# GETTING HOOKED

When the increasing breeze starts to sound fluting notes in the rigging and the boat swings sharply around to her anchor, some people climb out of their warm bunks and pace the decks, nervously taking bearings on shore lights. Others snuggle more deeply into their pillows, confident their sleep will not be disturbed by a pre-dawn anchor drill. In our years of cruising, we have become convinced that one cornerstone of domestic bliss while cruising consists of a well-set anchor, one the crew trusts not to drag in anything but the most extreme of conditions. Good anchoring allows both sound sleep at night and anxiety-free trips ashore to the pub. Unfortunately, the critical action takes place out of sight underwater, and so, to many, appears to be a mysterious black art. However, bulletproof anchoring is neither difficult nor complex. Understanding and applying the three simple principles that constitute basic anchoring will get the anchor set securely 90% of the time. Five more principles make up the graduate and post-graduate courses in anchoring, and will ensure a good night's sleep in all but the last tenth of a percent of anchoring situations.

## ANCHORING 101 – THE THREE BASICS

To anchor at all requires an anchor, a rode and some technique in deploying these. But three simple principles applied to these three basic ingredients will set the anchor securely 90% of the time.

(1) PROPERLY SIZED ANCHOR: A heavy main anchor is the single best assurance of a good night's sleep. A heavy anchor holds better in difficult bottoms and compensates for mistakes in technique when the crew is tired, the wind howling, or the engine misbehaving. With a heavy anchor already deployed, no second anchor needs to be set when a gale warning suddenly pops up in the next six-hour forecast. With a lighter anchor, the anchor type must match the bottom, but with a heavy anchor, the specific type becomes much less important. Any of the common brands work just fine.

At a minimum, cruising boats should carry one size larger anchor than the manufacturer recommends. On the 37-foot, 18,000-pound ketch we circumnavigated aboard, we quickly moved up from the recommended 16-kilogram CQR to a 20-kilogram Bruce. This added only 4 kilograms of weight but increased our setting and holding power by about 30%. Our current boat, a forty-seven foot, 30,000-pound aluminum sloop ended up right on the borderline between a 20- and 30-kilogram Bruce according to the manufacturer's recommendation. We decided to put a 50-kilogram Bruce on the bow. While a more significant weight increase, we have enough confidence in this single anchor to stow our secondary anchor, chain and rode further aft in the sail locker rather than in the bow locker, which easily compensated for the extra weight on the bow.

It is possible to successfully anchor with lighter anchors, and some people do in order to keep their boats light and weight off the bow. We know of one (but only one) racing-oriented boat that used this approach during a successful circumnavigation. More effort and skill are required to get a good night's sleep using lighter anchors. First, multiple anchoring attempts with different types of anchors will often be necessary to get one to set and hold. Most people using this approach carry a Danforth type as their main anchor since these have the greatest holding power per kilogram. However these anchors will often not set in rocky/gravelly/kelpy bottoms, so after a couple of attempts with the Danforth type, a second type of anchor (often a Bruce) must be ready to deploy. In thick kelp, a third anchor (usually a Fisherman type) may be the only thing that will set. Second, if the wind builds above 25 or 30 knots, a second anchor must be deployed to increase holding power. If the crew are ashore and an unexpected storm blows in, they will need to rush back to the boat to do this. Third, to make sure these anchors are not just set but really holding, they must be backed down on hard, with high RPMs. In the tropics, a thin layer of sand covers hard smooth coral, and a light/small anchor, particularly of the Danforth type, will appear to set but will have very little holding power because it cannot penetrate very deeply.

Most cruisers find a single, heavy main anchor of 'storm size' to be the best answer. It will be big enough to work in most bottoms, will easily hold through gale-force winds, and offers the greatest piece of mind for the least effort.

(2) ADEQUATE SCOPE: Anchor rode does absolutely no good inside the boat. Several formulas exist for figuring 'proper' scope, but no rocket science is required here: simply put out as much rode as the swinging room allows. In a crowded harbor, we will set the anchor on an all-chain rode at 4:1 scope at a minimum, and then shorten it to 3:1 if we are swinging close to neighbors and the harbor is secure. With an all-line rode, we would set the anchor on 5:1 scope and shorten to 4:1. Notice it is better to set the anchor with longer scope and then shorten up. We often see people trying to set the anchor with short scope intending to let out more rode when they see where they end up. In most cases, the anchor never sets with the short scope. In anticipation of a storm we will put out as much scope as possible. We slept well using 20:1 scope during a gale in a somewhat exposed anchorage in Tonga and 15:1 in a 45 knot blow in Bermuda.

To end up with adequate slope requires three simple things. First, the bottom depth where the anchor will end up must be known. Most of us have electronic depth sounders, but for those who don't a lead line or just a quick look at a detailed harbor chart will indicate the depths. Second, communicate the anticipated amount of rode based on depth and swinging room to the person letting out the chain on the bow. Beth and I agree on an anticipated rode length as we are approaching an anchorage before she goes up to the bow. I walk up to the bow and suggest a different length if we end up in a significantly different depth than we had planned. Third, the rode must be clearly marked, usually at 25- or 50-foot intervals, so the person on the bow can keep track of how much has been let out. Chain can be painted, or wire ties can be put through the links, or webbing can be sewn through the links. Sewn webbing has lasted the longest for us. Line can be marked using indelible ink, webbing or pre-printed markers can be woven through it, or contrasting colored twine whipped around it. Remember to err on the side of using more scope rather than less and shorten up later if necessary.

(3) PROPER TECHNIQUE: Gently let the anchor engage the bottom and only then set it with gradually increasing power. To set the anchor, head slowly up into the wind. Stop the boat where you want to place the anchor. Lower the anchor down, and when it hits the bottom slowly reverse or if the wind is over about 15 knots just let the wind blow the boat back while letting out the proper scope. When the proper scope has been let out, continue slowly reversing or letting the wind blow the boat back until the chain stretches out and the bow of the boat comes up into the wind. Let the anchor set for a moment under very light reverse (or just wind pressure). Then gradually increase the RPMs in reverse until the rode becomes taut.

Most people we have seen who have trouble setting an anchor don't follow this sequence of gentle reversing and then gradually increasing RPMs. Some people drop the hook over the side, let the wind blow the boat back and never reverse on it. Their anchor will be sitting on the bottom, not dug in, and when the wind comes up it will drag. Other people drop their hook on short scope and then immediately reverse at great speed. Their anchor never has enough time to settle into the bottom and just bounces along without setting.

While setting the anchor, find and watch a transit that is abeam. Line up a relatively close stationary object that is on the beam (such as the mast of an already anchored boat) and with a more distant object (usually whatever piece of land lines up behind the anchored boat's mast). This transit will be moving (e.g. the anchored boat's mast will look like it is moving forward relative to the shore) as you are moving backwards while straightening out the rode and setting the anchor. When the transit stops moving, the boat has stopped moving and the anchor is set. Many cruisers look down at the rode, or try to feel if the rode is vibrating, to determine if the anchor is set. This often gives a false impression while the transit method is foolproof.

## ANCHORING 201 – INTERMEDIATE REFINEMENTS

A further three simple principles will get you anchored securely in almost any protected anchorage for almost any kind of weather.

(1) THE RIGHT PLACE: Use all the available clues to find a patch of sand or thick mud. Most anchors set and hold well in medium soft sand or thick mud. Even in harbors with generally difficult holding, a few patches of sand or mud almost always exist. In clear water, the bottom type can often be seen with the naked eye. In sunlit tropical water, sandy patches look lighter blue. A sandy or muddy bottom can usually

be found off streams or waterfalls in deeper, higher-latitude waters where the bottom isn't visible. Many harbor charts have letter codes indicating bottom type in various locations. In Newfoundland we often asked the local fishermen puttering around the harbor where the best holding was. They would point and tell us, 'the old sailing schooners always anchored right over there.'

A special purpose anchor may be necessary in the few anchorages where no sandy or muddy patches exist. We have yet to find a bottom where our 50-kilogram Bruce would not hold, but a smaller main anchor may mean resorting to a secondary anchor in such bottoms. The fisherman-type and Bruce-type work best on rock or coral bottoms. In deep kelp, nothing beats a fisherman. The Fortress does well in soupy mud or fine/soft sand.

(2) MORE HOLDING POWER: In a few special situations it makes sense to put additional anchors out even with a big primary already set. We do use two anchors in a few situations: in anticipation of a really strong storm (over Force 9), on a particularly difficult bottom, in a narrow channel anchorage with a reversing current (the classic Bahamas anchorage), or in a really tight anchorage with limited swinging room. There are two alternate ways to deploy multiple anchors – attaching the anchors in series to the same rode or using a separate rode for each anchor.

To increase holding power (e.g. in a storm or difficult bottom), put the anchors in series. Attach 10 to 20 feet of chain to either the crown or shackle on your main anchor and shackle a second anchor to the end of this chain. Lower the second anchor over the side and when it's fully over, start backing up and lower the main rode in the normal way.

To limit the boat's range of motion (e.g. in a narrow channel with current or a tight anchorage) then put separate anchors out on their own rodes. We typically set the main anchor in the normal way and then dinghy out the second anchor. Alternatively, set the main anchor and then motor to where you want to drop the second anchor, letting out the first anchor rode as necessary.

Exactly how many anchors to put out depends on the specific situation and is always a judgment call. We have used multiple anchors only a couple dozen times in a circumnavigation and a half and only once in the past three years on *Hawk* - when anticipating a Category Four (140 knots) hurricane in Antigua we put every one we had out (5 in all) and wished we had more.

(3) IMPORTANCE OF ELASTICITY: Some mix of chain and line is necessary in your anchor rodes. It used to be a simple rule that blue water cruisers carried a 300-foot (~100-meter), all-chain (usually 3/8-inch chain for most common sized cruising boats) main rode. This rode has high holding power, is absolutely chafe resistant and grips well in a windlass. But even when anchoring on an all-chain rode it is essential to use a long nylon snubber. The snubber adds some elasticity to the rode so the anchor is not jerked out of the bottom if the bow starts plunging up and down in a chop. The snubber should be 30 to 50 feet long and about the same diameter as the dock lines. It should be cleated to a strong bow cleat to take the load off the windlass.

On *Hawk* we started out with this "typical" 300-foot, all-chain rode and then switched to 150-feet of chain plus 150-feet of nylon. Three developments have made this a more efficient solution for us. First, the windlass manufacturers have now developed very effective chain/rope gypsies that haul both rope and chain and the joining splice without a glitch. Second, experience shows that the chain to rope splice is strong and durable if inspected ever year. Third, cruising boats, including *Hawk*, are lighter and higher performance than they used to be and saving a hundred kilograms of weight (150 feet of 3/8-inch chain weighs a bit over 100 kilograms) in the bow makes more of a difference in both performance and comfort (less pitching in waves).

Some cruisers have maintained their all-chain rodes but have switched to smaller lighter chain. We don't think this makes good engineering sense. Comparing two rodes with the same total weight and length - one all chain with smaller diameter chain and the other shorter heavier chain followed by nylon, the latter will have much higher holding power in almost all situations.

The shorter/heavier approach can only be taken so far in deciding the proper length of chain in a mixed rode, and should be tailored to the composition of the bottoms you typically anchor in. The chain length must be sufficient so that the chain takes the chafe from coral and rocks on the bottom, rather than the line. Also a respectable length of chain significantly increases holding power in thick mud or boulders. To demonstrate this point, compare how hard it is to drag a length of chain over a rocky beach versus a length of rope. The chain dissipates force every time it takes a slight bend around a rock while the rope simply glides over the top.

The optimal mixed rode then, maximizes the value of chain friction by providing good contact with low rocks and coral while concentrating as much of the weight of the chain as possible near the anchor. In our experience, this translates into an absolute minimum of 40 feet (12 meters) of chain for perfect sandy cruising grounds, somewhere around 75 feet (~25 meters) for shallow muddy/rocky cruising grounds, and up to 200 feet (60 meters) for corally areas, or very deep areas like Chile, Norway or Newfoundland.

## ANCHORING 301 – THE GRADUATE COURSE

Two somewhat more subtle refinements provide a final measure of security.

(1) SCOPE ISSUES: If your anchor is pulling downhill, or if the wind might shift so that you could end up that way, put out a generous amount of extra rode – up to twice as much is not excessive. The slope of the bottom has a tremendous impact on how much scope will be necessary to keep the anchor set. It is obviously much harder to pull or drag an anchor up a steep slope and easier down a slope. This impact is more significant than most people assume. If anchoring with the anchor pulling downhill on a bottom that slopes 5.5 degrees (1 foot down for every 10 along, which is quite common in the Caribbean), a 10 to 1 scope will be required to get the same holding power as 5 to 1 scope on a flat bottom. Conversely, if anchoring uphill, 4 to 1 scope would result in the same holding angle as 5 to 1 on a flat bottom. In the latter case, don't forget to stay sufficiently far away from the shore to keep from grounding if the wind shifts!

In fjord country (Newfoundland, Norway, Chile), the bottom may be too deep even with the full rode deployed. In these anchorages, a bow anchor and a stern line to a tree or rock ashore will keep a boat secure. The rode has a good angle and holding power, pulling up a very steep hill, if the wind is on-shore, and the line tied ashore will hold you in place if the wind is offshore.

(2) PREVENT SAILING: Rig your boat at anchor so as to reduce the amount that she sails around. A boat that is allowed to yaw or "sail" at anchor is more likely to drag than one that rides steadily into the wind. The boat's side profile offers much greater wind resistance than the bow profile. Further, the boat builds up momentum while "sailing" which imposes a peak load on the ground tackle when the boat finally fetches up. On *Silk* the peak loads were roughly twice as high when we let her sail around versus when we raised the mizzen to keep her pointing steadily into the wind. To reduce sailing, use two anchors or a bridle on a single anchor, or drop a roller furling jib.

A similar situation arises when anchoring behind a small island where the wind is funnelling first from one side and then the other. The boat will sail off in one direction and fetch up just as it is hit by a gust from the other direction. In this situation, putting out a second anchor works best if feasible. Otherwise, extra scope helps to buffer the forces actually reaching the anchor.

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Optimal ground tackle and anchoring technique depend upon your cruising ground and the typical bottoms you encounter. However, no matter what your anchoring set-up, keeping these practical points in mind will allow you a better night's sleep or a last relaxed drink at the pub when the wind whistles through your anchorage.