



Anchoring

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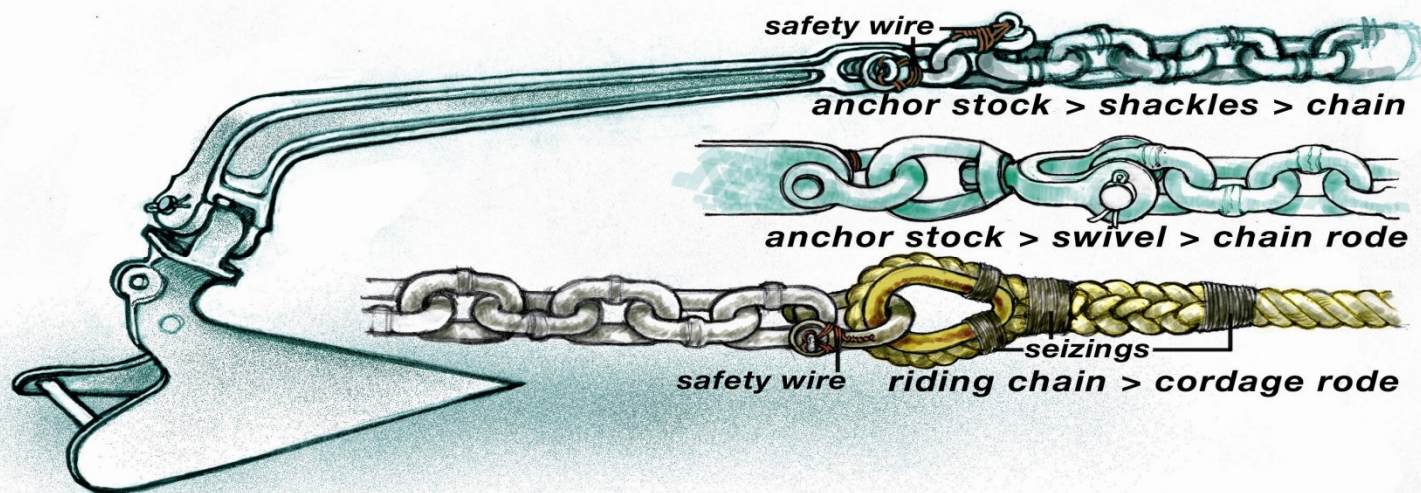
Outline

- **Methods/Techniques:**
- **Equipment**
 - Mixed Rope/chain vs. all- chain rode
 - Catenary and scope
 - Proportion of rope/chain in mixed rode
 - Use of a kettel (sentinel)
 - Popular anchor types
 - Discussion of pros and cons of each style
- **Factors that affect holding and setting**
- **How to communicate between bow person and helms-person**
- **Single-anchor guidelines for deployment and setting**
- **Single-anchor guidelines for breakout and retrieval**
- **Multiple anchor techniques**
- **Scope and depth**
- **Crowded anchorages**
- **Group Discussion**
 - Member stories... When things went wrong
 - Rafting
 - Weather and storm prep
 - Lightning

Note: Unless otherwise noted, most illustrations from <http://www.captkfanier.com/articles/art29.html> "Anchoring 201" By Frank Lanier -- Illustrations by Jan Adkins <http://www.janadkins.com/> Reproduced with permission from Jan Adkins

Tackle

- Beware of inferior hardware
 - Marine chandlers sell inferior Chinese-made components alongside higher quality American and European-made fittings and chain.
 - Not all fittings are made equal
 - Make fitting has WLL marked, or don't trust it
 - Alloy and HighTensile shackles have superior strength
 - Use largest shackle that will fit your chain
 - Never attach swivels direct to anchors
 - Position shackle pins through chain for max strength (
- Seize all shackles with stainless wire or black zip-ties (if you use zip-ties replace them annually)





Mixed Rope/chain vs. all- chain rode

Characteristics:

- **Rope (Nylon)**

- Vulnerable to abrasion and props
- Stretches, Absorbs shock
- Lower dynamic loads
- Light weight
- Easily handled by-hand
- Coils not easy to handle
- Bucket, bag or locker

- **Chain**

- Resists abrasion and props
- No stretch – no shock absorption
- Very high dynamic loads
- Heavy
- Difficult handling by-hand.
- Longer lengths require a winch and chain locker

Mixed Rope/chain vs. all-chain rode

- Mixed rope/chain is best for most small boats
- There is no “rule of thumb” that is right for every boat or anchoring situation.
(One foot per foot of boat length has no basis)
- Decision factors to determine proportion in mixed-ropes:
 - Abrasion hazards based on bottom type (rocky or coral)
 - Some chain is desired to resist bottom abrasion and cuts
 - More/all chain increases catenary
 - More/all chain reduces swinging, and wandering in still air
 - More/all chain reduces chance of prop cut or entanglement from passing boats
 - Weight reduces boat performance, affects trim, is not desired in the ends of the boat.
 - More weight in the anchor is more effective to improve holding than more weight in the chain.
 - All-chain reduces holding power except in very deep anchorages.*

*References:

<http://www.petersmith.net.nz/boat-anchors/catenary.php> “Catenary & Scope In Anchor Rode -- Anchor systems for small boats” by Peter Smith)

<http://alain.fraysse.free.fr/sail/rode/rode.htm> “Tuning an anchor rode” by Alain Fraysse

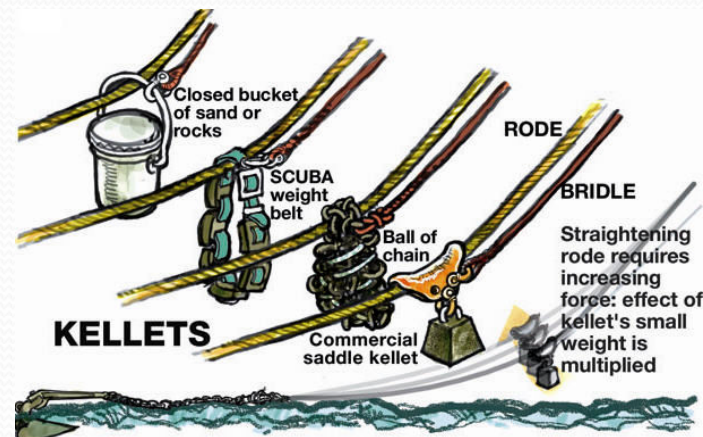


Catenary and Scope

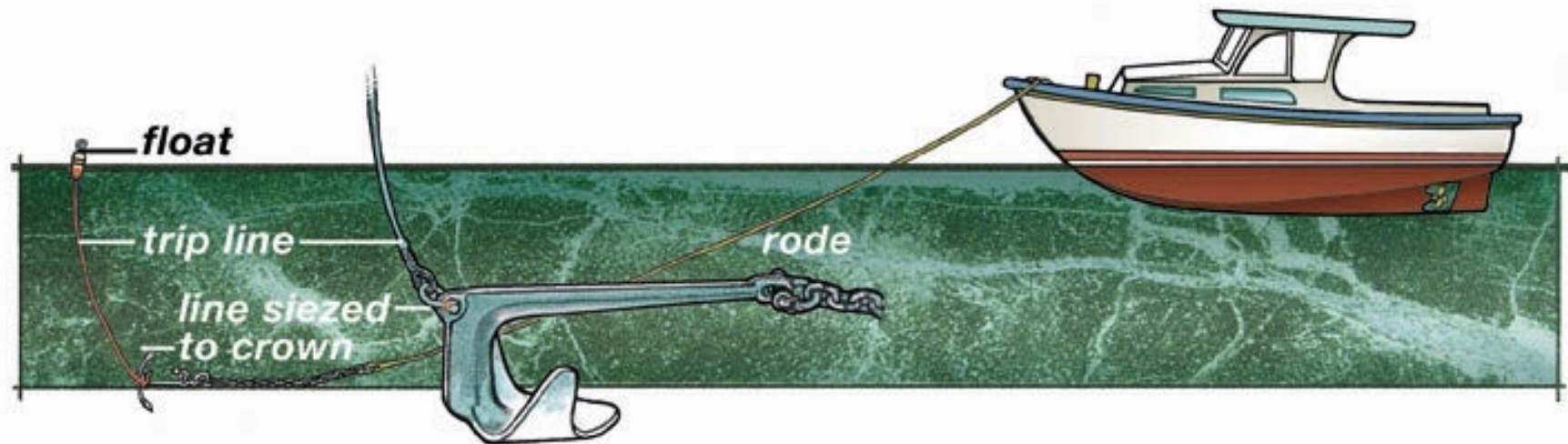
- Catenary: Sag in in the rode caused by weight along the rode.
- Scope: Ratio of rode length as a multiple to depth (X:1) from the bow attachment
- A lower angle of pull increases anchor holding power
 - 10:1 is considered max scope (anything more is excessive)
 - 3:1 is minimum in mild conditions (e.g. "lunch hook")
 - 5:1 is minimum when overnight anchoring or leaving boat
 - 7:1 or greater for storm conditions
- Catenary should NOT be used as a factor in planning scope (except very deep anchorages).
 - As wind/current increase, catenary is reduced.
 - In storm conditions, a chain rode can be "bar tight"

Use of a Kellet or Sentinel

- A Kellet or Sentinel is a weight placed at a point along the rode to increase catenary and lower effective pull angle.
- Use a snatch block or “rode rider” and control line.
- Pros:
 - Can improve holding in moderate winds/current
 - Can reduce wandering and sailing at anchor in calm conditions
 - Can reduce the chances of a rope rode becoming cut or entangled by passing boats.
 - Can reduce the chances of entangling your rode on your own rudder or keel.
- Cons:
 - Complicates deployment and retrieval of your anchor.



Trip Lines



- Used when bottom is fouled
 - Rocky, coral or debris/cables
- Attach to rear of anchor, to pull it out backwards
- Float can be snagged by passing boats
- Complicates anchor deployment and retrieval

Popular modern anchor types



Small-boat anchors are made to hook or bury.

- Popular hook types:
 - Grapnel
 - Herreshoff / Fisherman / Luke
- Popular proven burying types (examples):
 - Hybrids (hook and bury): Bulwagga, Claw/Bruce, Northhill
 - Lightweight Fluke types: Danforth/Fortress/Hooker/WM-brand
 - Plow: CQR, Delta
 - Scoop type: Spade, Rocna, Manson Supreme,
 - **IN BURYING TYPES: FLUKE AREA AND PENETRATION ARE KEY to HOLDING POWER.**



Factors that affect holding and setting

FOR BURYING ANCHORS --FLUKE AREA AND PENETRATION ARE KEY

FOR HOOK ANCHORS – BOTTOM STRUCTURE IS KEY

- Pick the right bottom and location for expected conditions and your ground tackle
- Bottom
 - Mud (thick or slurry)
 - Loose Sand
 - Hard Packed Sand or Clay
 - Gravel
 - Shells and stones
 - Grass and weed
 - Rocks and boulders (use a trip line)
 - Debris and cables/chain (use a trip line)
- Wind
 - Direction and shelter
 - Strength
 - Fetch
- Current



Anchoring Among Other Boats

- Swing room -- Open areas
- Your boat's motion at-anchor (power vs. sail)
- Observe how other boats are anchored
- Chain or rope rodes?
- Converse with neighbors
- Raft-ups or noisy boats with generators
- Scope and depth must be a consideration
 - Bottom type and slope
 - Use sounder, and anticipate tide changes
- Proximity to facilities
- Avoid channel and heavy traffic
- Protocol if conditions change: Latecomers move first



Single-anchor guidelines for deployment and setting

1. Locate spot you want anchor to set
2. Heading upwind/current, stop boat at that spot, note depth to calculate length of rode for needed scope
3. Let out anchor at controlled speed as boat drifts slowly aft.
 - Chain should not pile up on top of anchor
 - Avoid fouling rope on keel/rudder/prop
4. Pay out approximately 3:1 scope if all chain, or 4:1 scope if rope/chain, snub it and either keep hand on rode or place foot on it (on deck) to feel if anchor is holding or dragging.
5. Test the set when boat stops drifting back:
 - Wait to let the anchor settle in. Then put engine in reverse and slowly accelerate to 90% throttle for about 30 seconds.
 - If no dragging, let out remainder of scope and then snub the rode. (Set snubber if all-chain, or bridle if desired).
 - If dragging, pick up anchor and check it is clear, then re-position.



Hand Signals and crew communication

Walkie -Talkies and hands-free headsets are not necessary

The following are examples. Feel free to invent and agree on your own.

Dropping Anchor

- Steer to starboard: Right arm completely extended to the right, hand flat.
- Steer to port: Left arm completely extended to the left, hand flat.
- Steer straight: Any arm completely extended forward, hand flat, palm forward.
- Slow down: Any arm slightly extended along the body, hand palm downward moving in a downward motion.
- Stop: Any arm extended upward vertically, hand flat, palm forward. No arm or hand motion.
- Anchor going down: Thumb down not moving.
- Back up/reverse: Fist with thumb motioning backward
- Anchor set: Thumb up and forefinger making a circle (this can be used for anything that means OK.)

Weighing Anchor

- See steering signals above.
- Anchor chain going up: Thumb up not moving.
- Anchor set on the bow roller, boat free: Thumb up and forefinger making a circle.

Source http://www.sailonline.com/seamanship/Hand_signals.html



Before you go to sleep or leave the boat

- Get a “fix” on your spot
 - Set visible track to “on” on chart-plotter and zoom-in
 - Your track should resemble a small arc as you swing, with each arc line overlaid on or very close to the last.
 - If it resembles a zig-zag arc, then you are dragging.
 - If you don’t have a chart-plotter, plot your chart position using a bearing-compass with two fixed reference points ashore.
 - Plot again periodically to be sure you’re not moving.
 - Plot again after dark referencing immovable lights.



Single-anchor guidelines for breakout and retrieval

Bow-person is in command and should give hand signals to guide helms-person

- Use engine in slow-forward to ease strain on rode as it is retrieved
 - Do not use the windlass by itself to pull boat forward.
 - Be careful not to over-run rode: Risk of catching rope rode in prop.
- Follow bow person's directions to steer over anchor, if a trip-line is used the bow person must retrieve the trip line as you move forward.
- When rode is near-vertical and boat is almost directly over anchor, place engine in neutral, snub rode
- Continue to drift forward, it should break out
- Raise anchor
- If it doesn't break out, snub it on a cleat with the rode under tension and wait. Keep vertical tension to the rode and it will probably work free.
- If it still doesn't break out, use the trip line, or if no trip line continue to over-run the anchor under slow engine power. (It may be snagged on rock or debris and need to be pried out.)
- Choices if you can't free the anchor:
 - Dive and attach a trip line if you can
 - Buoy the rode with a fender and abandon it, record GPS coordinates then hire a diver to retrieve it
 - Don't buoy the rode and abandon it, record GPS coordinates then hire a diver to retrieve it.



Multiple anchor techniques

- Bow and Stern
 - Used to maintain position and heading
 - Med Moor (Common in Europe)
 - Bow is tied close to dock, Stern is anchored out from dock
- Bahamian Moor (two anchors set on separate lines from bow)
 - Anchors are set in opposing directions: 180-degrees apart
 - Used in estuaries and reversing strong tidal currents
 - Used with anchor types that do not reliably reset if wind reverses
- Tandem
 - Two anchors are set on same line, separated by a length of chain
 - Used in storm anchoring
 - Largest anchor should be at end of line
- Anchor Mooring
 - Three anchors are set in star pattern (120 degrees apart) each on a length of chain, shackled to a single chain rode.