

Introduction

When we first wrote *Climbing Anchors* and *More Climbing Anchors*, our aim was to try and standardize the entire subject into basic components and protocols generic enough they would apply to everything from the sandstone desert bluffs of Moab, to the great granite walls of Yosemite. It's remarkable to think that just a decade ago there were few common terms (most of which I either made up or filched from different sources) for even the most basic elements of an anchor, and there were even fewer standard protocols about how to build them. We venture into this new edition with most of the terms now known and used by all and with the basic protocols established and refined by millions of climbers in many lands.

And yet in some ways this book is far trickier to put together than when I wrote the first anchor book in 1992. Over the last dozen or so years, the strengths and weaknesses of the basic systems have been examined 1,001 times. The short-form verdict is that the majority of our anchoring techniques are provisional, not absolute. Furthermore there are often trade-offs in choosing one technique over another. Lastly, while we'd like each anchor to conform to a wide-ranging evaluation criteria called SRENE (solid, redundant, equalized and no extension), it's the rare anchor that can accomplish this even close to 100 percent. If we could suggest a few protocols that would absolutely work in absolutely every situation, I could write this book in fifty pages. Instead it will take us four times as long to grasp an exceedingly fluid subject. Climbing anchors are largely a matter of compromises; the trick is developing a feel for what you should and should not compromise at a given place on the rock.

For several reasons we've decided to load *Climbing Anchors* and *More Climbing Anchors* into one volume to provide a single Anchor Omnibus. As climbing has continued to grow over the last ten years, trends have evolved and gear has changed. In the meantime the Internet has taken over the universe. On countless threads on countless climbing Web sites, anchors have remained a hotly debated topic, providing invaluable perspectives drawn from real, on-the-rock experiences. Reader feedback and Web dialogues, along with a growing (but incomplete) database of lab-derived facts and figures, have led to such a thorough reworking of our original material that little beyond the basic breakdowns and a few photos survive in the present edition.

That much said, the task of compiling a definitive text on anchors will always be lacking because of the inexhaustible variables found on the rock. There are also dozens of methods and as many ideas about how to execute most all the basic anchoring procedures. If we were to include even a fraction of these, this book would run a thousand pages long. While the material in this book is, strictly speaking, nothing more than our experiential opinion about a broad-reaching subject, that opinion has drawn heavily from manufacturers, instructors, guides and leading climbers in the United States and beyond. Heeding current refinements and wrangling it all into one standardized *modus operandi* is the mission of this book. And the starting point for all of this is the philosophy underlying the entire subject of climbing anchors.

THE SOURCES

Hard information about anchors and protection are drawn from two sources: the lab and the field. Lab testing provides facts, figures and general counsel per the specs of this material and that system. Using the collected knowledge of physics and engineering, along with evolving testing methods and computer analysis, lab tests yield crucial generic information.

Climbing is not a lab job, however, so we cannot expect lab tests to furnish protocols applicable directly and infallibly to actual climbing scenarios. Sometimes they do, but field testing ultimately determines if a lab-hatched technique lives or dies. Conversely, techniques and methods drawn from the field are frequently lab tested in the hopes of isolating the pros and cons of a given technique, system or particular piece of gear. If we've learned anything over the last twenty years, it's that the limitless variety of geology will always frustrate a one-size-fits-all anchor strategy. Manufacturer catalogs and Web sites offer illustrated ways to do most everything, rarely mentioning that there are times when you *cannot* do things as advertised. Again, more than simply showing you what to do, this book concentrates on developing an understanding of basic principles so thoroughly that with time and experience, you can decide for yourself what to do.

Conveying this information in a book presents several challenges. Our method is to cover the material in both theoretical and practical terms. Once the theory is covered in the text (and summarized in multiple sidebars), we place the reader, via illustrations and photographs, in a real world climbing situation and ask: "What might we do here?" Then we proceed to show concrete options, giving pros and cons for each.

A change in this volume is that "What might we do here?" is largely spelled out through applying a general principle to a specific set of circumstances. The photos will typically illustrate a concept (such as equalization, redundancy, etc.), with the



Peter Croft leading *Astroturf*, Joshua Tree, California. PHOTO BY BOB GAINES.

photos grouped to show the concepts applied in various ways. By seeing a concept come to life in a dihedral, under a roof, or in a horizontal crack, we learn to diversify our basic toolkit, while coming to appreciate that we can never eliminate judgment and creativity from the art of building anchors. Once you are out on the cliff, you have to work with what you have on your rack and what the rock affords. It is debatable whether there is ever some objective “best way” to build an anchor at a given location. Every anchor is a matter of compromises. We compromise our desire for anchor overkill by placing two instead of six bolts at a belay station; in the name of proficiency we build a hanging belay from five, not fifteen, nuts, and so on.

SECURE

This leads to the great conundrum about the entire topic of anchors: What does “secure” actually mean? Or more accurately, what *should* “secure” mean? Not in a theoretical sense, but in the sense in which a real climber will confront a real situation on a real rock and must make decisions that will keep her alive. Without “cliff sense” and acceptance that skilled climbing is efficient climbing, some people consider the subject in terms of absolutes. “Secure” will then be defined and defended from a position of neurotic fear, resulting in needless overkill in the quest to achieve the impossible goal of absolute safety. Such thinking, if applied to freeway driving, would lead us all to rumble down the road in Abrams tanks. But it’s impractical to do so, so most of us are fine with driving a car with some—though not absolute—protective qualities. Yet as any experienced driver will tell you, the key to avoiding accidents is not to drive a tank, but to stay on the ball and avoid risky maneuvers.



Hidetaka Suzuki finger jamming on *The Phoenix*, Yosemite, California. PHOTO BY BOB GAINES.

Instead of improving one’s wherewithal on the cliff side, gym-trained sport-climbing has introduced a brand of climber prone to believe safety comes from the equipment and the systems themselves, instead of how these are used. This expectation can never be realized in the field. Secure climbing remains the product of experience, knowledge, judgment and common sense, as opposed to the gear you employ. Our gear and our methods must be “good enough,” but unless we can accept that “good enough” can never be an absolute, we’ll keep looking for the climbing equivalent of that Abrams tank. Not only will we never find it, we’ll waste everyone’s time overbuilding anchors and exasperating our partners with specious arguments chasing the unreachable goal of total safety.

In practical terms, “better” means “stronger” only if what you have is not “strong enough.” Allow me an example. Several years ago a group of us met at a local beachside crag, rotating between slab climbing and body surfing throughout the morning. Around noon we decided to step it up and string a top rope over a vertical 80-foot seaside cliff sporting some challenging face routes. I rigged the TR with a 50-foot loop of static cord clipped to half a dozen bolts on top. I draped the anchor line over the lip, which I’d padded with a pack, and, via two locking biners, gates opposed, connected the climbing rope to a double figure eight knot tied in the static line, thus creating my “power point.” Just to be sure, and because I could rig it in ten seconds flat, I backed up the static line with a runner clipped off to three topside bolts. You could have tethered a submarine off this anchor, but for one guy it wasn’t “good enough.” He wanted me to tie another power point, just in case the one already doubled power point should fail, along with the back-up runner. He kept on about how much “safer” his method was, as opposed to what we’d rigged. It was a little like trying to argue with someone terrified of butterflies. You get nowhere, no matter how rational your arguments.

Here we have someone trying to judge an anchor by absolutes. His method would have provided a stronger anchor, but not one any more secure since what we had was easily ten times as strong as was needed for top roping. In any practical sense, his idealized anchor was a bust—and he never forgave me for not rigging it out to his phobic specs. An hour later, we’d all run multiple laps on the steep face and the fellow was still carping about the sketchy anchor, a self-inflicted martyr of all-or-nothing thinking.

WHEN DOES “GOOD ENOUGH” BECOME TOO MUCH?

“Good enough” does not mean barely enough to keep you from dying. Good enough means an anchor that will unquestionably hold the greatest forces a climbing team can place upon it. Additionally, every experienced climber factors in a safety margin of at least one fold, meaning the anchor is built to withstand at least twice as much impact as that generated by a factor 2 fall (explained later). “Good enough” does not mean an anchor capable of holding a celestial body, which has forces you can never generate on a rock climb. An anchor that can hold Neptune in orbit is not “better”

Remember . . .

- A stronger belay anchor is not necessarily a better anchor.
- Climbing gear rarely breaks, but it often pulls out.
- Even the strongest primary placements are worthless unless they are securely unified into the roped safety system.
- Protection and the belay anchor work in tandem with judgment, experience and belaying and climbing skill.

than a “good-enough” anchor because the former is safeguarding against purely imaginary forces. And we should know that even this advice is impossible to follow at least some of the time. It’s likely that at some point you will find yourself hanging from anchors you pray to God are good enough, while knowing that they are probably not. Once you start up a rock wall, there are no guarantees.

In short, this manual is geared to provide tangible, specific, comprehensive and user-friendly information to climbers who are learning how to place protection, and who arrive at the end of a pitch and have to construct an anchor to safeguard their lives. As Canadian big-wall icon Hugh Burton stated, “Without a bombproof anchor you have nothing.” The importance of sound anchors cannot be overstated.

That much said, protection and the belay anchor are only parts of a hazard-mitigating system that works in tandem with judgment, experience and belaying and climbing skill to protect the team from the potential dangers of falling. Here risk evaluation can only be broached in terms of placements (protection or “pro”) and anchors; the rest falls under leading skills, which is a separate study imperative for all aspiring climbers.

BASIC ANCHOR BUILDING FACTS:

“Perfect” rarely exists in real world climbing anchors.

No single rigging technique will work in every situation.

Trad climbers must efficiently improvise on a handful of anchor building techniques.

The ability to improvise requires a thorough understanding of basic principles.

Climbing anchors always involve compromises—the trick is to understand what you should and should not compromise at a given place on the rock.

MODERN RIGGING METHODS ARE NO SILVER BULLET

Over the last twenty years ingenious rigging methods have been developed, methods that were much needed and long overdue. These methods, described throughout this book, take practice to master, though mastering them ensures nothing. In some cases climbers have come to put more emphasis on these rigging methods—the way in which they combine various components of an anchor matrix—than on the security and holding strength of the components themselves. Simply stated, the purpose of modern rigging methods is to exploit every possible ounce of holding strength from a given anchor in order to make it secure. But believe it: All the fancy rigging in the world cannot compensate for individual nuts, pitons, cams and bolts that themselves are unsound.

Consider, for example, an interesting experiment we ran some years ago at Trash Can Rock, out at Joshua Tree National Monument. Someone had an old VW Bug, and we got the crazy idea of testing anchors built in the nearby cracks by hooking up a line to the chassis of the Bug and loading the anchors till the Bug's tires spun in the gravel or the anchor shot from the nearby wall. We broke several biners and slings, mangled a few spring-loaded camming devices (SLCDs) and hexes, and in the process learned to take cover when the Bug went into gear and the anchors were "tested."

Though this exercise would never qualify as proper science, it did indicate the absolute holding power of a given primary anchor and various rigging systems. By a ratio of about 10 to 1, the anchors that held the Bug fast consisted of large passive nuts lodged in bottleneck placements and rigged with the most rudimentary tie-in systems. Elaborate and ornate anchors consisting of five or more small-to-medium-sized devices, ingeniously equalized and built to absolutely perfect, textbook specs, were always the first ones to fail. Basic, bombproof nuts simply rigged proved time and again to be the anchors that provided the most security.

Before we get into the instructional part of the text, it's worth touching on some recent tragedies involving anchor failure with the intention of avoiding the same mistakes. Without getting too technical, recent anchor failures suggest that the most vulnerable setups tend to be combinations of small to medium nuts and cams placed in horizontal cracks, rigged with elaborate equalization systems. This is not to say bomber anchors cannot be obtained with small nuts in horizontal cracks, rather that when building such anchors, special care is required to make sure the anchor is indeed "good enough." Moreover we must wonder if the victims of these anchor failures (all fatal) believed that the modern rigging methods would automatically transform a poor anchor—in terms of primary placements—into a good one. We can never know the answer to this question, but it's one we should never lose sight of.

The lesson here, and one fundamental to this manual, is that the starting point of any anchor is setting bombproof primary placements. The means by which you connect the various components into an anchor matrix should never be relied upon to provide the needed strength not found in the primary, individual placements. Furthermore, the goal is not simply strength, but security. More on this later.

SRENE—SOUND PRACTICE, BUT NOT THE FINAL WORD IN ANCHORS

When I wrote out the "rules" in my previous two anchor books, the idea was to establish general protocols that would maximize the likelihood of folks building fail-safe anchors. Over a short time the rules got codified into a sort of gospel—by no

SRENE Anchors

- Solid
- Redundant
- Equalized
- No Extension

means my own, since I drew upon many sources (including Marc Chauvin and the American Mountain Guides Association)—and after standardizing the terminology, I wove the lot into one overall strategy. Perhaps the result saved a few lives.

The downside of this “gospel” is twofold: First, folks came to believe that if the anchor met the SRENE (solid, redundant, equalized and no extension) criteria, then it was automatically secure and fail-safe. Second, any anchor that did not meet the criteria was, without exception, a liability, as was the climber who placed it. Reality does not support either notion. There are far too many accounts of well-rigged anchors that failed for the simple reason that SRENE criteria cannot compensate for bad primary placements (again, bombproof placements remain the backbone of all sound anchors).

The fact is, even SRENE criteria cannot be met in absolute terms. No anchor is ever perfectly equalized; a well-equalized anchor commonly has some possibility of “extension” if one component in the anchor matrix fails; and few anchors feature textbook redundancy. The true value of SRENE is for use as an evaluation strategy, not as some ideal anchoring model you can and should attain. But even if someone, somewhere *could* build perfect, SRENE anchors, we could never apply the criteria across the board and believe we had the danger licked. Though I would not recommend anyone violating the SRENE code, there are anchors out there that do not conform to SRENE, and yet these anchors are literally capable of holding a car.

KEY SRENE POINTS

SRENE is an evaluation strategy, not a checklist.

Observance of every SRENE principle does not guarantee that an anchor will hold a single pound.

Modern rigging techniques cannot compensate for insecure primary placements.

With strong primary placements and modern rigging techniques providing security, climbing's roped safety system is typically very reliable.

THE MODERN CLIMBER VS. THE YOSEMITE PIONEERS

Newsweek recently reported that there are 1.9 million active rock climbers in the United States. “Active” was broadly defined, and the 1.9 million figure was probably cooked by the gear trade. But go to any popular gym or sport-climbing area and you’ll see a regular ant farm teeming over the holds, so perhaps *Newsweek*’s estimate was not so far off.

Thirty years ago, Bill Forrest—an innovator of modern climbing equipment—used to travel the country hawking harnesses, copperheads and plastic nuts off the ass-end of his pickup. Nowadays, annual sales of climbing gear run in the hundreds of millions of dollars. Space-age materials, computer modeling and ingenious designs provide excellent protection devices. Likewise, anchoring methods and rigging systems have become a special study. Still, with all this technology thrown at what twenty-five years ago was a niche sport, you'd think rock climbing would be less dangerous than ever before—but statistics indicate that the injury per climber ratio has actually increased over the last few decades. Why? The answer can never be fully known, but I believe two main reasons stand out. Both are crucial to understand as they drive the basic philosophy of this manual.

The first reason is obvious. The bulk of present-day climbers learned the ropes in a climbing gym, not on the rock. In a gym, the anchors and protection are fixed in place and bombproof, so a belayer and a leader need only know basic clipping, belaying and lowering techniques to keep the game adequately secure. That frees up a gym climber to concentrate on the physical moves, and the learning curve is quick for most anyone fit and motivated.

The problem comes after a gym climber acquires blazing licks on plastic, and expects that prowess to translate directly to the outdoors. This often proves so, to greater or lesser degrees, on the limited venue of clip-and-go sport routes, where every bolt is fixed and the routes rarely top 100 feet. But consider traditional (trad) climbing. Here a leader must place most if not all the protection and build anchors, often complicated ones, as well as rig and perform multiple rappels, on routes upwards of 3,000 feet long. Anyone can appreciate that the gym provides little preparation for such serious adventures.

In the old pre-gym era, from day one climbers were obliged to set anchors and protection, as well as rig and perform rappels. The downside of the old-school curriculum was that it often took several seasons for an active climber to start leading routes approaching the 5.9 grade, something most gym climbers now achieve in weeks, if not days or even hours. The upside was that from the outset climbers of old gained experience with, and a practical grasp of, both the gear and how to use it, while slowly developing a comfort zone on the rock. The result was far fewer basic mistakes and fewer accidents than those suffered, per capita, by present-day climbers.

The second reason that modern gear and techniques have not by themselves reduced the danger quotient is more difficult to explain and understand. Basically, much of the modern testing has focused on calculating the breaking point of ropes, slings, “high-tensile cord” and every piece of hardware ever made. Because these items are generally more robust than is required in the field, the high test



Sandy Litchfield on #1 Super Guy, Shelf Road, Colorado. PHOTO BY STEWART M. GREEN.

scores might be great as a sales tool, but they add little *new* information to our study of anchoring systems. More apropos is when the engineers strength-test methods of securing the anchors—alone, and in groups or matrixes—to the climbing rope. Rigging, in other words. Before about 1975, there wasn't much strategy about how to rig an anchor beyond trying to snug the knots up so the forces of a fall (the actual figures were then largely unknown) would be somewhat displaced between the various pieces of the anchor matrix. In the old school, the main emphasis was on the strength of the anchors themselves—the primary placements—not on how you connected or equalized them. The thinking was: build an anchor from individual placements that are absolutely

bombproof, impossible to pull out “no matter what.” Then tie the thing off, snug up those knots and get on with it.

By most criteria, if you were to replicate the anchors used by the Yosemite pioneers on the first ascent of virtually every big wall, they would be deemed unsatisfactory, owing to the ways in which the individual placements were rigged together. But statistics do not bear out this appraisal for one irrefutable reason: None of the old pioneers, or any of their immediate followers, ever died from anchor failure.

A SHIFT IN PRIORITIES

Fast forward to forty years later. A bunch of folks start casually testing new ways to rig anchors and, after field input and tweaking, those ways become standardized, as well they should have. Without anyone taking note, there is a subtle shift in priorities, from the primacy of the basic anchor points, the individual nuts, bolts, pitons, etc., to the way these anchor points are joined together. The new rigging strategies furnished significant advances, rendering much more secure anchors for

the same placements of the old timers. But as new rigging configurations became standard practice across America, perhaps too much emphasis came to be placed on the setups, while in some cases the importance of the primary anchor points became secondary. As we've already touched upon, and will keep touching upon, some climbers came to believe that the new rigging systems were so great that any old anchor would do, so long as it was rigged according to SRENE criteria. Climbers of old, on the other hand, had little concept of SRENE, and instead put their confidence in the outright holding strength of the individual placements, content to bash home enough pitons so that the anchor would hold "no matter what."

But these pioneers had the luxury of acquiring monumentally strong anchors with steel pitons 95 percent of the time. Nobody's arguing in favor of bringing back the piton for security's sake—the rock suffered too much damage. Still it's taken us roughly forty years to develop passive gear and rigging systems that can now approximate the brute strength attained by the pioneers with their racks of chrome molly steel. And yet anchor failure has become a more common occurrence. Hence, the need for this manual.

ABOUT THIS BOOK

The mission of this book is to provide the following:

- A simple, basic philosophy that guides the entire process
- A set of general, tangible motifs and rules-of-thumb to focus the overall process
- The general themes clarified through text, sidebars and specific examples via pictures, illustrations and breakdowns

Practical value is the guiding principle of this manual. There's no getting around the fact that this is a textbook, technical by nature. I'm not writing it for fun or amusement (though I hope some might find parts of the text amusing), and my impulse to make it flow like a short story has been sacrificed in an effort toward thoroughness. The sheer volume of information can sometimes overwhelm the beginner. Although the many sidebars break down each key topic into simple bullet points, there's still no getting around doing some heavy lifting to get through the material, especially if the subject is somewhat new to you.

Before you get involved in the specifics, though, always keep in mind two basic principles we will elaborate on throughout this book. First, the primary concern in building secure anchors must be the outright holding power of the individual placements themselves. Second, the means by which the individual anchors are linked together into an anchor matrix should always take into account modern rigging protocols and criteria, with the emphasis being on simplicity and efficiency. By keeping these two cardinal rules in our head, the sometimes-confusing configura-

tions and infinite options of building anchors can be made much more straightforward.

There are many topics more involved and complex than climbing anchors, but few where the concepts are so rigorously applied, and where slipshod workmanship can so quickly make you dead. This is the main reason to take your time with this material. We've all crammed for exams, then later walked from the classroom with all that we "knew" pouring from our beans like flour from a sieve. The material herein can never be absolutely mastered. Once you absorb the basic concepts, it comes down to experience and judgment, qualities that come in their own time—or not. Rock climbing is not for everyone, especially adventure or "trad" climbing, for which this book is especially germane. Building anchors is a lifelong study, so pace yourself, and live long.

WHEN BUILDING ANCHORS, ALWAYS REMEMBER . . .

The primary concern must be the outright holding power of the individual placements.

Use modern rigging methods and criteria to link the individual placements.

Slipshod workmanship can kill you.

Double-check your work and your partner's.

Building anchors is a lifelong study.

A BRIEF HISTORY OF ROCK HARDWARE

If a modern-day rock climber could time-travel back forty years to the halcyon days in Yosemite, she would see equipment and techniques that few remember and fewer still ever used. Back then, boots, or Kletterschues, were more like clodhoppers, with their stiff uppers and rock-hard cleated soles. Ropes were adequate, but not nearly as versatile and durable as the modern article. Protecting the lead was a business of slugging home pitons and slinging the odd horn. Artificial chockstones (nuts) were available, but most were weird, funky widgets with limited utility. Save for really bombproof placements, these first nuts were far less reliable than pitons for securing the rope to the cliff.

In 1970 most nuts were European imports. The best came from England, where they were invented. Initially American climbers were suspicious of nuts, and most everyone considered them unacceptable as a general replacement for pitons. Clearly they weren't as sound, and anyone making a hard sell for their use in the United States was thought to be a daredevil.

Things changed suddenly. In the early 1970s John Stannard wrote a seminal article illustrating how pitons were rapidly demolishing the rock, followed closely by Doug Robinson's "The Whole Natural Art of Protection," which appeared in Chouinard Equipment's 1972 catalog. Royal Robbins also suggested nuts as the only alternative if the crags were to survive aesthetically. By this time, Chouinard Equipment (now Black Diamond) was mass-producing chockstones, and almost overnight "clean climbing" became the rage. First "clean" ascents of popular big walls became fashionable. Climbers waxed poetic about "artful nutting" and "fair-means" climbing. By 1973 walking up to a free-climbing crag with hammer and pegs was akin to showing up at an Earth First! festival in a bearskin coat.

It is a wonderful thing that the climbing community was quickly won over to clean climbing. The sport was booming and every classic climb was destined to become a ghastly string of piton scars unless nuts replaced pitons as the common means of protection. Within a couple of seasons, clean climbing had reduced a climber's impact on the rock to chalk and boot marks. The benefits were clear, and the change was long overdue.

Unfortunately the nuts available at the time still had serious limitations. Chouinard Equipment's Stoppers and Hexentrics (Hexentrics appeared in '71, Stoppers in '72) were pretty much the whole shooting match, though one could flesh out a rack with oddball European imports that did little more than take up room on the sling.

Recall that in the '70s, American climbing standards came principally from Yosemite, where cracks are generally smooth and uniform. The Stoppers worked well in cracks that were ultra-thin up to an inch in width, but the first hexes (a name later adopted by other manufacturers and now used as a generic term) needed a virtual bottleneck for a fail-safe placement. On long, pumping Yosemite cracks, such constrictions often are few and



Hexes from the early 1970s. PHOTO BY CRAIG LUEBBER



Pin scars on *Serenity Crack*, Yosemite. PHOTO BY BOB GAINES.

far between, if present at all. From about 1971 to 1973, old testpieces became feared again—not so much for technical difficulties, but because of the lack of protection provided by available nuts. There were a handful of routes where you simply couldn't fall, though more than one climber did, and the scenes were not pretty. Clearly the limitations of these first nuts, coupled with climbing's rising standards, made clean climbing on hard routes a bold prospect during that first phase of the hammerless era.

Then in late 1973, Chouinard changed the symmetry of the hexentric, eliminating the radical taper. The resultant "polycentric" was a nut one could place in four different attitudes (including endwise), and

each placement was far more effective than what could be achieved with the old design. These new hexes hinted at the camming to come and brought a degree of security back to the sport.

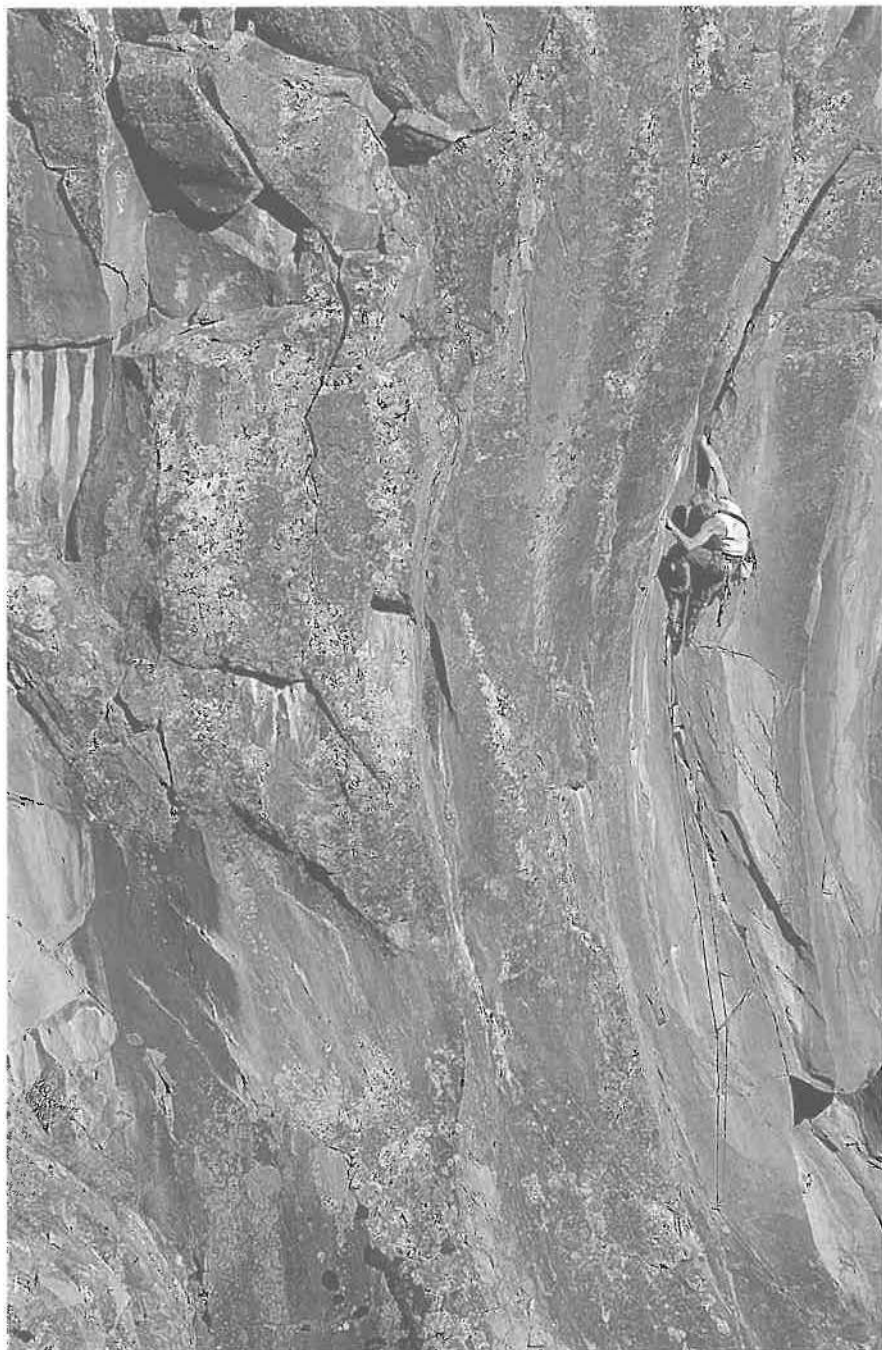
Subtle changes also were appearing in other chocks. Wire cable replaced rope and sling for the smaller-sized nuts. Manufacturers entered the market with specialized gear—brass nuts, steel nuts, even plastic nuts were available for a short time. New-fangled homemade gear also began appearing, and the race was on for more diverse designs.

The pivotal breakthrough came in 1978, when Friends first became available commercially. The popular story is that Friends evolved from a simple camming device invented by Mike and Greg Lowe in 1967. Ray Jardine, a climber with a background in aerospace engineering, spent much of the '70s refining the concept (the Lowes had the right concept but never produced a workable design), and the first spring-loaded camming device (SLCD) was the result. The era of super-specialized protection had finally arrived, and a protection revolution followed. In the ensuing ten years, SLCDs—more commonly called camming devices, or cams—became available from many manufacturers in various forms and sizes. Also component "sliding nuts" appeared that literally expanded in breadth when weighted in the

direction of pull (explained in detail later). Sliding nuts never truly caught on, possibly because they were often difficult to remove.

As other companies sprang up and European companies airmailed ingenious, sometimes kooky contraptions into the American market, passive nuts were steadily improved and customized for specific applications. Sling materials likewise evolved, as did carabiner design and rope technology. Present-day novelties include the DMM revolver carabiner, with a built-in pulley, and the removable bolts now available from Climb Tech, to mention only a few. Yet since the SLCD first arrived on the scene in 1978, there hasn't been any comparable breakthrough in protection technology. Refinements continue with every aspect of climbing tackle. Classic designs are regularly tweaked and buffed and reworked to effective ends. Cams themselves have undergone significant change, with some designs now offering greatly increased range of placement. But the Next Great Thing has yet to appear.

All told, the current state of rock-climbing equipment makes memories of barrel-chested bruisers in lug-sole boots slugging home pitons almost quaint. To catalog all the viable equipment manufacturers would involve adding fifty pages to this book. Simply understand there is fierce competition for your dollar, and to get it, companies are sparing nothing in both technology and research and development. The result is gear superior to most any other adventure sport.



Charlie Henrikson on *Born Under a Bad Sign*, Paradise Forks, Arizona. PHOTO BY STEWART M. GREEN.