

# The Knife<sup>1</sup>

## A Tool, a Privilege, and a Responsibility

A knife is probably the most useful of all the common tools used by a marine technician. The knife was one of the first tools developed by the cave man. They sharpened and ground thin pieces of flint and quartz to make knives for skinning animals and cutting meat. Knives are continuously evolving as new designs, materials, and production techniques provide an increasing array of specialized uses.

Obviously, a knife can be dangerous, and one should exercise caution and good judgment in its use. Use of a knife or any tool as a weapon will not be tolerated in this class. **Careless and/or aggressive use of a knife will result in expulsion from this class and/or the college. Aggressive displays of any kind with any tool will also result in the immediate involvement of law enforcement. Illegal blades are not permitted on campus; possession of illegal blades on campus will result in legal penalties.**

## Knife Types

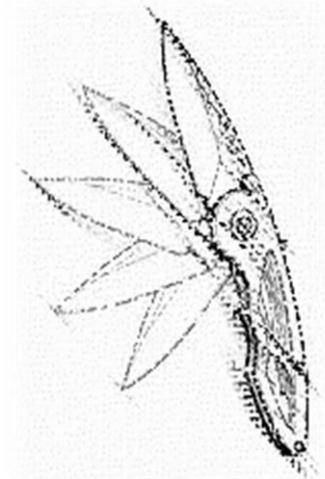
There are three general types of knives – **fixed-blade**, **folding blade**, and **multi-tool** – suitable for use in this class. Generally speaking, the most common design for a present day professional mariner is the folding, lock-blade knife.

**Fixed-blade knives**, once the standard for all knife uses, have sturdy, rigid blades and are easy to reach when only one hand is free and you need a cutting edge immediately. A good one is well designed and functional – it has a part to hold and a part that cuts – with no springs or hinges to break or gum up. Short of a broken blade, little can fail.

If a fixed-blade knife is chosen for general marine use, it should be of the traditional “sheep foot” design with a relatively small ( $\leq 4$  inch) blade length. However, because of safety concerns, many agencies prefer their technicians not wear large and sometimes illegal daggers on their belts.

Exceptions to this would include “dive knives” which are designed with specific uses in mind, and are not usually thought of as a general-purpose knife.

**Folding blade knives** are by far the most common knives in use today. I would strongly recommend a folding knife that has a lock-blade of approximately 2½ to 4 inches long. The folding, lock-blade is safer and more convenient to carry than the fixed-blade knife. There are many finely crafted lock-blade knives on the market, and most offer quality workmanship and materials only recently made available with the development of modern alloys, synthetic materials, and production techniques. Some folding knives are designed with a clip and are intended to be carried clipped inside a pocket; hence the name “pocket knife.”



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<sup>1</sup> Illustrations for this handout were excerpted from *Backpacker Magazine* (March 1981) and HiClipart.com (2018). Information from several articles written by Lionel Atwill and Jonathan Blumenfeld was used.

However, several folding knife designs do not ride/fit well in the pocket; due to this, many are designed to be carried in a sheath/case on your belt.

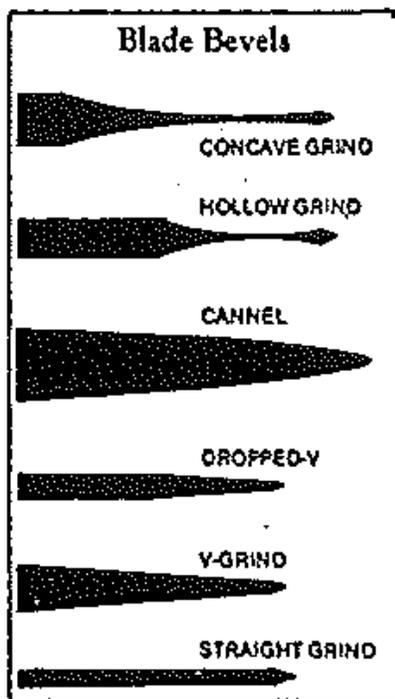
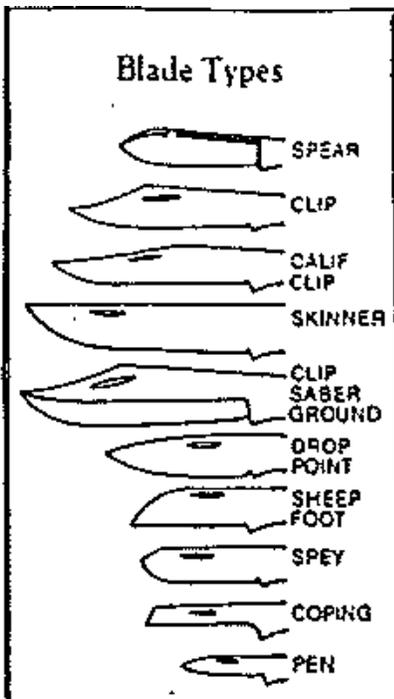
You should be aware of the two inherent differences between the **folding-blade** and **fixed-blade knives**. First, a folding knife pivots on a pin, and at that joint there is a potential weakness as well as safety concern. A locking-blade helps ease the safety concerns. Second, any folding knife is susceptible to fouling in its many crevices with fish guts, dirt, grease, or other debris. This can inhibit smooth hinge action and make cleaning difficult.

The third knife type, the **multi-tool**, such as a Swiss Army knife or a Leatherman knife can be indispensable for a backpacker or as a tackle box tool; however, I do not think they are convenient to use as a general-purpose knife. The opening and closing process can be tedious, many do not have a locking blade, they are difficult to clean, and the pin must carry the “weight” of many “tools.” If this type of knife is chosen – stay away from cheap imitations.



## Blades: Size, Shape, & Grind (Bevel)

Blade design and size is very subjective. Some technicians prefer large blades, while others favor smaller ones. In many states there are laws governing the length of knife blades. Check the laws in your area. As I understand it, in North Carolina you are not allowed to carry a concealed knife with a blade longer than four inches. A two and a half to four inch blade offers greater control in cutting. A four-inch blade is stout enough to cut any of the light or medium duty ropes you may run into yet small enough to work with netting. Any blade smaller than two inches will not prove very useful as a marine technician tool.



Choose a blade grind according to intended usage. Most production knives are either flat or hollow-ground. A **flat-ground blade** has sides which taper in toward the edge evenly along the entire width. This characteristic makes the flat-ground blade very strong and capable of holding a reliable edge for use in working with ropes.

A **hollow-ground blade** has sides which appear concave. This makes the blade more delicate, but can yield a sharper edge. Hollow-ground blades will not hold an edge for as long as flat-ground blades, but they are slightly lighter and offer somewhat less resistance when cutting.

# Steel

Steel is a blend of iron and carbon. About one percent carbon is added to the iron to make it harder and stronger. Prior to the introduction of stainless steels, high-carbon steels were the standard for the best quality knives. Many third and fourth-generation carbon-steel knives are still in use and their owners swear by them. With some attention, carbon-steel knives will do yeoman's service. These knives hold an excellent edge and sharpen very easily, but in general they tend to be brittle and are prone to rust, particularly in a marine or coastal environment.

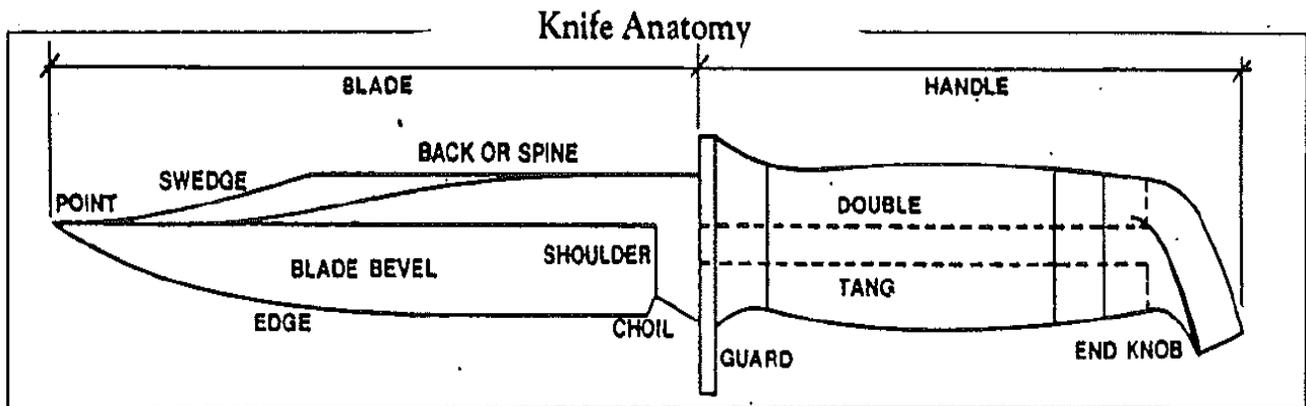
The development of quality stainless steels is a relatively recent phenomenon, coming about within the last few decades. Containing 11.5% to 29.5% exotic metals such as chromium, molybdenum, tungsten, vanadium, manganese, silicon, nickel, sulfur and phosphorus, these steels are virtually immune to rusting and common corrosion. While the earlier stainless steels were noted for brittleness and difficulty in sharpening, modern alloys possess excellent edge-holding abilities and are often as easy to sharpen as most carbon steels.

One indication of a blade's hardness and edge-holding ability is its Rockwell hardness rating. The **Rockwell scale** measures the penetration depth of a diamond point, under regulated pressure, into a finished blade. The standard C-scale on a Rockwell testing machine measures hardness of heat-treated, hardened steel and runs from C-20 to C-68.

There is no perfect steel, however, and all of these alloys are compromised. Very hard steel with a rating of C-60 or above will hold an edge for a long time, but it will take longer to sharpen and may snap if used to pry (lacks flexibility). A more flexible steel with a rating of C-52 or below is much easier to sharpen and will rarely break, but it will need constant sharpening to keep the edge in shape.

Common stainless steels used in production knives include 440A, 440B, 440C, AUS6-A, AUS8-A, and AUS8-A. Many custom knife makers use more exotic steels such as D-2, F-8 and 154-CM. This list is far from complete, and new alloys and materials are regularly being created and tested. Each offers advantages and disadvantages. D-2, for instance, holds an edge well but is expensive and does not tend to maintain a high mirror polish. F-8 is an excellent edge-holder, but is brittle and relatively difficult to sharpen. 154-CM possesses excellent general qualities, but is very difficult to work with and to sharpen. The 440 steels take much less time to sharpen, but they need it often.

# Structure



## What to Look For: How to Shop for a Folding, Lock-Back Knife

A close examination of a knife will offer subtle clues to the care with which a knife was crafted. The following list offers suggestions to guide your knife buying.

- Obviously price is a major consideration – generally speaking if a deal looks too good to be true, it probably is. You should expect a price tag of twenty to forty dollars.
- Remember, you are buying a working tool, not a collector’s item.
- It is a good idea to consider where the knife was manufactured. I prefer a knife made in an industrialized country with modern forging techniques.
- Traditionally, one would expect the “Bolsters” or end caps to be cast or machined of stainless steel, nickel-silver or brass. However, a variety of innovative construction techniques now offer lightweight knives with interchangeable blades and synthetic bolsters and handles. You should look for a sturdy construction.
- All metal surfaces, including liners, should be smooth and finely finished.
- The spring action, if applicable, should be strong, and the locking firm. Open and close the knife a few times. The blade of a quality knife will lock rigidly into position with a crisp click.
- The blade, when locked into position, should be rigid and true. Sight down the length of the blade with the handle nearest your face – it should be straight from butt to tip. Grasp the blade at its midpoint and wiggle – there should be absolutely no lateral movement. Now close the knife and look down into the handle slot – the blade should be aligned exactly in the center.
- All knives should have beveled or rounded surfaces on all non-cutting edges for safety and ease of handling.
- Make sure the knife handle feels comfortable in your hand and has a good balance or “feel.”
- You may also want to look for a knife with a locking mechanism to keep the knife locked shut. This can be desirable on pocket knives that are clipped inside your pocket.

## Whetstones

The Arkansas stone, a form of novaculite, is the traditional whetstone. Novaculite is a form of quartz composed almost entirely of silica in a dense mass of crystals. These stones come in four standard grades.

**Washita**, a pink-and-white stone of 400 grit (fairly coarse), is used to remove nicks from a blade. **Soft Arkansas**, a grayish stone of 800 grit (medium), is a good general-purpose stone used for finishing an edge – if only one stone is going to be used, this one would be the best. **Hard Arkansas**, a white stone of 1000 grit, is strictly a fine-finishing stone. **Black Arkansas**, relatively rare and expensive, is a polishing stone used for honing surgical instruments.

Although traditionalists still prefer Arkansas stones, some newer additions to the whetstone market offer attractive features. Synthetic **carborundum** and **alumina ceramic stones** are lighter and significantly less expensive. **Diamond stones** are the lightest and offer an additional advantage – water, not oil, is the preferred lubricant.

# Sharpening

**A dull knife is a dangerous knife!** The extra effort required to force a dull blade to do its job increases the likelihood of slipping and injury. A sharp knife is easier to keep under control.

Sharpening is simply the process of abrading the bevels along the edge until they intersect at a consistent **angle of 10 to 20 degrees**. This can be done with a sharpening steel, a ceramic sharpening rod, or a whetstone.

## Whetstone Method:

- Obtain a soft Arkansas stone (or equivalent) about twice the length of your blade. Secure it to a workbench with molding or use a commercial clamp and or housing.
- Cover the stone with a lubricant such as a light film of honing oil – any light oil will do. (Some schools of thought suggest water could be a good choice of lubricant as well – we will discuss this further in class.)
- Place the blade flat on the stone, and then raise the spine (back) until it forms about a 15 to 20-degree angle with the stone surface.
- Pass the blade over the stone, edge first, generally stroking away from you. The best pattern is an arc that passes the whole blade, from heel to point, evenly across the stone. Press firmly, as though you were trying to slice a thin layer of stone off the top.
- Count the number of strokes, then turn the blade over and repeat the process for an equal number of strokes.
- Keep the stone well lubricated and be sure to maintain the same angle on both sides of the blade. This angle is critical, with many knives having their own unique angle or bevel. If you have difficulty, there are commercial devices that clamp to the back of the blade to maintain an optimum honing angle.
- When you have a reasonably sharp edge, switch to a finer-grit stone to “polish” the blade or take off the fine burr that honing leaves along the edge. Leather strops can also be used for this polishing technique. Unlike sharpening, when polishing the edge of a knife you should draw the blade across the material with the edge trailing.
- Never check the sharpness of a blade by drawing it across your skin (e.g., to see how closely it will “shave” your arm hair) or by drawing your fingers/thumb across the blade’s edge. The best method for testing a knife’s sharpness is by using it for its intended purpose, such as cutting a piece of rope – if it does not cut fast and cleanly, it needs sharpening. If you prefer a quick-test, use a piece of paper. A sharp knife will cut cleanly with a single motion and will not leave any ragged edges. A dull knife, on the other hand, will rip, shred, or crumple the paper.

