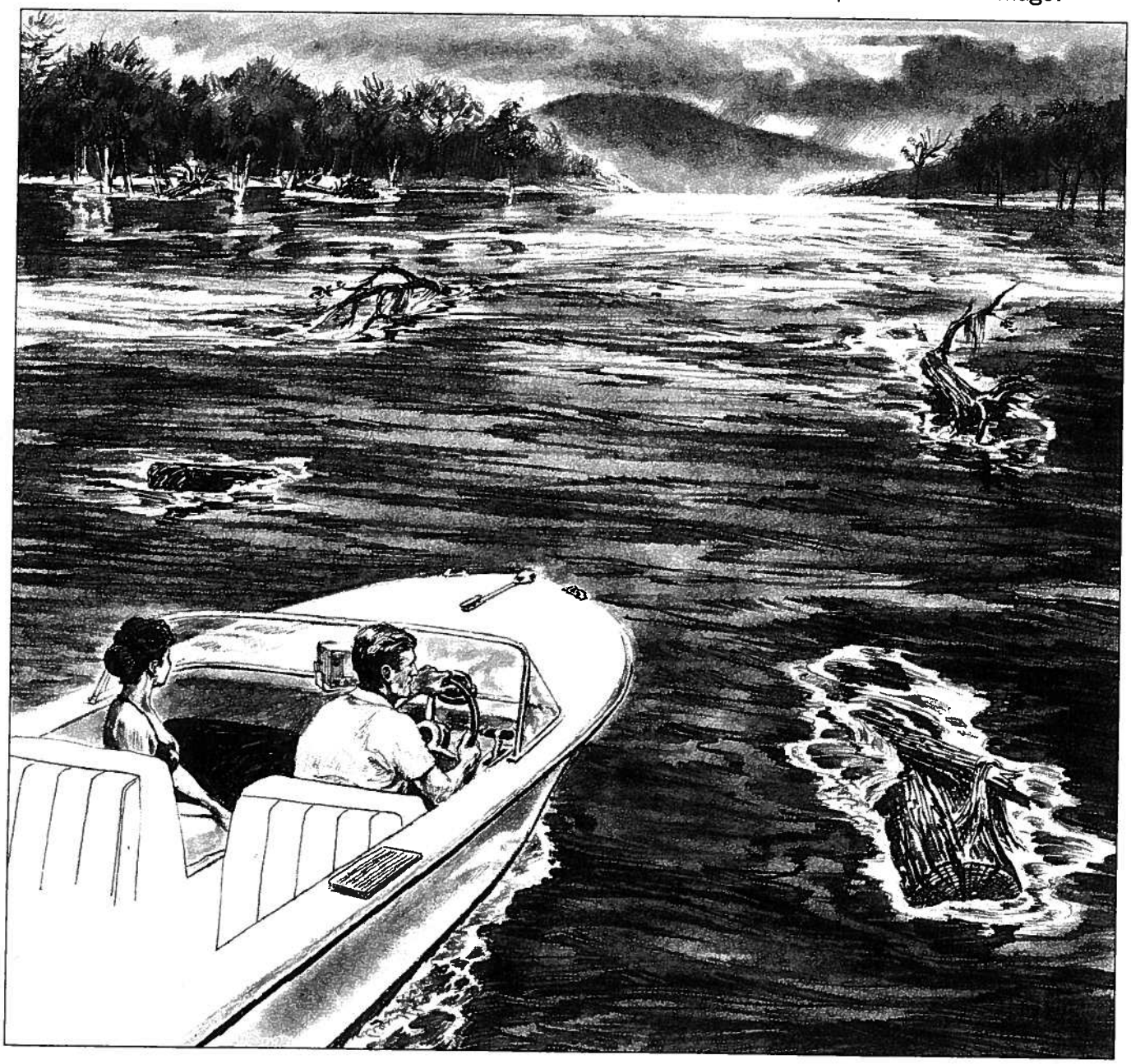
from: The Illustrated Book of Basic Boating
Christopher Caswell. NY: Hearst Marine Books 1990

Common Hazards

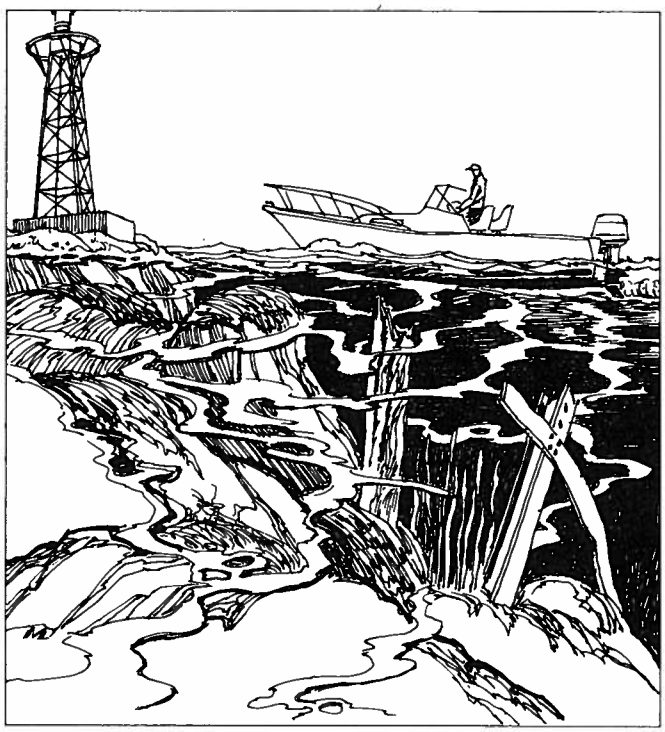
Logs and driftwood are year-round problems in some areas, such as the Pacific Northwest, and a seasonal hazard elsewhere. You can expect to see more semi-submerged objects after a rainstorm, for example, when logs and driftwood are carried into boating areas by rivers that have risen above their normal level. Try to stay away from river outlets after a storm and slow your boat down when passing through debris.

Logs and Driftwood

In many parts of the country, particularly those areas with forested shorelines, skippers should keep a sharp lookout for floating wood. Other areas, such as harbors and ports, may have debris in the water. Hitting a floating object in a small powerboat usually does no hull damage but it can bend or break a propeller blade. Watch the water ahead for any unusual spots that don't have the same motion as the surrounding water. A semi-floating log or piece of debris lying just below the surface will affect the action of the waves. In these areas, many powerboat skippers find it wise to carry a spare propeller and the tools needed to change a damaged prop. Remember: The slower the speed the less the potential for damage.

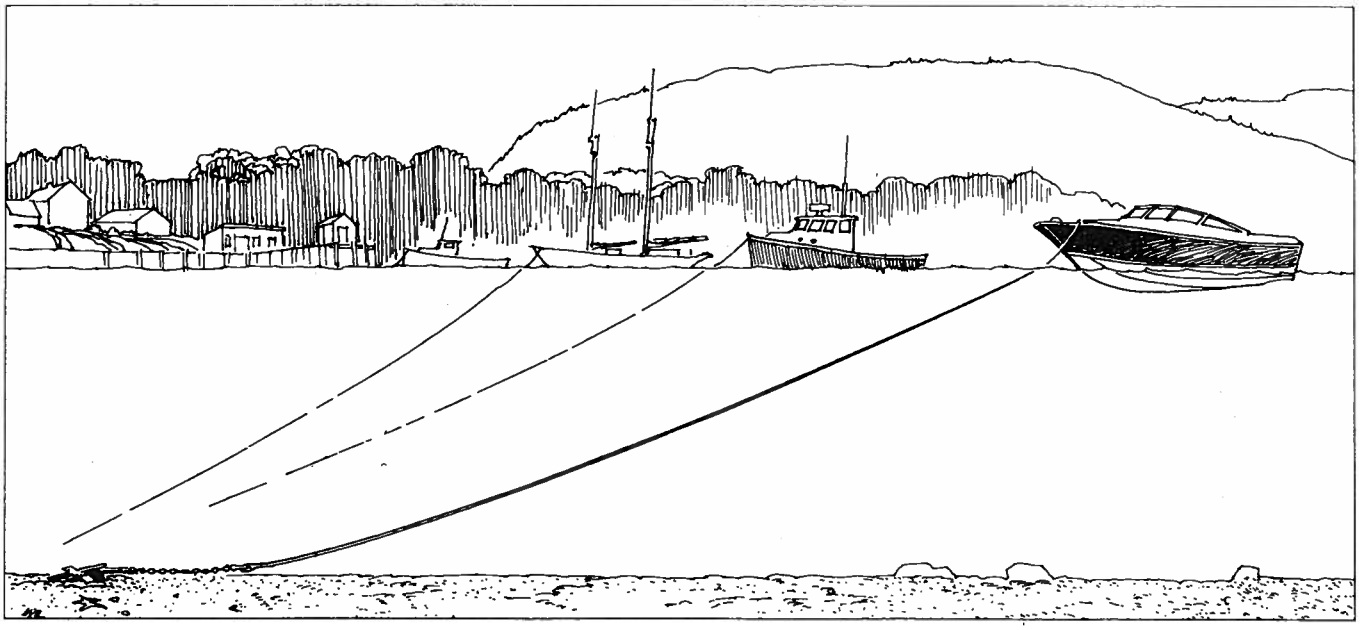


Visual clues often suggest the presence of obstructions or hazards below the water's surface. A beach that slopes gradually is likely to continue at the same angle underwater, for example, making for shallow water. If there is a derelict warehouse along the shore, the remains of a pier are likely to be in the water nearby. Boulders piled along the shore are a good indication that there will be underwater rocks as well.



Shallow Water/Underwater Obstructions
Every boating area has shallows. Until you've become familiar with charts and buoys that show you where these areas are located, proceed with caution. Underwater obstructions may include old pilings that have broken off below the surface, rocks or even sunken vessels. One way to avoid these, in the absence of a chart, is to watch where other boats go as well as areas they avoid. Don't be shy about asking other skippers for tips on shallows or obstructions. They may have found them the hard way—and save you the expense and embarassment of finding them yourself.

Anchor Lines
You'll find anchored boats in every boating area. Anchor lines, or rodes, pose a potential hazard because they may lie underwater at a shallow angle, invisible to the passerby. Since they may extend far out in front of a boat, be sure to leave plenty of clearance when passing the bow of an anchored vessel.

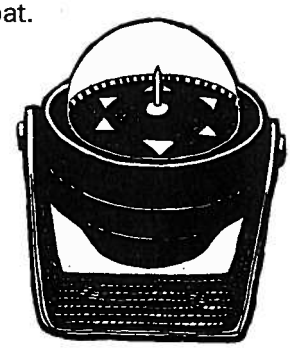


Basic Navigation

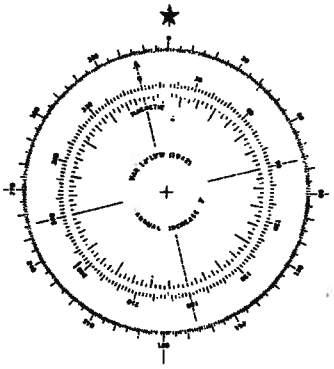
Coastal piloting, or piloting, is basically the art of getting from here to there without going aground or getting lost. It requires a few basic tools—a compass, a chart, parallel rules, dividers, a sharp pencil—and a few simple, easy to learn skills. This kind of basic wayfinding allows you to range far afield, venturing out of familiar home waters and into new cruising grounds with a sense of confidence.

TOOLS

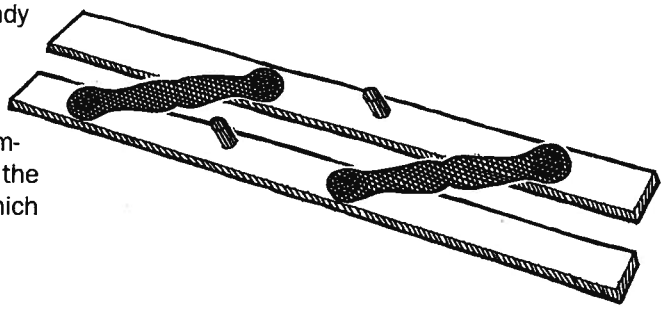
Compass: The most basic and useful navigation aid available, the compass houses a card that is magnetically oriented towards north, regardless of your boat's direction. The card reads in degrees. Your boat's heading is indicated by a "lubber's line," a pin or stripe lined up on the clear dome. A professional should adjust the compass to compensate for the magnetic field set up by your boat.

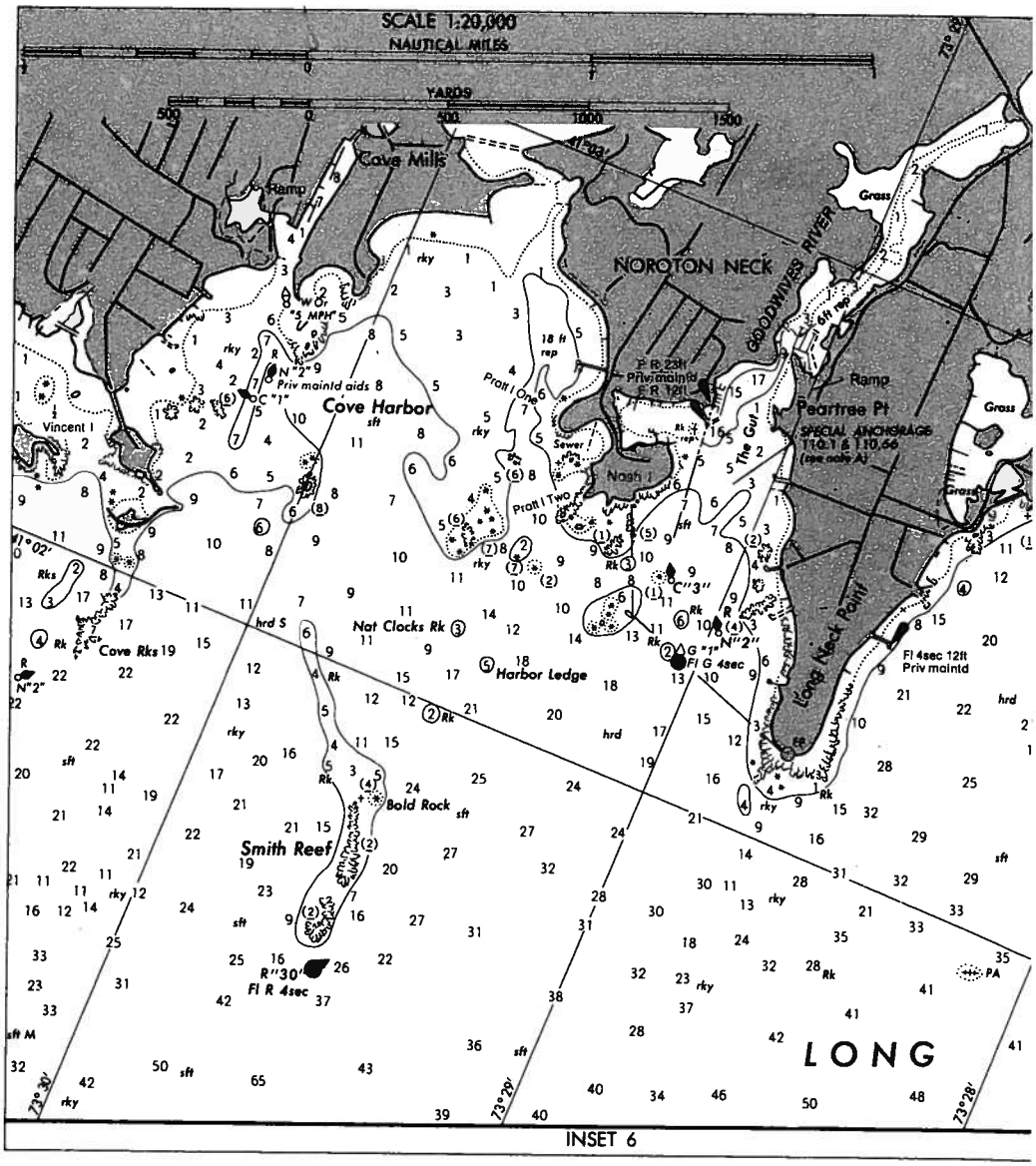


Compass Rose: Taking its name from the flower it resembles, a compass rose on a chart shows two sets of bearings: the outer ring is oriented to true north, while the inner one shows magnetic bearings oriented to the magnetic north pole. Since your compass is magnetically oriented, use the rose's inner (magnetic) bearings for navigational purposes.



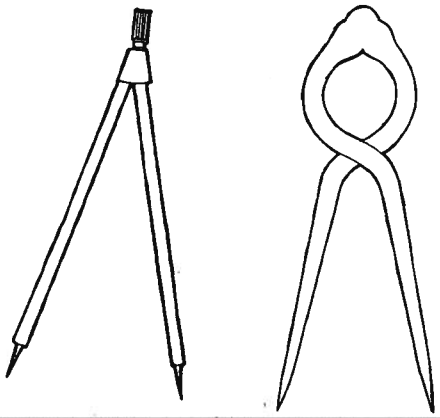
Parallel Rules: This handy device allows you to draw a course between two points, then "walk" the course over to a compass rose to determine the magnetic direction in which to steer.

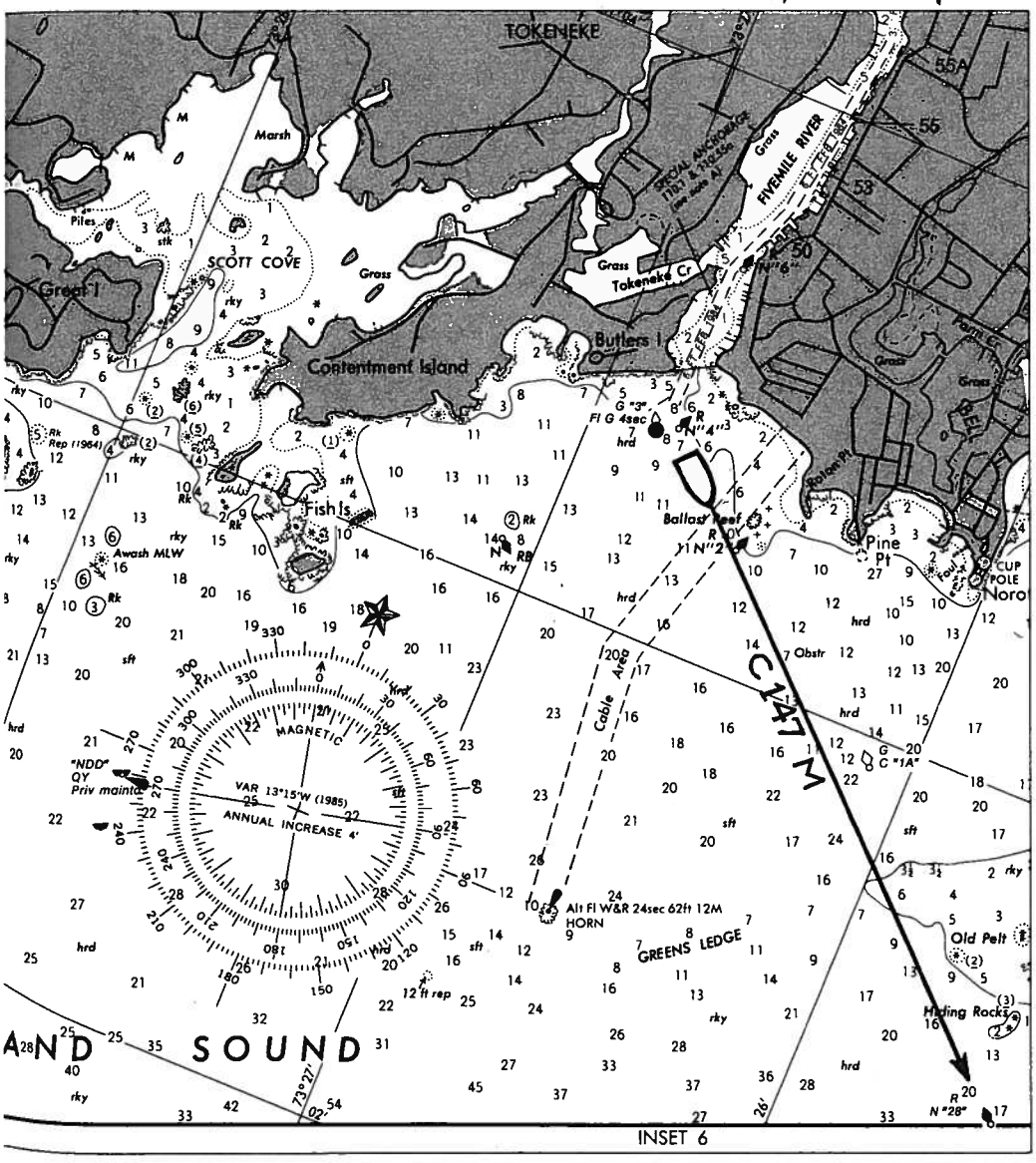




A course on the water, much like a road on land, may not provide the straightest line to your destination. It will, however, take you around or away from shallow areas, land masses, rocks, sunken wrecks and other underwater obstructions. Calculating your route through inland waters and along coastlines also provides a way by which you can recheck and update your current position along the way.

Dividers: Hinged to open or contract, dividers are used to measure distances on charts. Normally, navigational distances are measured in nautical miles (approximately one-seventh longer than statute miles). Speed, in nautical miles per hour, is expressed as knots (not knots per hour).





PLANNING AND STEERING A COURSE

1. Beginning with your starting point, pick your first intended waypoint on the chart. In the example to the left you are starting at N "2" (Nun number 2) and headed for N "24" (Nun number 24).

2. Using the parallel rules and a sharpened pencil, draw a line between the two points.

3."Walk" the rules over to the center of the compass rose. Do this by holding one rule down firmly while opening the other in the direction of the compass. Then reverse the procedure until one rule bisects the cross lines at the center of the compass.

4. Note where the rule intersects the inner (magnetic) circle in the direction you wish to go. In this case, the indicated course will be 147°.

5. Mark the course on the original line you drew.
Precede the bearing with the letter "C" (for course) and follow it with the "M" (for magnetic).

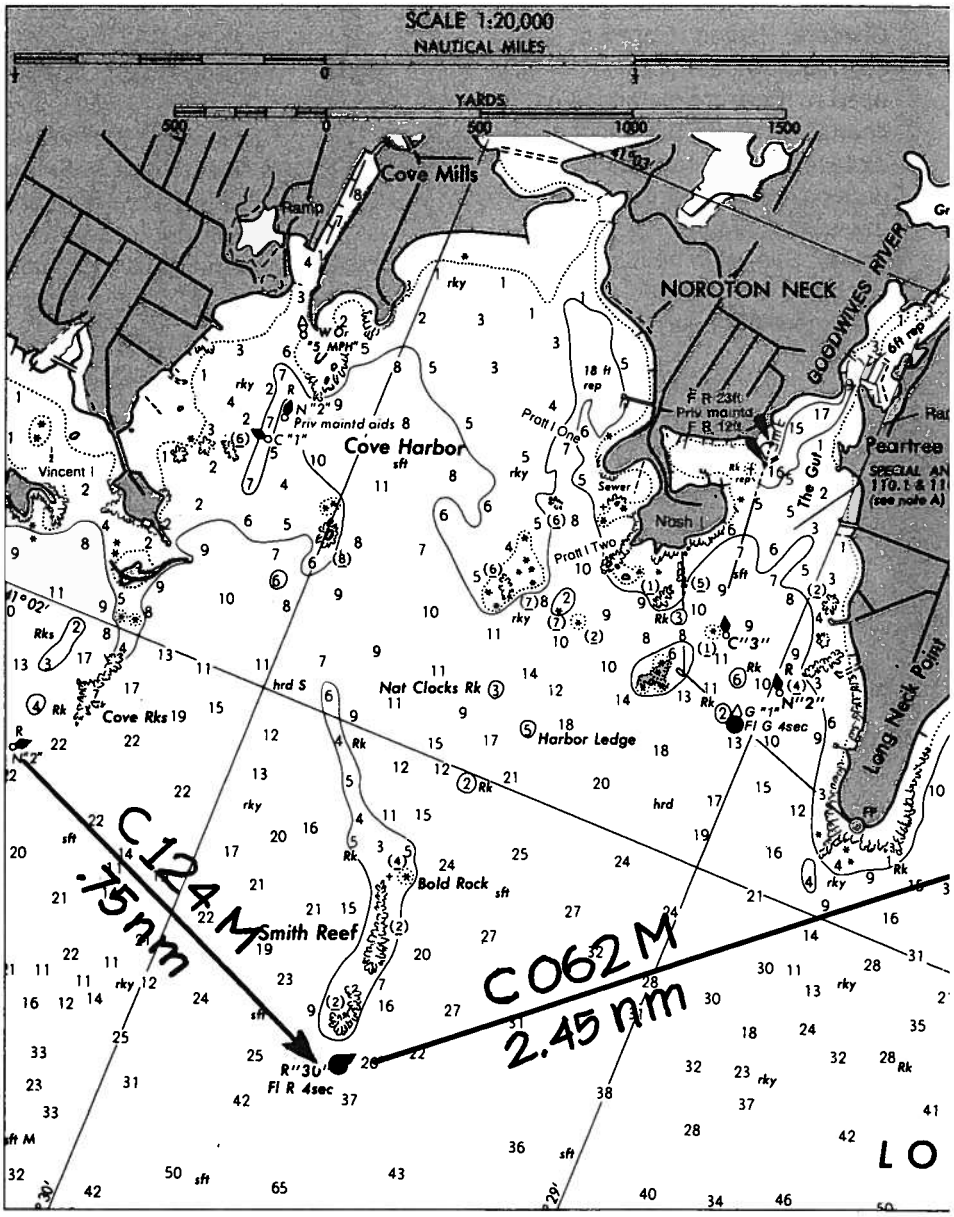
6. Align the lubber's line on your boat's compass on 147 and try to steer that course.

Plotting

Having marked the courses between buoys, the "legs" of your intended trip, you will want to measure them. And, having measured them and added them up for total mileage, you will want to figure out how long it will take to make the trip. Since distance divided by speed equals time, you will first have to learn how to tell boat speed. If you know your speed and distance on a leg, you can compute time in hours.

Course
Examine the chart to determine the best way to get from your departure point to your destination. You may be able to go straight between the two. More likely, however, the trip will require several doglegs to avoid shallow area and hazards. Using a pencil and parallel rules, draw straight lines between the navigational aids you plan to use along the way.

In the example at right, getting from point A to point B requires skirting a reef, peninsula and small island.



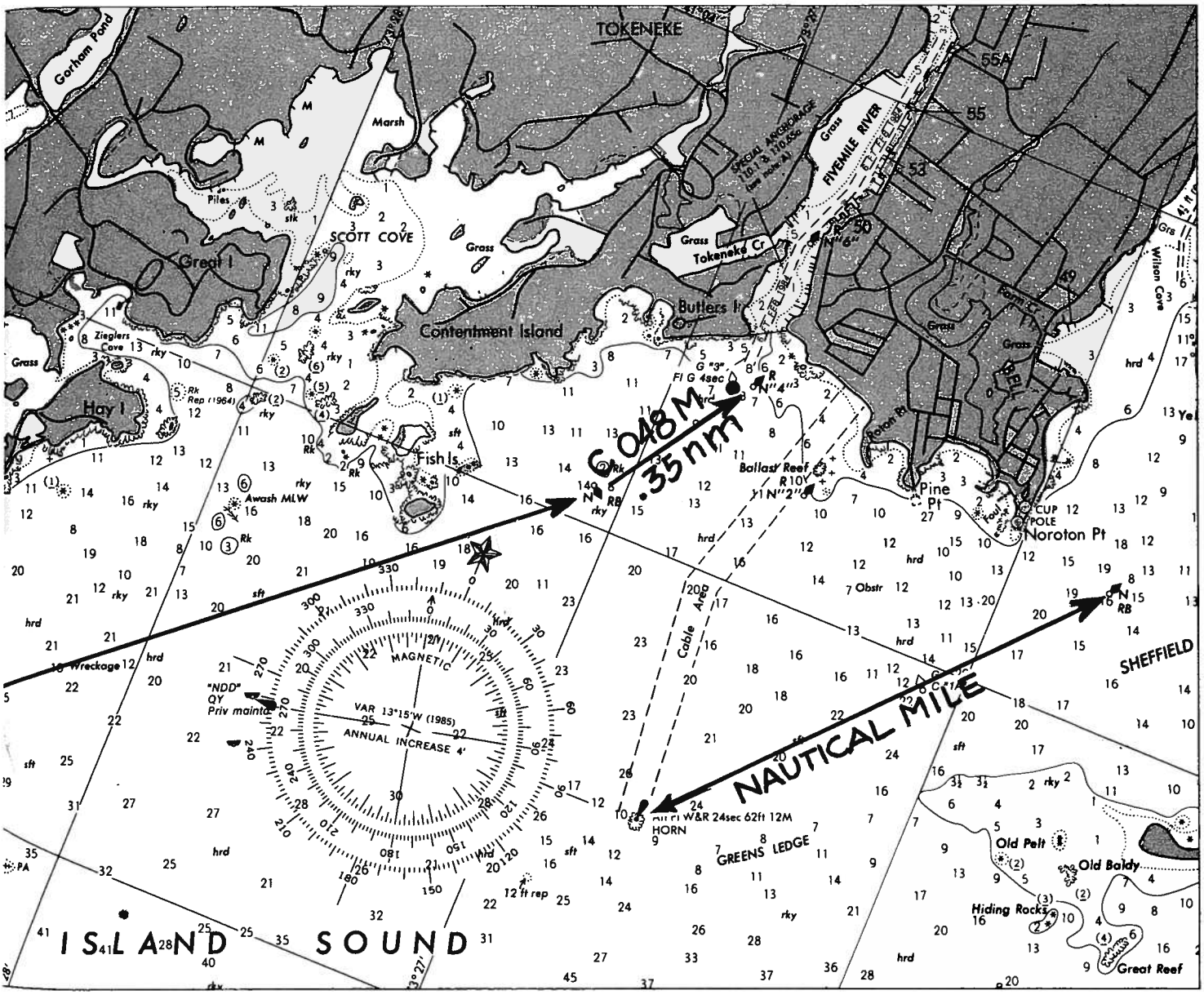
Distance
At the top of the chart is a scale in nautical miles. Using the dividers, determine the distance of each leg. Write the distance for each leg beneath the course marked on the line, followed by the letters "nm" (short for nautical miles).

In the example, the first leg is .75 nm, the second is 2.45 nm, the third is .35 nm.

Speed
A tachometer can be used to determine a vessel's speed through the water. Thus, at any given engine rpm, the skipper knows what speed the boat is making.

To come up with a speed table, choose a mile-long course between two known navigational aids (e.g., between the horn and nun buoy on the chart above). Run the course each way at a given throttle setting, then do it again and again at increasingly higher settings. Average the time it takes to cover the distance at each setting, convert the average into seconds and divide the seconds into 3,600 (seconds in an hour) to get speed. If the measured mile is a statute (land) mile, speed will be in mph. If the measured mile is a nautical mile, speed will be in knots.

There are various ways to determine boat speed. Some vessels have speedometers. Larger ones are equipped with navigational devices, such as loran, which compute speed electronically. Smaller boats can calculate velocity by timing their running time on a measured mile at different engine rpm. To minimize the effects of wind and tide, timed runs should be made in each direction at a given rpm.



Speed Table

rpm	East-West Time	Speed	West-East Time	Speed	Average Speed
600	9:02	6.6	9:06	6.5	6.5
1,000	7:08	8.4	7:12	8.3	8.3
1,500	5:16	11.4	5:22	11.1	11.2
2,000	3:08	19.2	3:18	18.2	18.7
2,500	2:28	24.3	2:36	23.1	23.7
3,000	2:04	29.0	2:18	26.0	27.5
3,500	1:44	34.6	1:48	33.3	33.9
4,000	1:30	40.0	1:32	39.1	39.5

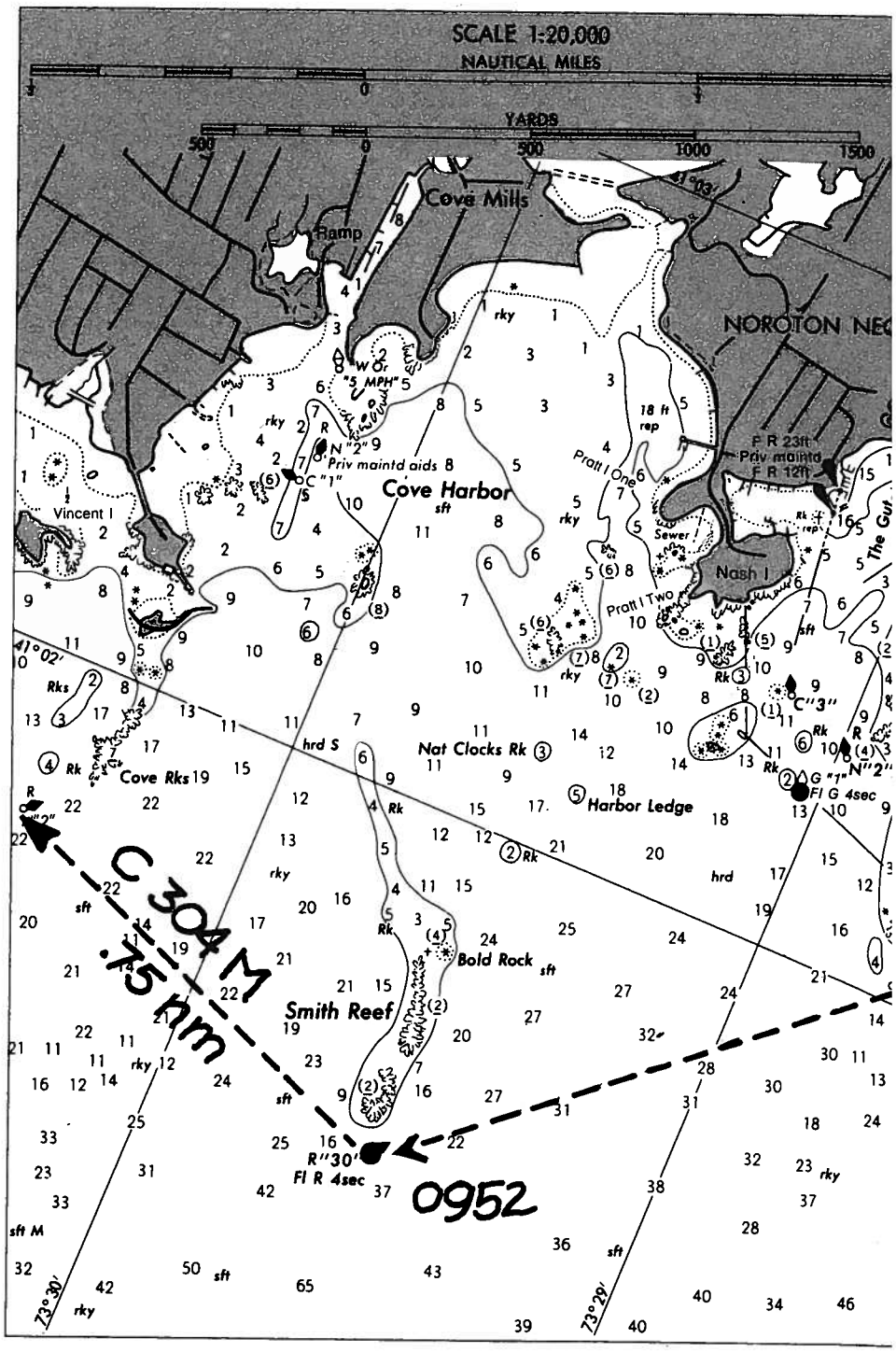
Dead Reckoning

On long legs between known navigational aids it is difficult to know your exact location at all times. However, by keeping track of your compass course, time and speed on each leg, you can "reckon" where you are at any given moment. Constantly updating your estimated position isn't as necessary in familiar waters as in unfamiliar ones. But knowing where you *should* be is critical in any emergency.

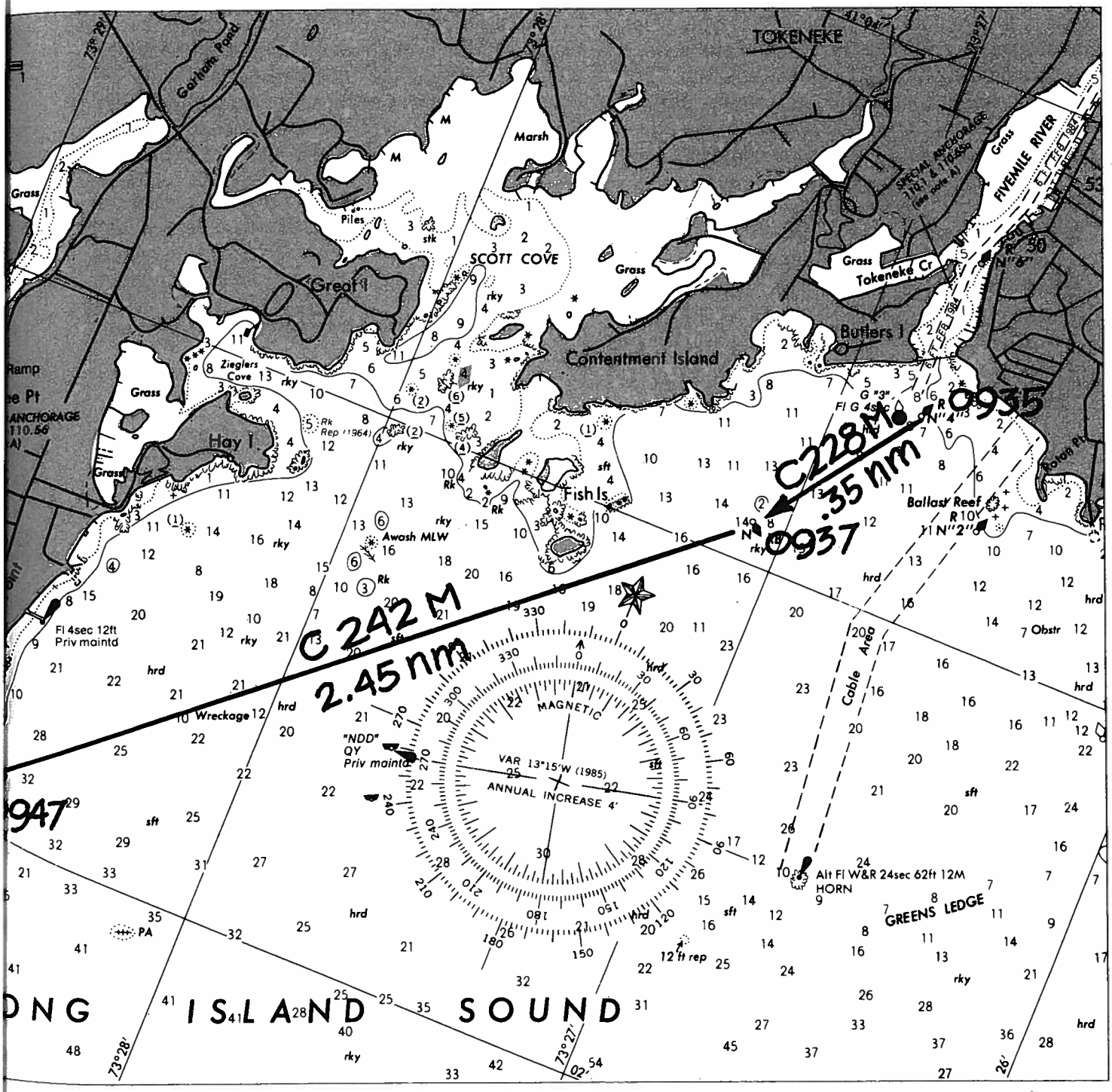
Waypoint
Dead reckoning involves recordkeeping. Each time you pass a waypoint, for example, you should pencil in the time next to it on the chart. If you know your compass course and speed from that point, you can determine your location at any given time along the leg that you are traveling by multiplying your speed by the time that has elapsed since you passed the last waypoint divided by 60 when dealing in minutes. You should also be able to predict your arrival time at the next waypoint (e.g., if you departed Nun "4" at 0935 at a speed of 10 knots, you should arrive at the next nun in about two minutes and at the the red flasher 14 to 15 minutes after that).

Checkpoints
Dead reckoning information should be updated as frequently as possible.

To check your progress on a two-and-a-half-mile leg (the long one on the chart at right), you should note the time you came abreast of Long Neck Point.



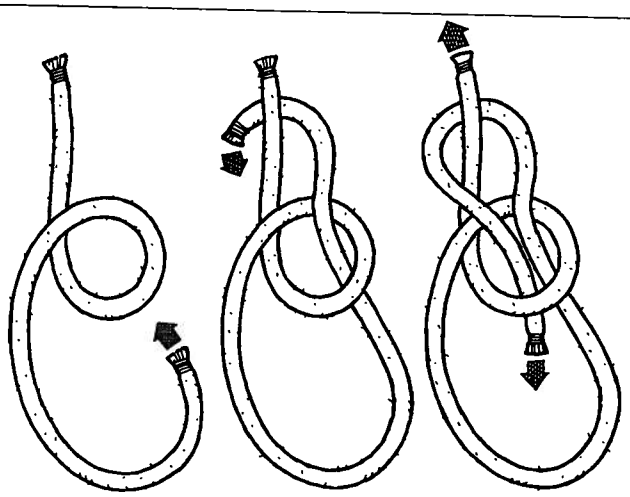
On a long leg of a journey, tides and currents, even wind, may push you off course, slow you down or speed you on your way. The longer the leg, the greater the possibility of deflection. One way to correct and update your dead reckoning is to use waypoints along the way to check your progress on each leg. Look for conspicuous landmarks along the shoreline, nearby headlands and well-defined land contours.



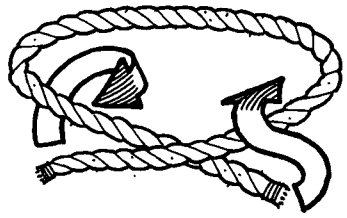
Four Basic Knots

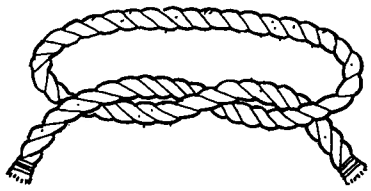
The key to knots and knot tying is knowing how to select the right knot for the job. Some knots are intended to slip easily while others will grow tighter with tension. Your selection should be based on the task at hand. Happily, of the hundreds of knots available to the mariner, a handful will take care of most needs. Nevertheless, your repertoire of knots will grow with your boating experience.

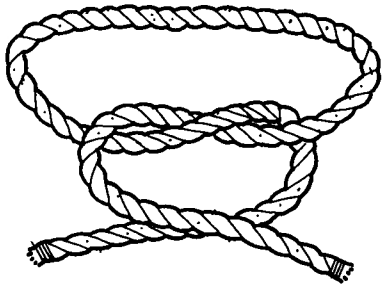
The Bowline is a traditional sailor's knot because it makes a non-slip loop in the end of a line and can be easily undone even after great tension has been applied. A bowline can be used in an emergency to pull someone out of the water since the loop doesn't tighten.

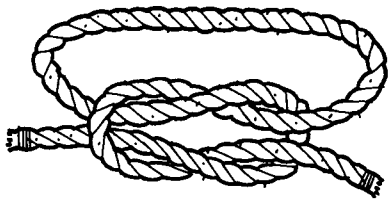


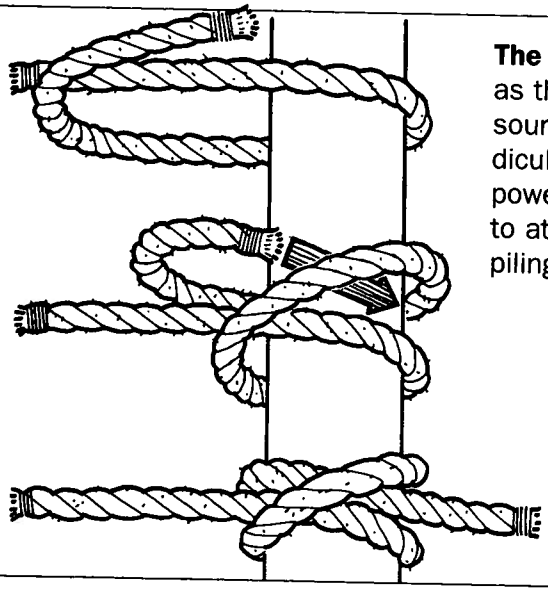
The Square Knot, also called a reef knot, is commonly used to tie lines around an object in order to keep it secure. A symmetrical, flat knot, the square knot is also suitable for joining ropes of equal sizes.





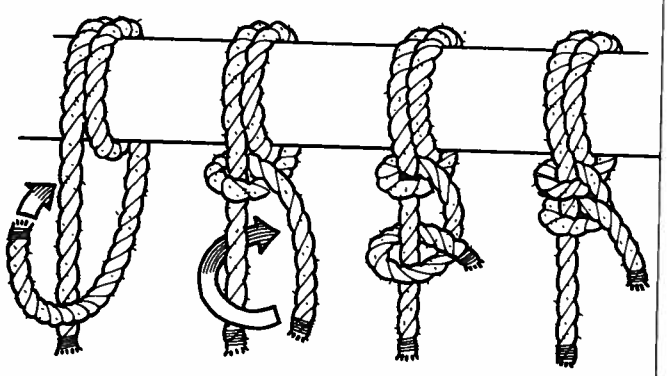






The Clove Hitch will hold as long as there is pressure on it and the source of pressure is in a perpendicular direction to it. On small powerboats, a clove hitch is used to attach dock lines to rails, pilings or bollards on the pier.

Two Half-hitches are a quick way to secure a line that may shift in direction or handle different strain. On a powerboat, two half-hitches are commonly used to hang fenders from handrails. They are also useful for securing lines to mooring rings on docks.

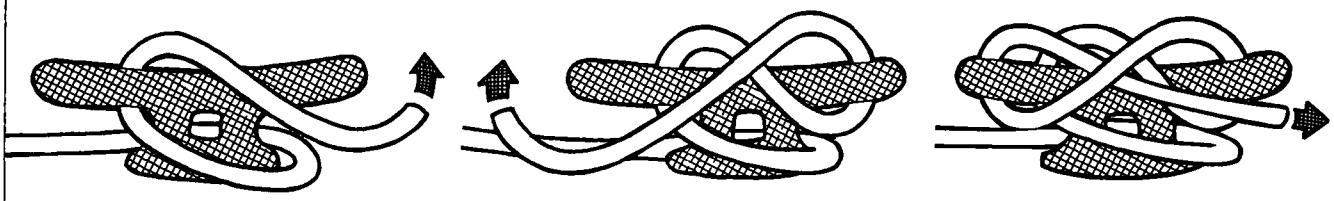


Cleating, Coiling, Stowing and Heaving Lines

Any length of rope (called line on the water) can quickly become a useless snarl unless care is taken to coil it neatly and store it so that it will not tangle. Thus coiled and stowed, a line is ready for instant use. Another seamanlike skill that comes in very handy is learning to throw, or heave, a line so that it reaches its mark. This technique is particularly useful when docking or in emergencies.

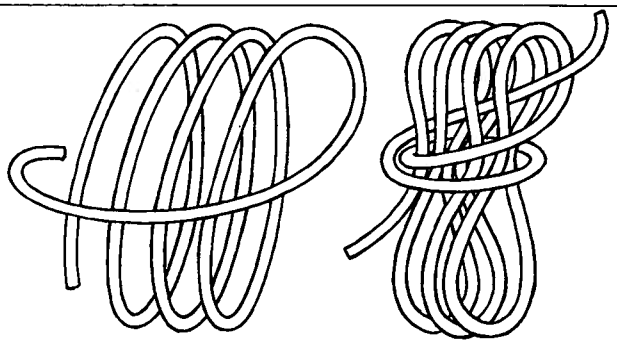
Cleating a Line

Lead the end of the line completely around the base of the cleat. Follow this with a crisscross wrap around one horn and finish with a half-hitch on the other horn. The greatest line tension or pull is on the cleat base. The crisscross wrap and half-hitch make the line fast, or secure.



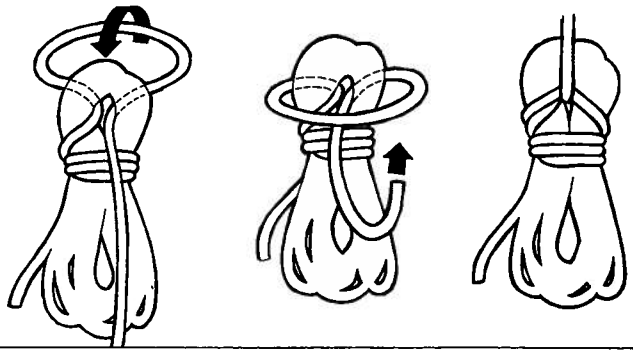
Coiling a Line

Any length of unused line should be coiled so that it's ready for use and doesn't trip you up. Hold the line in your left hand. Feed loops of line in with rhythmic and equal swings of your right hand, giving each section a slight clockwise twist with your fingers to help it form a coil. Braided line, which looks woven, should be allowed to fall into figure-8 coils to prevent kinks.



Stowing the Coiled Line

The best way to stow coiled line on a small powerboat is with a "sea gasket" coil. Take three to four feet of line from the coil. Wrap tightly around the middle of the coil, working upwards. Bring a loop of the remaining "tail" through the center of your coil and slip it over the coil and down. Pull it tight. Your coil will be neatly secured.



Heaving a Line

Divide the coil of line between your throwing hand and your other hand, which should be kept open. If appropriate, secure the non-throwing end of the line to a cleat. To heave the line, swing your throwing arm back then forward with a strong side-arm movement. The weight of the thrown rope will pull from the coil held in your non-throwing hand. When heaving a line to someone, throw it slightly to one side.