Lesson Two

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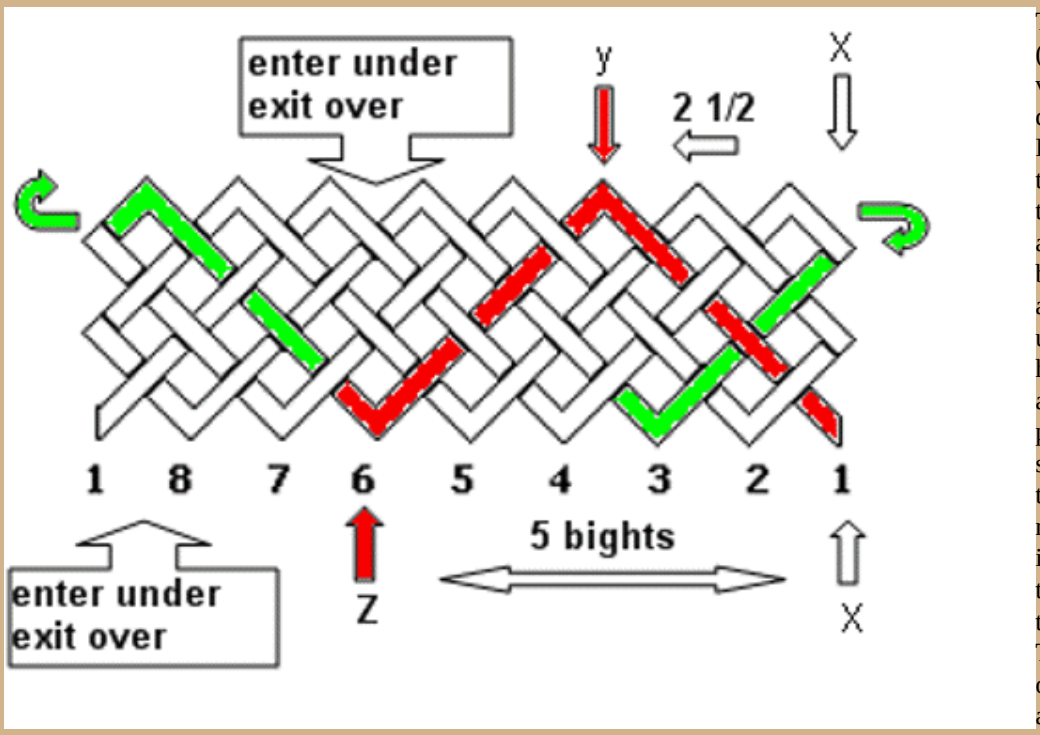
Now that we have a way to define the individual knots and the templates to see a picture of them, we need to consider some common characteristics of all the simple turksheads. These are the same for all knots with an odd number of parts, and differ slightly for all knots with an even number of parts. In all cases, the knots will be described with a vertical orientation of its cylindrical form, with the running end passing in a clockwise direction, as viewed from the top, around the knot as it is braided. This makes the flat braid structure of the knot go horizontally around the knot.

When we realize that the simple over one, under one, or casa coded turkshead is a flat braid done in a cylinder with one string, an examination of the structure of a flat braid will provide all the information we need to braid any such knot from its definition by its parts X bights.

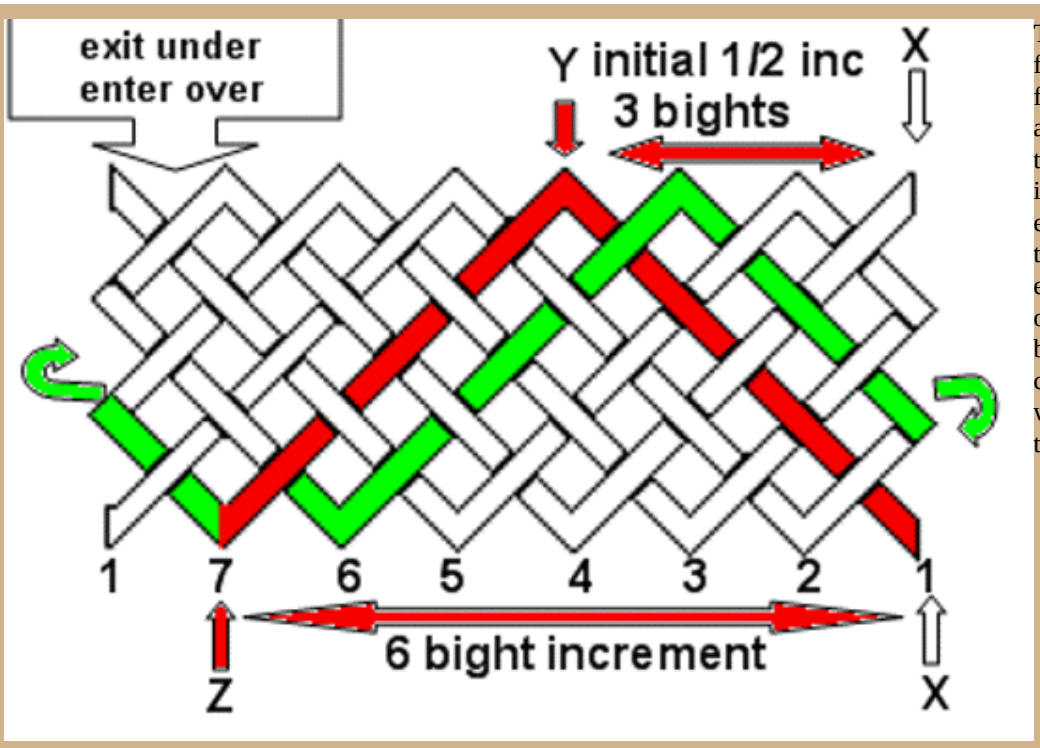
Basic Braid Structure

Odd parts



This is a a template of a five part braid structure, (also a complete 5p X 8b knot.). It is drawn for a vertical orientation of the knot with a clockwise direction of wrapping, starting at the bottom. First notice that each bight aligns vertically with the crossing between bights on the other side of the braid. This half bight offset in vertical alignment is true of all odd part braids, and can be called the bight alignment. The red part starts at a vertical reference line at X-X and goes upward (clockwise) to a bight position equal to half the number of parts (2) from the reference at Y. It then takes a bight and goes to a bight position equal to the number of parts (5) from its starting point to bight position 6. We will call this characteristic the bight increment. The reason for the first one half increment at the top is to center the bight at the top over the span of the increment on the other side of the knot. Thus the wraps are in the form of an isosceles triangle. This is a constant characteristic of all flat braids of this kind. This first wrap is the key to braiding any knot of this kind. Once it is in place, the rest fall in an orderly sequence parallel to it. The second wrap (in green) goes upward for another five bight increment and takes its bight. In coming back down, when it arrives at the left side of the template, it jumps horizontally to the right side and continues in the same downward direction for another five bight increment to bight position 3. Notice that the first bight appears with half on each side of the template but we only count it once in determining this second bight increment. The spacing between the termination of each wrap will be constant with each knot, and will vary with the ratio of its parts and bights. This we will call the bight progression. In this case it is three bight positions in a counterclockwise direction. One other salient characteristic of a simple braid structure is the way a part enters and exits the braid at each bight. In this example, the running end always enters the braid passing under, and exits the other side going over. This is true of all odd part knots of the true simple turkshead type. It is useful in determining the manner of crossing the standing end in the early stages of knots that do not have an adjacent bight progression, as in this example. (More about this later)

Even Parts



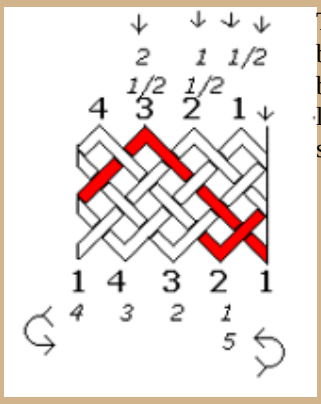
This is a six part braid structure (and a template for a 6p X 7b knot). The fundamental differences from the previous case are in the bight alignment across the knot, and the braid entry and exit at the top. The bights are now aligned vertically instead of being offset , and the braid exit and entry are reversed at the top. These are the only two things different in structure between odd and even part knots. You should notice that, because of the smaller ratio between parts and bights, the bight progression is now one bight position in a counterclockwise direction. This means that each wrap will fall adjacent to the preceding wrap on the right side.

The Bight Increment

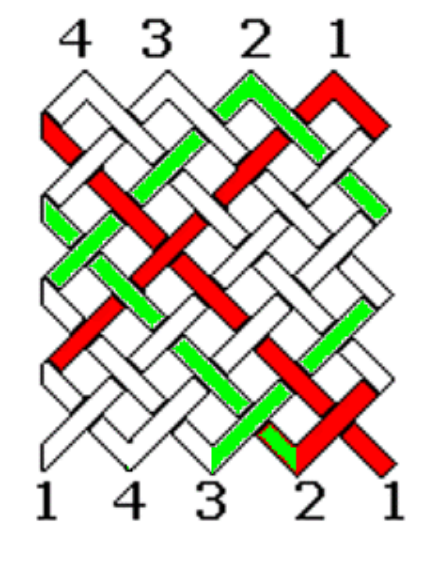
The spacing between each succeeding bight on each edge of the knot being equal to the number of parts in the knot is the primary key to braiding a simple turkshead. The use of the pinned mandrels makes this a simple matter of counting the pins.

When the number of parts exceeds the number of bights

What we have referred to as a wrap is actually the thong crossing the knot in one direction, changing direction to form a bight, and returning to the side where it began. The first pass across will spiral around the knot to a bight equal to ½ the number of parts from a point directly above the starting point and then spiral back to a bight spaced the number of parts from the starting point. Laid out flat, this would form an isosceles triangle, but in the knots with more parts than bights, the second half will cross the first one or more times in its path around the mandrel and we must count some of the pins more than once to achieve the proper bight increment.



This is a template of a 5 X 4 knot with the first wrap highlighted in red. We begin at bight 1 at the bottom and go 2½ bights clockwise to bight 3 at the top, Then 5 bights from the start to bight 2 at the bottom. Note that we had to count bight 2 twice (as the first and fifth) to achieve the five bight increment. If we place the first wrap properly, we have laid the foundation for the whole knot. All succeeding wraps are parallel to the first with a bight increment on both sides equal to the number of parts.

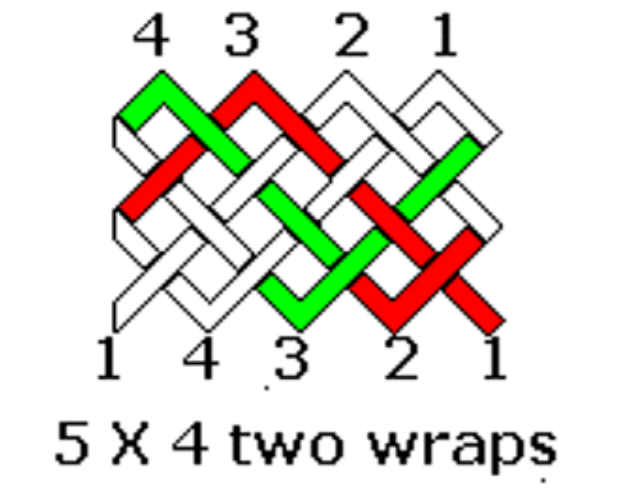


On the template for this 9 X 4 knot, the first half increment at the top is 4½, which carries us around the top from the reference and back to bight 1. This is a full turn around the mandrel. The 9 bight increment covers two trips around the bight count, so we will cross the standing end twice in returning to the bottom to the same bight 2 as the 5 X 4 knot. In both cases the second wrap falls adjacent to the first in a clockwise direction.

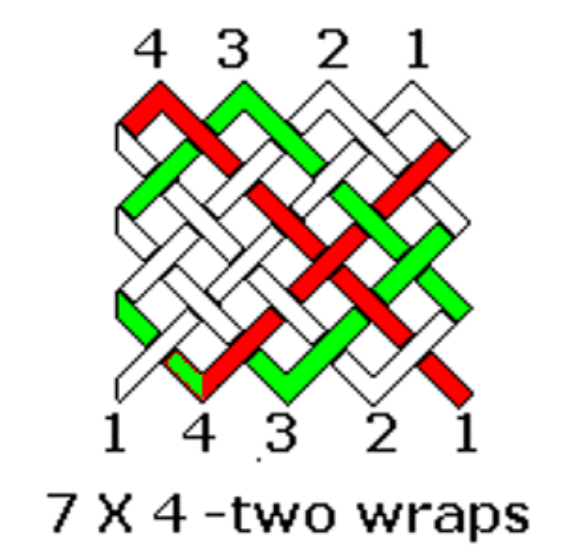
Bight Progression

Each wrap of the knot is parallel to the preceding wrap. This adds bights in an orderly progression around the knot as we braid. This progression may be either clockwise or counterclockwise, adjacent to or separated by one or more spaces, depending on the ratio between the number of parts and bights of the particular knot we are braiding. This characteristic of any particular knot is easily predicted by simply math, and is mostly useful as an error check in the braiding process. (More about this later.)

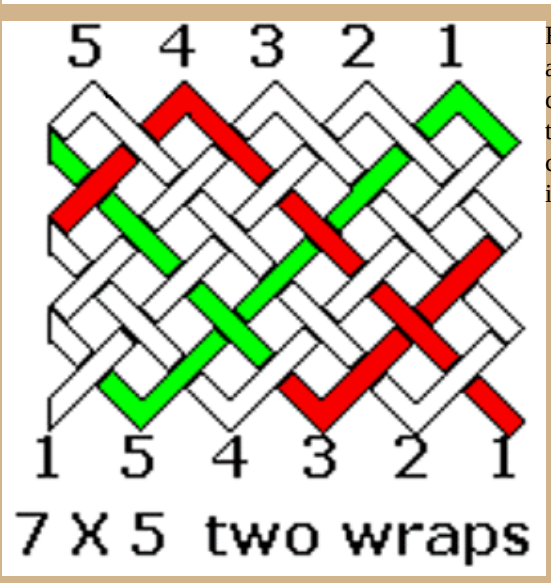
In fact the matter of bight progression is a matter of perception as each bight increment progresses in a constant number of spaces in either direction. We just chose the smaller number from the preceding wrap to observe in the braiding process to determine the manner of crossing previously crossed parts.



In this template of the 5 X 4 knot, notice that the first wrap (red) carried us one bight past the start in a clockwise direction. The second wrap (green), went one bight past the first to bight position 3 for one more space. The bight progression to use for this knot is clockwise and adjacent to the preceding bight.



The first wrap of this 7 X 4 knot (red) terminates to the right of position 1 where we started. The second wrap (green) ends at position 3, adjacent to and counterclockwise from the first wrap. The bight progression is counterclockwise and adjacent for this knot. (note) It is a unique characteristic of four bight knots that with each increase in parts by two causes the bight progression to alternate between clockwise and counterclockwise, but it is always adjacent.



For this 7 X 5 knot, the first wrap (red) goes two spaces past the start, and the second wrap advances two more bight spaces to bight position 5. The bight progression for this knot is still clockwise, but it is not adjacent. The intervening spaces will be filled by a "second trip" around the knot in the braiding process. There are knots that will exhibit this same pattern in a counterclockwise direction. The knots with a bight progression of two spaces have an interesting characteristic that I will discuss at a later point as Quick Start knots

The bight progression and bight increment are not something we have any control over, as each knot has it's own, but we need to be aware of them in the braiding process.

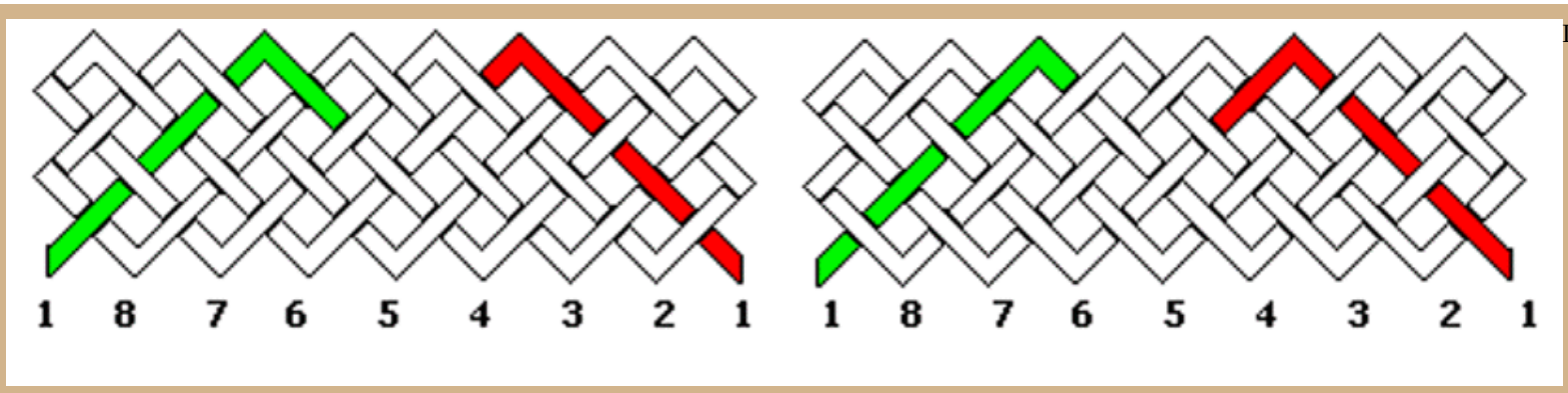
Some Math

A little bit of simple math will aid in placing the first wrap of a knot and predict the apparent bight progression. If we divide the number of parts by the number of bights in the manner of P/B=N+R with the N being the whole number and R being the remainder, we can determine a couple of things.

N will be the number of times the running end will cross the standing part in the second half of the first wrap. If N is 0 then there is no crossing by the first wrap. For conventional coding, if N is an odd number, all crosings in the second half of the first wrap will be over, and if even they will be under.

R will be the apparent bight progression in the direction of the wrap and B-R will be the bight progression in the direction counter to the direction of wrap. In analyzing a knot we will usually take the smaller of these numbers and call it the bight progression in the appropiate direction with a value of 1 being adjacent.

Coding



In the previous lessons, we have assumed a clockwise direction of wrapping, and braid entry and exit as shown in the left template above, with the first half wrap in red and the last half wrap green. This was only to follow a convention that the running end would pass under the edge of the braid when tucked up by the standing end to complete the knot. (Remember that when we get to the left edge, we jump back to the right and continue the braid.)

Now look closely at the template on the right. It is a mirror image of the left template, with the braid entry and exit reversed, and each crossing reversed. The overs, become unders and the unders become overs. This is called sobre coding because it results in the running end having to pass over a part as it tucks up beside the standing end to complete the knot in the conventional manner and go up one more part to go under and lock the braid. (The simple fix for this little irregularity is to take the tuckup with the standing end, which results in the conventional finish of under at the edge of the knot.)

There are two main points to this lesson. First, there are several ways to braid the same knot. The second is that some knots are much easier to braid with a particular method. This applies particularly to the “quick start knots” which we will discuss in another lesson. Because it requires less effort to make an over crossing than going under a part, we will try to chose a coding for any particular knot that maximizes the over crossing, specially in the early stages of the braid. (I know this seems a little bit complicated now, but it will “clear up” as we progress in the lessons.) With experience, you will be able to discard the book and braid any knot from its parts X bights definition.