PART TWO

ANCHOR SYSTEMS

Complex anchors consist of multiple primary placements, connected together to provide redundant and multidirectional belay anchors, toprope anchors, rappel anchors and bivouac anchors.

If no substantial natural anchor—a tree, block or large bush—is available on your chosen climb, you must construct an artificial anchor using hand-placed gear. Given that you understand how to place nuts and cams, the trick becomes how to connect them together to create a viable anchor system. Constructing a multipiece anchor will at first take time and trouble, but a trained eye, the knack for finding propitious nut slots and experience with the various rigging methods usually make this routine after a short while. On most trad routes climbers are called to build multinut anchors many times each outing, so the training comes quickly.

If you learn one thing from this book, let it be the **Golden Rule:** An anchor system is not good enough unless it can withstand the greatest force that can possibly be put to it, known as a factor 2 fall. This is common sense, plain and simple. The fact that there are comparatively few instances of outright belay, toprope or rappel anchor failures suggests that climbers are particularly observant of the Golden Rule. However it could also suggest that the Golden Rule is very rarely put

Climbers on the wildly exposed route *The Shield*, El Capitan, California. PHOTO BY BOB GAINES.

to the test, and when anchors do fail, tragedy usually follows. Every climber should occasionally thumb through any number of annual journals about accidents in climbing. Here you'll see that few survive a total anchor failure—all the more reason to bear with the discussion, long and entangled as it may be.

Before we get into specifics, let's review some general concepts concerning what not to do. First, never belay from one anchor point unless it's a tree the size of the Washington Monument, or a block bigger than the Sphinx. Even so, redundancy is security. However if you climb long enough, you're bound to run into a situation where you have to belay from a single anchor—perhaps a poor one. Allow me an anecdote here to show you just how dreadful it can be.

The Shield is neither the grimmest nor the longest aid route on El Capitan, but toward the top of that vast, overhanging curtain of orange granite, the exposure is strictly world class. At the end of one of those long knifeblade pitches, I hit a rivet ladder and finally the belay—a hanging one, of course, from one sorry, rusted, mushroomed, buttonhead bolt. Without a hanger. This was in the mid-seventies, before the route had seen many ascents and obviously before anyone had bolstered the anchors. Anyway, the haulbag, Mike Lechlinski and I found ourselves hanging on that single, miserable bolt. The rivet ladder above looked bleak, more so because the previous ascent party had tied off every rivet with hero loops that had somehow cinched so tight we couldn't get them off without a knife, which, of course, we didn't have. This ascent had taken place the previous summer, and over the winter the hero loops had bleached and frayed, and currently flapped in the wind like little threads of gauze.

As Mike took off, holding his breath on every frazzled loop, on every creaking rivet, I tried to study the river below, or watch cars creep along the loop road, 2,500 feet down. But every few seconds my eyes would snap back to that sorry bolt. I saw it rotate in the hole. I heard it creak, then snap like a toothpick. Twice I saw it melt out of the hole. I put my thumb over it, both thumbs over it. I imagined a loop snapping on one of those rivets, and Mike zippering down onto that jive bolt, which surely would pop, and I wept pitifully and pissed my pants. I made a quick and binding pact with our Savior that if I ever got off that stinking rock alive, I'd devote my life to the poor and bereft. It was a horrible experience.

Next consideration: Never trust a fixed anchor setup outright, no matter how bombproof it appears. Many things can disguise just how poor an anchor may be, particularly a huge knot of slings from previous parties who obviously trusted the thing. Why shouldn't you? Consider the big stump that used to be atop Arch Rock in Yosemite. There were no less than fifty runners slung around it; thousands of climbers had belayed and rappelled off it for twenty years. Richard Harrison took the time to check it one day and found that it was loose. We got behind it and pushed with our legs, and the thing popped from the dirt like a mushroom and pitched off the cliff, nearly killing a team of Korean climbers below. It was ready to go, and had been for God knows how long.

The point is, fifty slings don't prove that an anchor isn't garbage. Don't be

deceived by an anchor that appears sound, regardless of the fact that other climbers have long trusted it. I could go on and on about what to look for with fixed anchors, but the bottom line will always hinge on two points: Are the component, primary anchor points (be they bolts, fixed pins, nuts or a mix) sound, and if so, are they rigged together in a way that is likewise not only sound, but predicts the direction of possible loading? Examine the anchor and understand why it is good (or bad) before you trust it.

When no fixed anchors exist, you must set your own. In doing so understand that this book is based on several basic principles, none more important than this: The foundation of every anchor is the absolute holding strength of the individual or primary placements. No amount of crafty rigging can compensate for poor primary placements. Know from the start that other authors have other ideas about anchoring priorities. Some contend that component strength is overrated, and that the rigging, the means by which the primary placements are connected, is a more crucial concern in terms of force management throughout the entire safety system—and in fact, force management is really the name of the game. But when you start with bombproof primary anchors, keeping force management in mind, you are better off still. Furthermore the functioning of primary placements are simpler and better understood than the far more complicated and less understood mechanics involved once the primary placements are connected into a multiplacement system. In other words, primary placements are more predictable and easier to control than the system as a whole, so we make damn sure we get all we can out of the primary placements, then proceed from there.

Lastly, over the years I've been involved in analyzing a handful of total anchor failures (all fatal). The process requires investigating the gear that was found on the belayer's rope and reverse-engineering the setup to try and determine the particulars of the failed anchor. In more than a few cases it seemed pretty obvious that textbook rigging had been employed, and that small-to-medium-sized nuts and camming devices had blown out under loading. The fact that other rigging methods might have saved these climbers was a secondary issue for one irrefutable reason: In the same area in which the anchor had failed were options for other primary placements, often bombproof natural anchors such as large blocks or trees, anchors so strong that even with the most rudimentary rigging technique they would have held a cement truck. For these reasons, our system begins with the most fundamental task: **arranging strong primary placements.**

Beyond this basic tenet, keep the following details in mind whenever building anchors:

- Find a spot that provides convenient anchor placements and provides a suitable position for the climber once the anchor is set. Because a falling climber impacts

a belayer's body at the belay device, and because the give of a belayer serves as a crucial load-reduction element in the belay chain, an anchor will ideally be located a few feet directly above the belayer. What you want in a belay system is one that will limit peak loading through the collective give and flex in the system. The dynamic qualities (give and flex) in the belayer's body, the rope slipping through the belay device, the stretch in the slings and, first and foremost, the elasticity in the lead rope, all serve to gently slow down the accelerating mass, as opposed to stopping it all at once, like a head-on collision. While a steel rope and steel slings would be stronger than stretchy nylon, they would provide no dynamic decelerating give or stretch and would arrest a plummeting load so abruptly and with such an intense shock load that biners would break and cams would blow apart. Without the dynamic qualities in the belay system, it simply would not work.

- After selecting a location and securing yourself to that first placement, take a moment to plan the entire system. Analyze the situation and fashion the anchors to withstand loading from all possible directions of pull.
- Keep the system as simple as possible, so it is quick to set and easy to double-check and monitor. Use the minimal amount of gear to safely and efficiently do the job, which is usually three or four bombproof anchors, and more if they are less than bombproof.
- Remember that the placements are only as strong as the rock they are set in.
- Strive to make anchors SRENE: Solid, Redundant, Equalized, and allowing No Extension, so far as you can. See the next chapter for a discussion of SRENE.