in."

Exercise: Stand on level ground with all your weight on one foot. Place your other foot about six inches away. Shift your weight, and stand on the other foot, not lifting your trailing foot until all your weight is on the leading leg. Now, try the same thing, only move your leading foot 12 inches (place, shift, stand.) Keep doing this, moving your foot farther each time. Notice how much more difficult it gets the farther away you step. This applies to both vertical steps and horizontal steps on the rock.

Elvis leg (sewing machine leg). Many beginners start to get an uncontrollable shake in their leg as they stand on a

small hold and search for a handhold or their next move. When your leg starts to shake, lower your heel immediately and make sure your leg is straightened out, so that you are standing directly over it. The shaking is due to the muscular effort of staying on the rock. In most cases, if you lower your heel and straighten out your leg, the shaking will stop immediately.

Exercise: Stand on the edge of a sidewalk or porch, with only half the ball of your foot on the cement and the other half hanging off into space. Crouch down about six inches. feel the difference in muscular effort to hold that position instead of letting the bones support you. At the same time, stand on your tiptoes with your legs bent. If you hold this position long enough, your legs will start to shake. When they do, lower your heel back down and stand up straight.

Keep handholds low. On less-than-vertical faces, keep your handholds lower than the top of your head. Too many beginners try to reach the next bomber handhold and end up pulling themselves off the rock because they are forced to lean in to reach the hold. The more vertical the rock is, the less of a problem this is because the reach up does not pull you forward.

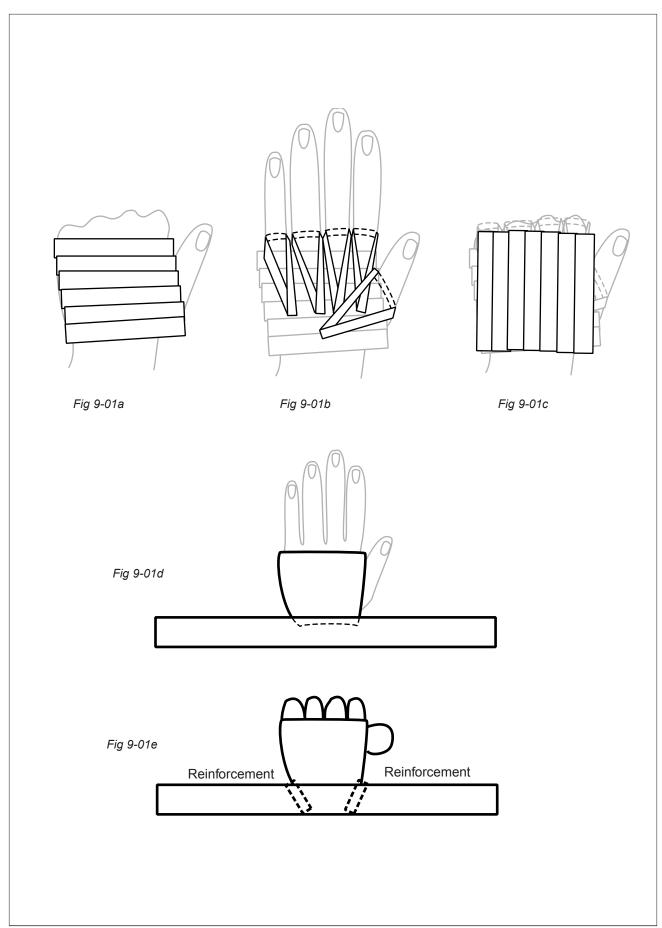
Overtesting footholds. Many beginners "test" footholds before committing their weight. The foot will always come off when testing. Remember, friction is a force that needs to be applied; i.e., you need to commit your weight to a hold in order for it to work. Place the foot on the hold and shift your weight. You will learn to trust your feet.

Failing to visualize the move. As you reach a rest stance, look ahead to the next few moves. Identify footholds and likely handholds, how you are going to shift your weight, and the sequence of moves. Being prepared can make a difference when the holds are thin.

CRACK GLOVES

To avoid nursing scraped knuckles for a week afterward, make crack gloves out of gymnast's tape. They generally last about a year, so the amount of tape used and the time consumed are well worth it.

- 1. Using 1.5" gymnast tape, stick horizontal over-lapping bands across the back of your hand. For this layer, if you stick the tape to cloth first to make it less sticky and then to your hand, it is easier to remove later. When applying the tape to your hand, make a fist. This will cause your gloves to be a little larger and more comfortable. Make these bands starting at the base of the fingers and work down. Since hands aren't square, the last band will sit at an angle to the others (fig 9-01a).
- 2. Tear the tape in half the long way (this is a little easier if you have two rolls to work with, one for full width and one for half-width). Stick a piece to the middle of the back of your hand. Run it around a finger and back to the starting point. Do this for each finger. As you pass around a finger, fold the tape in half so it won't stick to your finger (fig 9-01b).
- 3. Now make vertical bands across your hand to hold everything together. These should also overlap. Remember to work with your hand in a fist (fig 9-01c).
- 4. Very gently remove the whole thing from your hand. Lay it sticky side up. Put vertical overlapping bands on the sticky side so the glove will be removed more easily in the future.
- 5. You can also add more horizontal bands to the outside of the glove, especially across the knuckles where the most wear will be. Make the bands a little too long and wrap the ends around to the inside of the glove.
- 6. Put the glove back on to be sure of the positioning of the next part. Attach a piece of tape that is long enough to wrap around your wrist three times to the bottom of the glove. Center the tape on the glove (fig 9-01d).
- 7. Remove the glove again. Using another piece of tape the same length as the last one, tape the sticky side of the previous piece of tape.
- 8. Using 1/2 width pieces of tape, go over any obvious weak points. Two spots in particular are the corners between the glove and its wrist band. Start a piece of tape on the inside. Run it diagonally up to the corner and down the outside (fig 9-01e).
- 9. The glove is done. To use, put it on and wrap the wrist bands around your wrist. Tie the ends together with a square knot.



Page 9-8 • Climbing Technique	
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