

# SAWMILL FORUM

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**I'd like to get a spare saw for my mill, but at the moment, a new one just isn't feasible. What should I look for in a used saw? I don't really understand the different patterns and designs. How close should a used saw be to the one I'm running now?**

Inserted tooth circular saws in one form or another have been in existence now for more than one hundred years. In that time many patterns and styles have come and gone and in some cases, thankfully so.

If you happen to be in the market for a used inserted tooth saw, the first thing you want to check is to make sure that the blade does not have an obsolete pattern. If you happen to get stuck with a blade that is fitted with an obsolete pattern, don't despair. You probably needed a new sign for your sawmill anyway. Unfortunately even if it happens to be a beautiful saw that performs terrifically, the pattern reduces it to nothing more than sign material. The problem with the obsolete patterns is that even if you can find a rare box of odd bits for that saw today, where are you going to get the next box? And if the bits were rare and hard to find, chances are the shanks will be next to impossible to find. Avoid the aggravation and put that saw where it will do you some good, at the end of your driveway.

Now let's look at the four patterns that are not obsolete yet. I say "yet" because one of them will probably bite the dust before long, although I have been saying that for the last 15 years.

There are two different types of patterns available today. They are the single circle patterns and the double circle patterns. The single circle pattern has just one circle that both the bit and the shank fit into with a flat spot on the tip of the saw where the back of the bit (tooth) rests.

The double circle patterns have one size circle that the shank fits into with a different size circle (or part of one) where the bit fits. In a double circle pattern the bottom of the bit rests

on a flat spot that is between the shank circle and the bit circle. These two different size circles also have two different center points. It is the relationship of the location of these two center points that determines the proper fit of the bit and the shank aside from the size of each circle. In other words, even if the sizes of the two circles were perfectly within spec, if the relationship of the two circles to each other was wrong, the bits and shanks wouldn't fit properly. Then the polar ratio of the sockets is what determines the proper hook and back clearance angles of the teeth.

The two single circle patterns are the 2 ½ Pattern and the 3 Pattern (sometimes referred to as the old Hoe pattern) (no I don't think the term "old Hoe" was meant to be derogatory).

Of the four patterns that are still in use today, the 3 Pattern is definitely the one that is next in line to become obsolete although as of this writing it is still being produced. The differences between the 3 Pattern and the 2 ½ Pattern are the gullet size (or capacity) and the number of teeth you are likely to find in the saw relative to the diameter. The most common 3 Pattern configuration would be 10 or 12 fewer teeth than the diameter, such as a 56" saw with 44 teeth. It is also not that uncommon to see even fewer teeth in relation to the diameter in this pattern in that this pattern tends to show up more often in the smaller old hand-set mills that in some cases tended to be underpowered compared to a production mill. In those cases, a low horsepower saw might easily have 36 to 40 teeth in a 56" saw. Remember that each tooth draws a certain amount of horsepower. So the way to have a workable saw in a low horsepower situation was not to have a smaller diameter saw, but rather to have a saw that had fewer teeth in relation to the diameter.

On the other hand, the 2 ½ Pattern is the complete opposite of the 3 Pattern. The 3 Pattern has a very large gullet capacity and therefore can be used in a large depth of cut without fear of plugging the gullets and stalling the saw. The 2 ½ Pattern has the smallest gullet capacity of the four different



**Double Pattern saw.**

patterns in use today. As a result it really won't work very well in a large depth of cut because in a large depth of cut its minimum feed rate happens to exceed its maximum feed rate. That means that in a large depth of cut, if you feed fast enough (above minimum) in order to make a large enough chip to stay in the gullet, you will also be feeding too fast (exceeding the gullet capacity) and stalling the saw. That description makes it sound like a totally useless saw. To the contrary, it is a great pattern when you use it for what it was designed for. The 2 1/2 Pattern happens to excel in saw small knotty logs. The 2 1/2 Pattern saw will have anywhere from two fewer teeth than the diameter to six more teeth than the diameter—otherwise known as “more teeth than a swamp full of alligators.”

It is this relatively large number of teeth that means more teeth in the cut at a time and that is what makes it less likely to dodge knots and produce a smooth cut if anyone bothered to make sure that the side clearances of the teeth were accurate. But it is the small gullet capacity that makes it inferior in a large depth of cut. Suffice it to say that this is not a versatile pattern, but rather a pattern that is more specific to a certain situation. Because it is more of a specialized pattern, when sawing small, knotty logs, it will far outshine any other pattern as long as you stay within its design parameters.

On to the double circle patterns, which by the way are far more common these days, although that 2 1/2 Pattern is quite common in areas with inferior sawtimber.



**Single Pattern saw.**

We have the F Pattern and the B Pattern. They are both very versatile and capable in all conditions, although if you lean a little more in the direction of small depth of cut the F would be a little better while if you tend to saw the larger logs, the F would work fine but the B would be a little bit better. When I say small or large depth of cut I am speaking in relation to the diameter of the saw. A 12" depth of cut is no big deal to a 60" diameter saw while that same 12" depth of cut is fairly large when you are trying to do it with a 48" saw.

Of course, any time the top teeth are buried in the log, the depth of cut is not only large, but actually too big for the saw to work efficiently. That doesn't mean it won't work. It just means that it is an abusive situation to the saw and it won't perform in an optimal fashion because it will be drawing more power than normal. This is because there are more power-drawing teeth in the cut at the same time and the saw will be making much bigger chips because the teeth are taking such a long cut while they are buried. In fact when the teeth are completely buried, the sawdust will be less like chips and more like excelsior. At that point you have to slow your feed rate considerably and at the same time risk saw dust spillage and the accompanying heat that will force the saw off line.

The normal configuration for the double circle saws are as follows: The B Pattern will tend to have 10 or 12 fewer teeth than the diameter of the saw while the F Pattern will feature 2 to 8 fewer than the diameter. I prefer 6 fewer teeth

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than the diameter in that it gives you a stronger shoulder with enough teeth for a demanding feed rate. When you have two teeth fewer than the diameter in a F pattern, you are spending more on tooth replacement, drawing more power, and you have weaker shoulders which means more chance for shoulder breakage in the winter. Six fewer than the diameter will give you all of the feed rate that any large production mill might need.

On the other hand, if you are in an under-powered situation on a small mill, the B Pattern with 12, or even 14 or 16 less than the diameter will decrease your need for power and still perform properly. That is not to suggest that the B Pattern is mostly for low-powered mills. The B Pattern will saw anything from small logs to large ones and will draw a bit less power than the F. If you tend towards the larger depth of cut, even in a high production setting, the B will do a little better for you than the F although it will also work okay for you. That is the beauty of both the B and the F Patterns. And there is one bonus if you

happen to saw a wide variety of logs and therefore have some saws in both the B and the F Pattern: The teeth that fit the B Pattern also happen to be the same teeth that fit the F Pattern. So you can have two different patterns of saw and only have to stock one type of tooth, unlike the 2 1/2 and the 3 Patterns which have teeth that look similar but are actually very different in their dimensions.

Here are the gullet capacities of the different patterns: The B and the 3 Pattern both have about 2.5 square inches of gullet capacity while the F has 2 square inches and the 2 1/2 Pattern has only one and a quarter square inches of gullet capacity.

I should tell you that one thing I don't like about the single circle patterns is that the flat spot where the back of the tooth meets the tip of the saw tends to wear quite a bit because of the constant vibration of the bits. Yes, bits do vibrate as they saw no matter how quiet they seem to be. As that flat spot wears back, it means that the bit and shank roll in a tiny bit farther which changes the hook and the back clearance angles. As those two angles change, the tooth is cutting a little harder because it is now at the wrong angle. The harder it cuts, the more vibration to further wear that spot and the more likely it is to break a shoulder or tip in frozen logs. As far as I am concerned, you can saw any kind of log well with a B or and F Pattern and I would say the most versatile would be the F Pattern.

Of course if your shanks are worn too thin or your bits are not sharpened accurately, it really doesn't matter what pattern you have, it won't perform properly.

Questions about sawmills and their operation should be sent to Forum, The Northern Logger, P.O. Box 69, Old Forge, NY 13420, FAX #315-369-3736.

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