4

EQUIPMENT

INTRODUCTION

Climbing by its nature is inherently more dangerous than many other activities. Some equipment used in the climbing world is designed to reduce this danger and is required to meet industry safety standards. Other gear is just plain useful, and is not part of the life support system. In this chapter, we will discuss the equipment used in climbing. We do not discuss "protection" in our Basic School.

SAFETY STANDARDS

Safety standards are developed by governments, industry groups and manufacturers. Although safety standards may differ from country to country or company to company, most companies comply with all sets of standards in order to sell to a wider market.

Climbing gear sold in Europe must conform to Comite Europeen de Normalisation (CEN) standards. In developing EEC-wide standards, the CEN adopts existing standards where possible. Since the UIAA has long been the organization that establishes criteria for climbing equipment, the CEN has adopted UIAA standards and added the labeling criteria. When buying used gear, look for the UIAA symbol to ensure that it was approved for climbing (used hardware can be a good deal, but don't buy used soft goods like ropes and harnesses unless they are from a trustworthy source). When buying new gear, look for the CE markings. Gear sold in the U.S. is not required to meet CEN standards, although it usually does, as most companies want to sell overseas.

ROPES

Rope Construction

Modern climbing ropes are made of nylon fibers woven in such a way as to dissipate the energy or impact force of a falling climber. Imagine falling 10 feet on a wire cable instead of a rope; you would come to an abrupt, wrenching stop. A rope's shock-absorbing property helps to prevent injury to the climber and the rope.

Ropes can be either static or dynamic. **Static rope** stretches less than 2%; the effect of falling on static is similar to that of falling on wire cable. Static is used for rappelling, caving, anchors, mechanical ascending, haul ropes or anywhere else that stretch is not desirable. Rock gyms use a hybrid with a little more stretch, because most of their climbs are short and they need to balance out the possibility of a "grounder" with the impact force of a fall.

Dynamic rope is used for climbing. It stretches up to 8% (static elongation, as described below) and is required to reduce the impact force to less than 12 kiloNewtons (kN). A kN is equivalent to about 225 pounds of force. Twelve kN are equal to about 2700 pounds of force. This number grew out of testing during World War II, when the government researched how much force a paratrooper could handle safely at the moment the parachute deployed. The strength of a rope varies, but most ropes will reduce the impact force to 8-9 kN (1800-2000 pounds of force) in normal usage, so they can easily handle the most force that can be generated in a climbing situation.

Ropes are made of two main sections, a **core** (kern) and a **sheath** (mantle), and are also called kernmantle ropes. The core is made of white nylon fibers. The abrasion-resistant sheath is designed to protect the core.

A rope that gets wet can lose as much as 30% of its shock-absorbing ability because the water surrounding and impregnating the individual fibers is not easily displaced in a sudden event like a lead fall. Also, the water alters the characteristics of the nylon fibers, eliminating the friction between them that is part of the shock-absorbing process. Because of this, many climbing ropes are treated with a water-repellent material. These are called **dry** ropes, while non-treated ropes are called **standard** ropes. The treatment can be applied by a coating or by saturation. The coating is more likely to wear off. Dry treatment also improves the abrasion resistance of the rope.

The standard length rope is 165 feet, or 50 meters. Longer 55- and 60-meter ropes have become popular recently. Much wear happens near the ends where the climber ties in; cutting off the 10' worn part can lengthen rope life.

Rope is very strong when stretched in a straight line. However, the tighter the rope is stretched, the easier it is to cut. Rope that is stretched to its rated strength can be cut with a dull knife. It is important to keep a loaded (weighted) rope away from sharp rock edges.

Rope is strong in a straight line because all fibers share the load equally. When a bend is introduced into the rope, some fibers bear more of the load, making it weaker. Imagine a bight of rope. The fibers on the outside of the bight are stretched more tightly than the fibers on the inside. The strength of the rope depends on the fibers that are stretched tightly because the slack fibers are not holding any weight. The knots described in the previous chapter all weaken the rope between 20-40%; the sharper the bend in the knot, the weaker the rope is at that point.

Rope Safety, Care and Maintenance

A rope will serve you for many years if you care for it. Any damage a rope incurs does not heal. Watch out for these:

- **Sharp edges** near a rope can damage it severely. A dull knife can cut a rope under tension. People have accidentally cut their climbing ropes while climbing on sharp rocks, much less sharp edges such as knives. Keep knives and tools in your pocket. Other "sharp edge" hazards are broken glass and falling rocks.
- **Chemicals** such as battery acid, oil, grease, gasoline or solvents can damage the nylon. Worse, the vapors from some of these can cause hidden damage.
- **Heat** from fire, campfire embers, radiators, cigarette ashes, or high temperatures in general can burn the nylon.
- **Excessive sunlight** can cause a rope to get stiff, brittle and lose most of its strength.
- **Dirt, sand or grit** is ground into the rope each time you step on it. Never step on a rope. It is the equivalent of forcing tiny knives into the fibers of the rope. Not only do these tiny sharp edges cut the rope when first introduced, they lodge in the rope and continue cutting as the rope is used.
- **Traffic in the climbing area can be hazardous to your rope.** Try to flake (stack) ropes away from the traffic pattern. Be careful when coming off a climb or rappel that you don't step down onto the rope below you.

Wash a dirty rope by hand or foot in a tub of water or in a washing machine. To play it safe, only use Woolite or its generic equivalent; other soaps or detergents can harm the rope. In a washing machine, daisy-chain the rope and tie the loose ends so the rope doesn't come apart during the spin cycle. Don't dry the rope on a cement floor (cement dust contains lime). Dry the rope uncoiled on a non-metallic surface (to avoid rust on the rope) or hang it from the shower rod, looped back and forth. Turn on a fan to speed up the process, but don't use heat to dry out the rope.

Whenever possible, keep the rope in shade. Never store the rope in your car, or in a window where the sun hits it. Keep it in a cool dry place and it will last longer.

When To Retire A Rope

Manufacturers' guidelines specify when to retire a rope from lead climbing status. They recommend retiring every 3–6 months in heavy use, 1–2 years in medium use, and 2–4 years in light use. These guidelines may change, so read the hang tag that comes with the rope.

Examine a rope by pulling the entire length through your fingers. Feel the rope with at least three fingers of one hand. Feel for bumps, thin spots or changes in stiffness. A bump or hard spot may be the result of overheating and melting the core's nylon into a lump. A thin spot may be a cut or tear in the core. A soft spot may be a damaged spot. Many ropes get a flat feel after being used in slingshot setups over a period of time, with heavy use in catching falls and lowering climbers, but are still okay for continued top-roping. Look for heavy fuzzing (50% of the sheath cut) or bulges of white core showing through where the sheath has been cut. If the core is visible, retire the rope immediately from all climbing purposes or cut out the core damage and make shorter ropes. With practice, whenever you flake out a rope, you can examine it at the same time, giving you a safety examination every time you use it.

As ropes age, they become weaker. The jury is still out on the rate of deterioration, but most testing proves that ropes lose strength just sitting on the shelf.

Rope Selection—How To Pick The Right One For The Job

Picking a rope is not too difficult.

- All climbing ropes will hold at least one fall safely, and the manufacturers recommend retiring a rope from lead status after one severe lead fall, so the number of falls doesn't make much difference. However, if you want to do multi-pitch or big wall climbs, look for a rope that is rated at more falls, since you may not have the option of retiring a rope with a severe fall while in the middle of the climb.
- Feel the rope. Softer, more flexible ropes tie and handle more easily. Stiffer ropes "run through" protection carabiners more easily while leading, putting less tension on the protection placement.
- Heavier people should consider ropes with a thicker diameter, lower "impact force," greater "static elongation," or greater "weight per meter" numbers. Each of these statistics indicates a stronger rope.
- If you are going to be climbing in wet climates, buy a dry rope.
- If you are going to the backcountry, buy a longer rope (55-m or 60-m) for those times when the belay isn't conveniently 160 feet from the last belay (but weigh this against the extra weight of the rope).
- If you will be top-roping in places where the climbs are right at the rope halfway mark, buy a longer rope.
- Bi-color ropes leave no doubt where the center of the rope is—unless the last ten feet on one end have been cut off due to wear or damage.
- If all other factors are equal, buy the rope with the lowest "Impact Force" statistic. It will provide a softer fall and less stress on the belayer and protection.

CARABINERS

Carabiners or "biners" are links that connect various pieces of climbing gear. They are used to attach slings to each other, slings to protection, protection to the rope, climbers to prusiks, climbers to rappel devices, and many other gear combinations. In proper usage, they provide a virtually unbreakable link. Used improperly, however, they can fail or cause other equipment to fail.

Carabiner Construction

Biners are generally made of 7075 aluminum alloy, a harder alloy than 6061 aluminum.

All biners have a **gate** that opens in one direction only—toward the interior of the biner, usually stopping when hitting the **spine**. The gate is **hinged** on one end. The other end is designed to close and to stay closed under pressure. This closure system must allow the **swinging** end of the gate to latch the **nose** of the biner so that a force along the **major axis** cannot pull the biner apart. The gate closure system is nowhere near as strong as the spine (fig 4-01).

Carabiner Locking Mechanisms

It is very important for biner gates to stay closed. For extra security, some biners are made with locking mechanisms. These are ideal for anchor systems, harness biners, and rappel and belay devices.

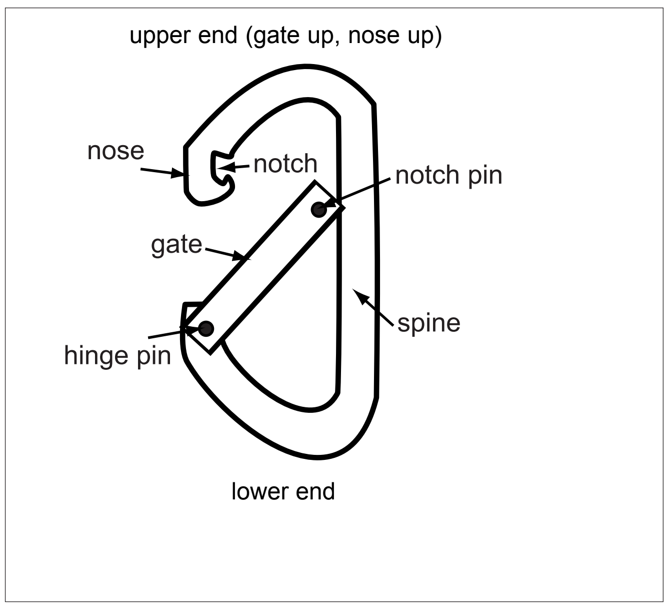
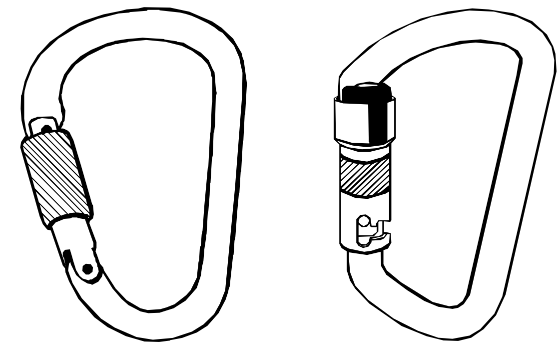


Fig 4-01—Carabiner terminology

The **screwgate** locker (fig 4-02) has a **gate nut** or **screw collar** that must be screwed up or down to lock or unlock. The **twistlock, autolocker** or **self-locker** has a spring-loaded twist mechanism that automatically locks the gate when it is let go; to unlock, rotate the gate nut and open. Lockers are ideal for anchor systems; however, you should always plan the use of lockers knowing that they can come unlocked during use.

Fig 4-02



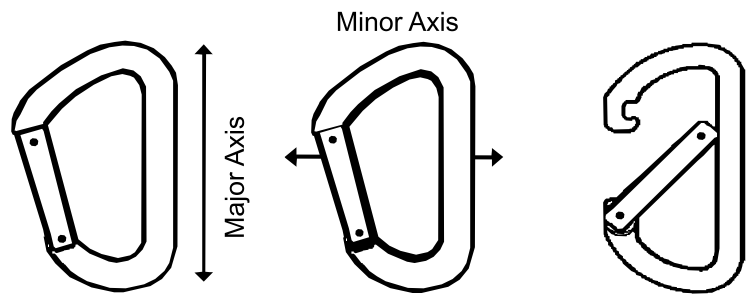
Locking biner
Locker
Screwgate biner

Auto locker
Self locker
Twistlock

Carabiner Ratings And Testing

The numbers that appear on the spine of modern biners reflect the maximum forces that the biner has been rated to hold in the specified direction (fig 4-03). Biners are designed to be loaded along the **major axis**, not the **minor axis**. Modern biners list three figures: (1) strength when loaded properly along the major axis, (2) strength when loaded improperly along the minor axis, or **cross-loaded**, and (3) strength when loaded along the major axis with the gate open. These forces are listed in kiloNewtons (kN). A kN is equivalent to about 225 pounds of force. A biner rated at 27 kN is rated at 6075 pounds of force. (For easy calculation when shopping, multiply by 200 and say it can hold in excess of 5400 pounds of force. At this level, it far exceeds any force you will encounter in non-rescue climbing work.)

Fig 4-03



Gate closed strength along the major axis must be at least 20 kN (4500 lbs of force)

Gate closed strength along the minor axis must be at least 7 kN (1575 lbs of force)

Gate open strength along the major axis must be least 7 kN (1575 lbs of force)

Carabiner Safety, Care And Maintenance

Biners, although very strong and seemingly unbreakable, are designed to be loaded and used in specific ways. There are three bad things that can happen to biners: biners can be improperly loaded, biner gates can open, and sharp edges in the biner can cut webbing or rope (fig 4-04).

Improper loading. Cross-loading (loading along the minor axis) or side-loading a biner (levering a biner over an edge) can cause it to break. Tri-axial loading (loading on more than the major axis) can lever the nose on a biner. Filling the interior with too much webbing can apply leverage on the nose if a loaded sling is forced away from the spine and toward the gate.

Open gate problems. Gates open accidentally for several reasons. Shock loading a biner with the gate open can break it (even along the major axis), as the open-strength rating is as little as 7 kN (1573 pounds).

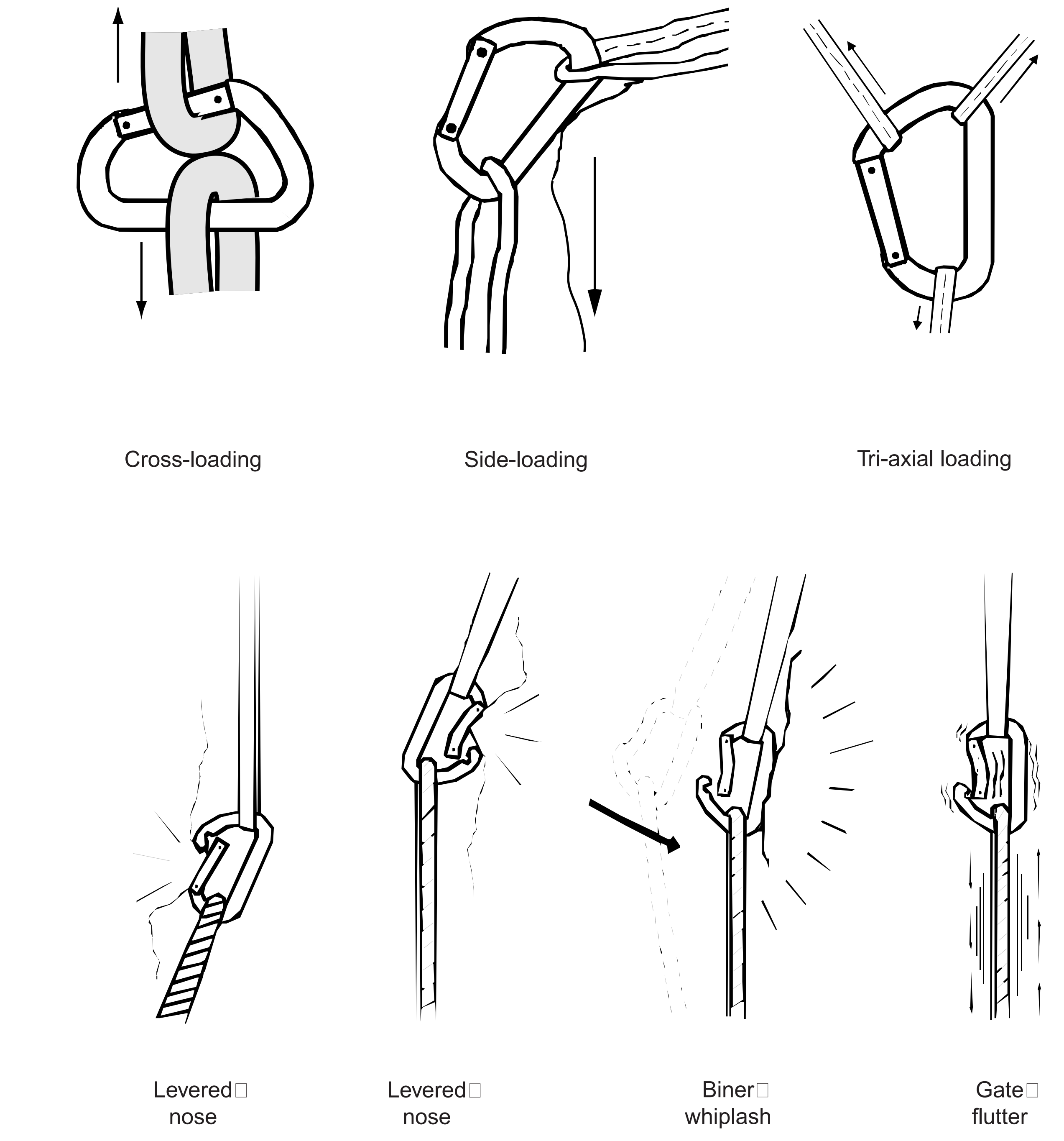
Hooking a biner (on its nose) and opening the gate combines the open gate problem with a leverage problem. The nose can catch on slings, other biners, other gear or irregularities in the rock. **This is the easiest way to break a biner**, as some tests show that a biner will break at 400-700 pounds of force. Even if the gate doesn't open, bad leverage is still applied against the nose end, stressing the metal. Some of the biners investigated by Black Diamond have had the nose bent but not broken after being hooked.

Ganging or **enchaining biners** can cause one biner to unclip, or at least hold the gate open on either biner. Don't clip biners to each other. The exception to this is in aid climbing, where it can be useful, or in occasional other uses where the ganged biners can be watched closely. Never gang biners in anchors or lead climbing applications.

Sharp edges. The inside of most biners contains **sharp edges**. They are usually at either end of the gate, where the manufacturer has milled the groove that will hold the hinge pin or gate pin. Some manufacturers "shroud" or dull the edges. Also, some of the auto-locker gate nuts have sharp edges that rotate into the inside of the biner, so that when the biner is opened, the edge can be forced against whatever webbing is attached to the biner.

Maintenance. Biners are almost maintenance-free. Keep them clean, and rinse and dry them occasionally if you live near saltwater. If the gate sticks because of grit, use a dry lubricant to clean and fix it. Retire the biner if the biner stock is twisted or if the gate sticks because the biner is out of alignment, since the metal has probably been stressed. If there are deep grooves or scratches, the strength may be questionable. If it is corroded, retire it.

Fig 4-04
Carabiner problems



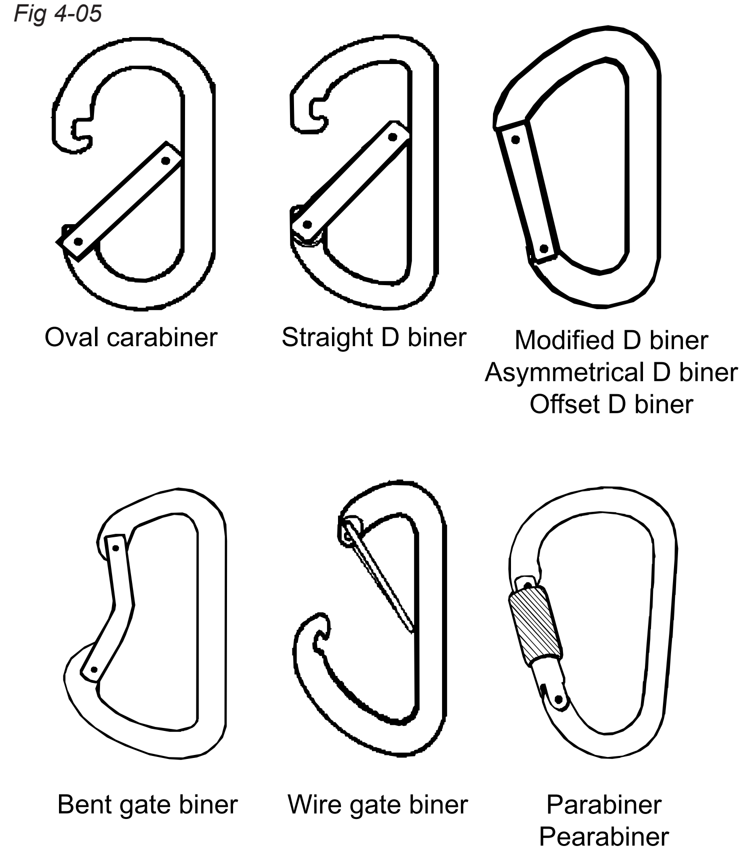
Watch for stress fractures at the pins that hold the gate on. In the manufacturing process, the pins are placed under pressure, and this pressure on the thin, milled wall of the gate can cause stress fractures.

The only way to tell if a biner has been damaged in a long fall is by X-raying it. This is an expensive process and not worth it. Biner manufacturers have done extensive testing with biners that have been dropped great distances (as high as 3000' off El Cap in Yosemite). Their strength is the same as biners that were not dropped, except when there was visible damage to the biner. If it looked broken, it was; if not, it wasn't. However, it is better to be safe than sorry. Retire it.

Carabiner Shape

There are at least four major shapes of biners: ovals, D's, modified (asymmetrical, offset) D's, and parabiners (fig 4-05). Although they are interchangeable in many cases, the different shapes have evolved to make specific tasks easier.

Fig 4-05



Ovals are the originals. They are ideal for aid climbing, holding wired nuts, the carabiner brake rappel system, and slingshot anchors but are not intended for lead climbing.

D's are the strongest biners, with ratings up to 30 kN. They cradle any gear in a corner away from the gate and close to the spine of the biner, where it is strongest. This almost eliminates the leverage that occurs in an oval.

Modified, asymmetrical or offset D's are variations on the D shape, with all the same advantages. Whereas in regular or straight D's the gate and spine are parallel, the hinge end of a modified D is narrower than the nose end. Since the nose end is wider than the usual straight D, it allows the gate to open wider, which makes it easier to clip gear into it (especially important for leading). Some modified D lockers are over-sized to allow them to be used as harness lockers.

Bent gates are specialized modified D's that are designed for easier clipping of the rope. They are designed to be the bottom biner in a quickdraw and are not recommended for use anywhere else. The problem is that the rope clips in more easily and unclips more easily. However, the feature that makes a biner most likely to "unclip" is the size of its nose, not the bent gate. Bent gates usually have a more protruding nose.

Wire-gates are another form of specialized modified D's. The gate looks like paper clip stock, which may bother the first-time user; however, the wire stock is strong enough that it could be used to make an entire lightweight biner. The reason biners are not made of this stock is that a rope or sling would cut instantly in a fall; so, the wire stock is used only for the gate. These are general-purpose biners that can be used anywhere.

Parabiners (also called **HMS biners**, **pearabiners**, or **pears**) are designed to allow the Muenter hitch (also called Italian hitch) to move back and forth freely. They are usually lockers.

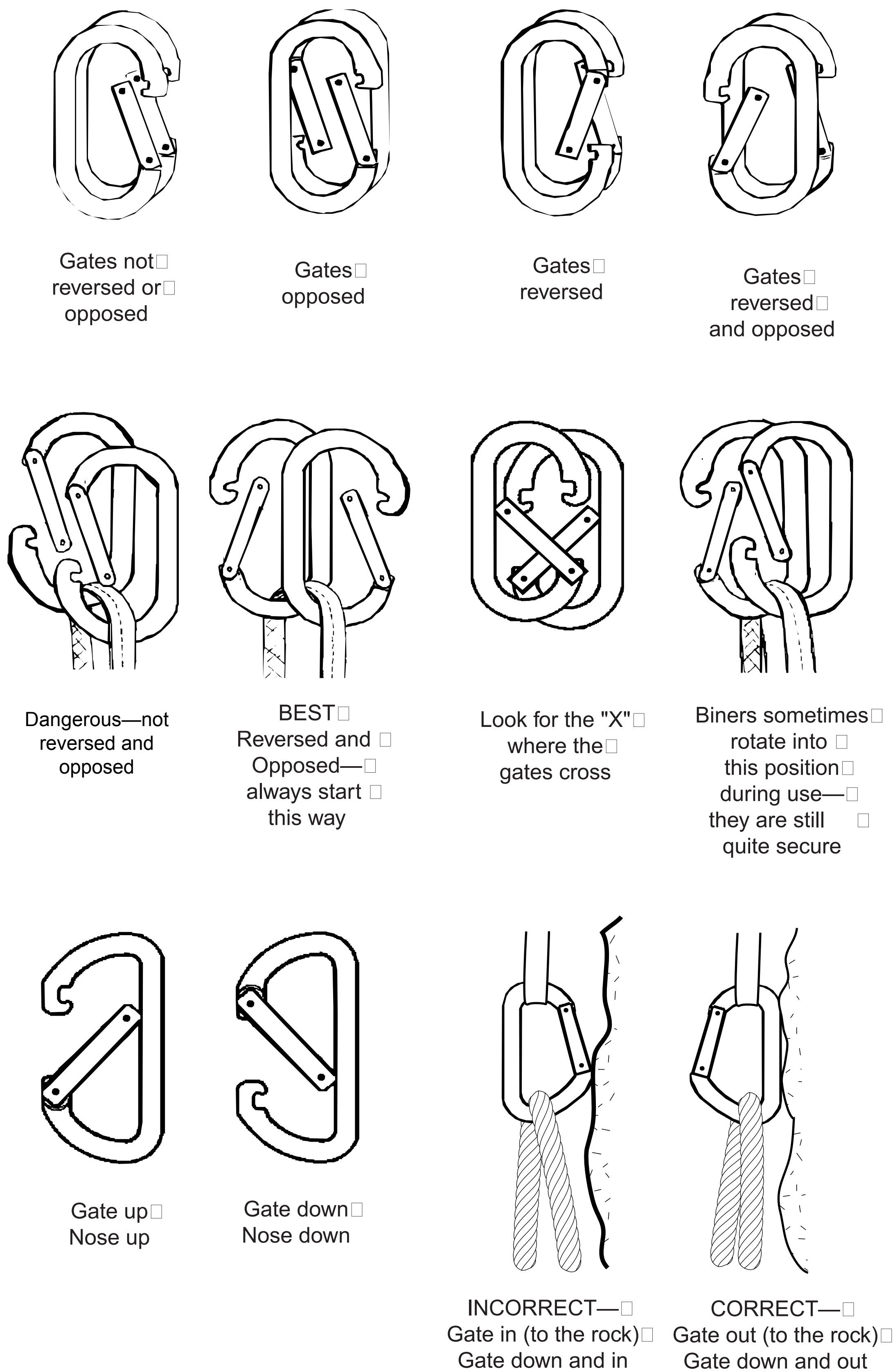
Carabiner Orientation

We have discussed how biners are rated, how they are designed to be loaded, and how a biner can be dangerous. This section discusses how to orient the biner when clipping it into various other kinds of gear, such as webbing, rope, etc., and how to use it to connect gear together (fig 4-06).

Reversed and Opposed

Whenever you use two biners to connect two pieces of gear, reverse and oppose the biners. Let's say you are connecting a figure-8 knot to a sling hanging down and the sling's loop is perpendicular to you. Clip one biner through the sling to the right and the other to the left. The second biner is installed in the **reverse** direction as the first, and the gates are **opposite** each other. The spine of one biner sits next to the gate of the other.

Fig 4-07—Carabiner orientation



Gate Position and Direction

Biners hang in space, against rock, horizontally suspended above the ground, horizontally on the ground, and in a number of other positions. It is important to consider the direction that the gate will point, not only in its original loaded position but also after dynamic forces reposition the biner. The goal is to avoid putting the biner in a position in which the gate can be forced open by rock, gear, or anything else. It is especially important to avoid hooking the nose on anything.

Biners can be oriented in any of six different directions.

Gate up (nose up): the notch end of the gate points upward, the hinge end downward
Gate down (nose down): the notch end of the gate points downward, the hinge end upward
Gate in: the gate sits against the wall, the spine away from the wall
Gate out (away): the spine sits against the wall, the gate away from the wall
Gate left: the gate faces left and the biner is parallel to the rock
Gate right: the gate faces right and the biner is parallel to the rock

Biner Orientation

The best orientation is for the biner to be "**gate down and out"** or just plain "**down-and-out,**" unless you can verbalize a reason for aiming it in a different way. In other words, the notch end of the gate should point downward and the gate should point away from the rock in order to prevent the nose from hanging up on any irregularities in the rock.

Biners usually hang parallel to the wall with the gate left or right. In most cases, orient the biner **gate down** in order to prevent the notch from hanging up on any rock protrusions. This will eliminate the potential problem of hooking the biner. Look at the rock. If there are protrusions on one side of the biner, avoid placing the gate in that direction. Ask yourself what can happen to that biner if the load changes direction due to climber movement or a failed anchor component. If it looks like the biner will swing in the direction of a feature that will open the gate, install the biner facing the other direction.

Biners are often oriented horizontally in anchor systems that originate away from the cliff edge. Orient these biners so that the nose of the biner faces toward the climb; in other words, if the anchor material hung down the cliff instead of out toward the cliff edge, the biner would be **gate down**. Since this is the direction in which the biner is being pulled, it is the direction in which the nose could end up hooking on rock.

In summary, orient biners **gate down**. Recognize that it is not wrong to orient biners **gate up** when there is no chance of their hooking on gear, but if you develop a habit of orienting biners **gate down**, you will almost never be wrong.

HARNESSES

The modern climbing harness is designed for safety and comfort. It is intended to distribute on your body the impact force of falling or catching a fall. Early climbers used only a length of webbing or a bowline on a coil tied above their hips called a **swami belt**. Without leg loops, it could (and sometimes did) cinch up below the ribs and cause the climber to suffocate or break ribs. Early climbers would often have bruises after falling; it was considered a part of the sport. **Sit harnesses** were created when someone added leg loops and started bearing most of the load on the legs.

Harness Construction

There are three basic types of sit harnesses on the market today: the seat harness, the diaper harness and the swami/leg loop harness. In most of today's models, one end of the waist belt is threaded through a metal buckle attached to the other end, then doubled back through the buckle. There are some specialized models designed for multi-day climbs that do not utilize the metal buckle.

The **seat harness** consists of continuous webbing arranged so that you tighten up the entire harness around you. These are usually "guide" or "one-size-fits-all" harnesses.

The **diaper harness** has a length of webbing that you thread between your legs from behind and connect to your waist belt with a biner, creating a leg support, but does not have true leg loops. In theory, the diaper harness allows you to drop the "leg loops" and go to the bathroom; in practice, most people still have to remove the whole harness. The Black Diamond Bod harness is an example of a diaper harness.

The **swami/leg loop harness** (fig 4-07a) is the most common and the safest of today's harnesses. It is constructed with a waist belt, two leg loops connected to each other with a leg loop connecting strap, and a belay loop connecting the waist belt and leg loop connecting strap.

The **rope tie-in area** (fig 4-07b) receives most of the abrasion on the harness. It is reinforced with ballistic pack cloth or extra webbing. Always thread the rope into this area to tie in (following the exact same path as the belay loop) due to its ability to handle the extra abrasion. Never tie the rope to a biner attached to the belay loop, unless you are using an occasional mid-rope tie-in, such as a butterfly knot. Every fall and every weighting, such as in rappelling or lowering, adds to the abrasion in the rope tie-in area. When the protective ballistic pack cloth or extra webbing wears through and the underlying webbing starts to abrade, the harness should be replaced.

There is usually a **haul loop**, or a single sewn loop of webbing, installed at the center of the back of the waist belt for trailing a rope or other gear. Sometimes this is used for a leg loop connecting strap in the back. Check with the manufacturer's specifications to see if your haul loop is intended for use as an anchor or for life support; if not, do not use it for that purpose.

The harness should fit above the hip bones so that when you put it on, you cannot slip out should you fall and invert. If you cannot snug the waist belt down over your hips, you should consider using a full-body harness. Younger children should usually have a full-body harness because they have no hips. This setup adds a chest harness to the sit harness and connects the two, so that the climber is more likely to stay upright, and definitely will prevent the climber from falling out of the harness in an inversion.

Harness Safety, Care and Maintenance

The timelines for retiring a harness are similar to those for retiring a rope. This is logical, since both are made of nylon. Manufacturers recommend that harnesses should be retired after 2-3 years of moderate use, or 5 years of minimal use. They also recommend retiring a harness after a serious fall. All of the safety rules for ropes apply to harnesses: sharp edges, chemicals, heat, etc. Remember, these guidelines apply to leading situations. You can generally use a harness for top-roping long after you have retired it from lead status.

WEBBING

Webbing for climbing is cheap, strong and widely available. Webbing is the raw material that comes on a spool; when tied or sewn in a loop, it is called a **sling.** Different size slings are called **runners**, **draws**, or **quickdraws**. These terms are essentially interchangeable, although longer slings are generally considered runners and shorter slings are considered draws or quickdraws.

Fig 4-07a
Harness

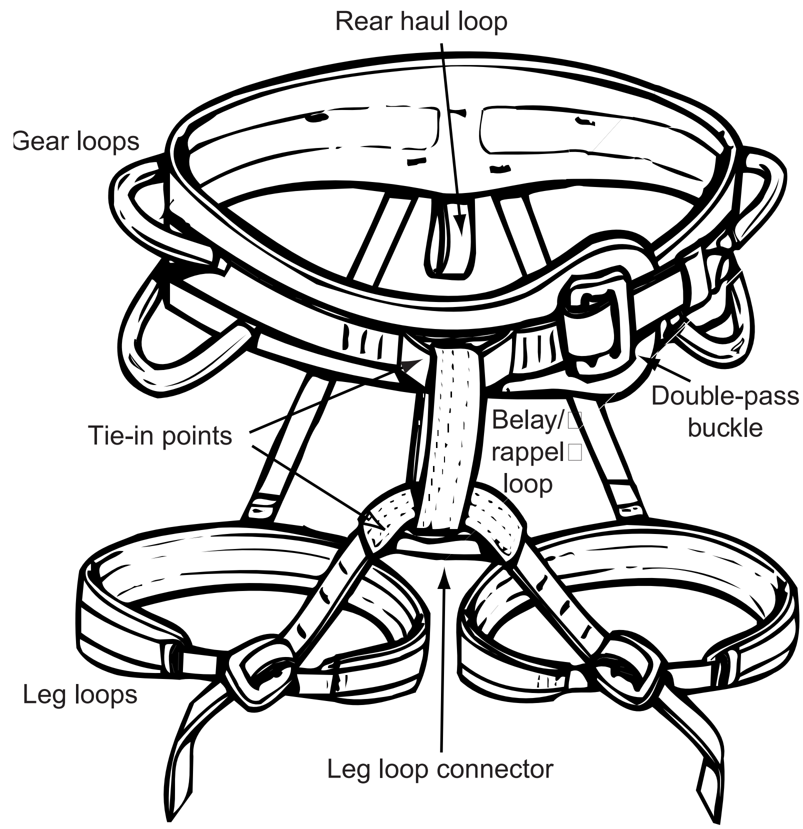
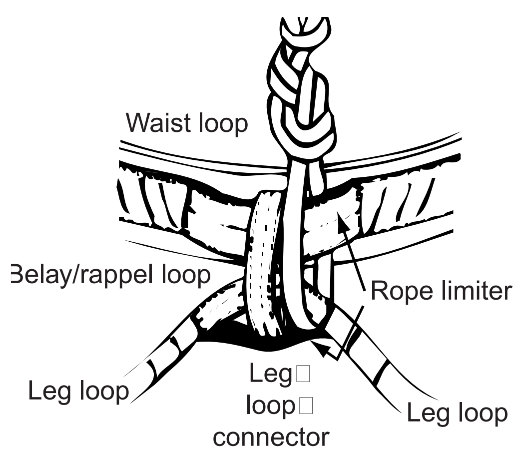


Fig 4-07b
Rope tie-in point. Always tie your rope into this area as shown. Always tie the rope through both the waist loop and the leg loop connector. Never tie the rope around the belay loop.



Webbing is usually made from **nylon** or a **nylon/Spectra™** mix. A tied sling of one-inch tubular nylon is rated at about 3800 pounds, depending on the manufacturer, and one of 9/16-inch nylon is rated at about 2300 pounds. When a tied sling breaks, it happens at a bend in the knot, which is the weakest point. When these materials are used in sewn runners, with no knots, twists or bends, one-inch tubular is rated around 6600 pounds and 9/16-inch around 4400 pounds. A sewn runner is made by a gear manufacturer; do not try to sew webbing into runners at home.

Spectra™ is sold only in sewn form, and usually in a 9/16-inch width. Most slings made of Spectra™ incorporate colored nylon for easier visibility and reduced cost. Spectra™ slings are rated at over 6000 pounds, depending on how much nylon is interwoven.

Webbing is considered static, and has virtually no stretch. It is ideal for anchor systems and for placements such as sharp wooden edges on tree bark or sharp edges under rocks that can damage the material.

Webbing comes in different colors, depending on the dye. There are bright colors and earth-tone colors. It is generally better to get bright colors (pink, red) for top-roping slings, so they won't blend in and get left behind by accident. If you are leaving slings at a rappel station or if you are climbing in an area where there is controversy about the visual impact of climbers, try to use earth-tone slings.

Mark your slings. They look alike in a pile of gear. After you have tied a water knot, mark the sling on the non-load-bearing tail. Initials, length and date of purchase are some of the info you can include. Use a felt marking pen. If you mark anywhere else or mark sewn slings, make sure the chemical in the marking pen is approved for nylon usage.

Care for your webbing the same way you care for your dynamic climbing rope. Keep it away from sharp edges, people's feet, heat, chemicals, vapors, and sunlight.

STATIC ROPE

Static rope comes in several different diameters, from three-mm to ½-inch. It usually is made of nylon and is advertised at 2% stretch. The smaller diameters usually are called static cord. Three-mm cord is used for non-weight-bearing purposes like tying biner loops to objects. Six-mm cord is used for prusiks; the softer the cord, the better the prusik hitch. Half-inch static rope from a spool is excellent for anchor setups where the anchor point is way back from the edge.

Care for your static rope the same way you care for your dynamic climbing rope. Keep it away from sharp edges, people's feet, heat, chemicals, vapors, and sunlight.

HELMETS

Helmets are the most important safety devices that climbers can use, outside of the equipment used directly for the climbing process (rope, webbing, biners, and harness). Helmets are designed to protect your head against falling objects (rock and gear) and falls. Although they will not protect against too big a rockfall, nothing will. There are many rocks out there big enough to kill a bare-headed climber, but that would bounce off a helmet with minimal damage.

Manufacturers generally recommend that after any serious impact, you replace your helmet, whether it is in climbing, bicycling, or other sports. Also, some manufacturers such as Petzl recommend that you replace a helmet after five years, period. Unlike the replacement guidelines for ropes and harnesses, which differ for leaders and top-ropers, this recommendation applies equally to all helmets, as pendulums and rock falls can be just as serious for non-leaders as leaders.

CLIMBING SHOES

Climbing shoes are designed with a leather or synthetic "last," a rand, and a sole. The rand wraps around the lower sides. The sole is made of special rubber that "sticks" to the rock better than the leather of your business shoes or the synthetic of your tennis shoes. A manufacturer's line of shoes may include all-purpose shoes, edging shoes, smearing shoes, pocket shoes, gym shoes, slippers or other specialized designs. These models change year after year as technical improvements are made, and more often as marketing ideas evolve.

The best sources for information on shoes are the local retailers. They spend time at the outdoor gear shows, talk to the manufacturers, and know better than individual climbers what is new and what works. They can tell what the replacement model is for the two-year-old pair you just wore out. They can fit you better than any manual.

There are, however, five factors for the beginner to consider in buying your first pair of shoes. The first is the **type**. Don't buy a specialized type as your first pair. You don't have the experience to know what type of climbing appeals to you. If it turns out you want to do sport climbing only, you may want pocket or edging shoes. If you want to do long multi-pitch in the backcountry, you need comfortable shoes you can wear all day and perhaps on a descent. Many people who buy specialized shoes have several pairs—one for this, one for that, etc. It is better to **buy a general purpose shoe** until you know what you are looking for. It is more important to work on your technique; then you can actually make use of the specialized features in shoes.

The second factor is the **sizing factor**. Although most local retailers are excellent at fitting you to a shoe, you may run into someone who tells you to buy shoes too small for you. Sometimes, good climbers work in the business of selling shoes, either in a climbing shop or in impromptu sessions out of the back of a van or in a gym. Some of these climbers buy shoes for themselves that are two sizes too small, curling their toes into a ball at the end of the shoe to get maximum sensitivity and minimum “roll” when climbing hard routes. As a beginner, you won’t be on these hard routes. You will be on routes that these hard climbers can do in running shoes, or Tevas, or barefoot. You don’t need a shoe that is too small, and some people who are sized this way end up losing toenails or having other painful climbing experiences. As a general rule, don’t buy any shoe that is more than one-half American size smaller than your regular shoe size. This guideline is complicated by the fact that climbing shoe manufacturers, like regular shoe companies, don’t make all size 10s the same size.

The third factor is the **testing in the store**. Plan on spending some time walking around in these shoes. Remember, as a beginner on a typical sport climb, you will wear the shoes for 15 minutes, 30 minutes, or longer. Your feet will hurt as you get used to the different muscle movement and pressures on your foot. Walk around the store and play on the inclined smearing and edging wall that most stores have. Try the next size down and the next size up. After 10-15 minutes in the shoe, you will get a feel for how the shoe will treat you on the rock. Buy the one that is a little tight.

Fourth, don’t buy a brand because it is popular, or because it is the stylish shoe. People have such a wide range of **foot shapes**—narrow and long, narrow and short, wide, etc.—that one company cannot fit all people. One person may have a Boreal foot while another may have a Sportiva foot. And not all stores carry all brands; many carry only the better-selling lines. If you can’t find the right shoe, look in the climbing magazines and read the reviews. They may give you tips on companies that aren’t represented locally, and where to find them.

Lastly, don’t worry about the **rubber**. You can resole right away with the rubber you like, but you can’t change the shape of the shoe. If you are a beginner, any rubber will work just fine. Since beginners wear out the rubber much faster, you will be resoling soon enough anyway. Although most people consider one popular brand of rubber to be the best, some blind comparison testing has proven inconclusive.

Shoes don’t require much attention, but you can make them last longer and resole less often if you take some care with them. Try not to walk around in them on the ground. Taking them off between climbs is not always convenient, but it will keep grains of sand from embedding themselves in the sole and degrading the smearing performance. Keep them out of the sun and away from heat and chemicals just like ropes.

MISCELLANEOUS

Chalk and **chalk bags** are used to help dry a climber’s sweaty hands. The design is personal preference, although most people prefer a bag that can be easily opened on a climb and easily closed when done. Some people don’t use chalk.

Daisy chain. A daisy chain is an excellent all-around personal anchor sling, because it allows for instantly variable length anchoring. Some are made from Spectra and some from slightly bulkier nylon. Just clip a biner in one of the loops and you have established the length of the personal anchor. There are two cautions with daisy chains. The first is that you should never, under any circumstances, clip a load-bearing biner through two loops. The stitching creating each loop is rated at approximately 3 kN, or about 675 pounds of force. A mild lead fall—or hard top-rope fall—can easily generate this kind of force, failing the stitching. This can cause a biner clipped through two adjacent loops to come loose from the daisy chain. The second caution is that to back up a failure of one of the loops of the daisy chain, you need to clip the loose end of the daisy chain into a different biner than the intermediate loop is clipped into. Again, and in spite of these warnings, the daisy chain is the best personal anchor.

Guidebooks are almost mandatory. They contain topos of climbs (illustrations or pictures that show the route), instructions for finding the climbs, and information about gear, anchors, descents, and history related to the climb. They can be protected by nylon book covers if desired. They often describe the protection on climbs using a rating system similar to movie ratings, with PG, R, and X ratings. Some people refer to “lies, damned lies, and guidebooks”—meaning that you may find the route incredibly different from the description in the guide.

MARKING GEAR

Most climbing gear looks alike. Your biners and slings resemble your friends’ gear. To avoid losing it, mark it distinctively, but safely.

Ropes are usually not marked because it is difficult to do so.

Biners are marked in several ways. Some people use narrow colored tape in different combinations and some use different shades of nail polish. You can use almost anything because the marking material probably won’t hurt the biner. Try to mark it in a spot that won’t get worn down easily. The gate and spine have less contact with the rock, so most people mark them.

Webbing is nylon, and there are chemicals that can damage it. Most webbing is tied into slings with a water knot. This leaves two tails that are not weight-bearing. Most people use a felt marker to write initials; some add the sling length and date of purchase.