

## Merlin Bows

### Technical Advice Sheet

#### Tiller

##### Tiller - Cause and Effects on Compound Bows

In all the articles ever written on the compound bow, the cause and effects of tiller have never been truly explained. Any reference to tiller has always been a muted subject. As an approximate measurement, a starting point, of anywhere between equal to 1/4". In other words no-one really knows.

On researching the tiller in an effort to improve the performance of our bows, through knowledge, I can now understand why no-one has tried to explain where the perfect tiller should be. So get ready to be confused.

Tiller is affected in many ways, and is more often used to correct discrepancies in both bow and limb design and shooters form. Each archer is looking for a bow that delivers as near perfect arrow as possible and a bow that groups as well as possible.

Excluding all factors, this is how tiller specifically effects the tune of your bow.

The word tiller is used as a reference of measurement between the bow string and where the limb leaves the riser. Its purpose is to measure the differences in flex between the two limbs. Here lies the first problem.

We assume both limbs are equally matched, and if not the assumption is by adjusting the limb bolt the desired tiller can be obtained.

1. The normal reference of assessing the balance of the bow is by the timing of the wheels. Perfect timing of the wheels is possible irrespective of how ill matched the limbs are.

Example: Having a limb of 60# on the top and a 40# limb on the bottom will not change the wheel balance at all. This is because it is a paired system which equalizes the 60 and the 40, giving a perfectly balanced 50# bow.

The problem is that the lower 40# limb flexes more through the draw stroke than the 60# limb, even though on the completion of the draw, both limbs have achieved exactly the same weight.

But the effect of the lower 40# limb flexing more results in the nocking point moving in an upward arc, making it impossible to get straight nocking point travel. FACT: It is impossible to get perfect flight if your nocking point is rising or falling in an arc\* during the power stroke. It has been said that if your nocking point is rising or falling, all you

need to do is to move the nocking point up or down the string until you have it in a position that the arrow then follows the path of the nocking point.

This is INCORRECT. What this does not compensate for is the fact that the arrow is resting on a constant position on your rest, and that the nocking point is traveling in an arc\* on an unmatched set of limbs. The arrow in front of the rest will move in the opposite direction to the nocking point causing porpoising.

(\* not in a straight line)

Don't worry! If you read it again it will make sense.

Conclusion: The more finely matched your limbs are, the straighter the nocking point travel becomes, and better arrow flight is achieved.

## 2. Why does altering the tiller sometimes improve the grouping?

For the archers who are not familiar with the terms 'tiller tuning', in brief it's a method of tuning for superior groups by changing the tiller in small increments while maintaining the same knocking point height, noting the grouping patterns and choosing the best setting.

It has always been assumed that tiller tuning makes the bow group better. This is not the case. What archers tend not to take notice of is how well a bow aims. Tiller tuning sometimes improves grouping, but it is because it makes you aim steadier, not through the bow shooting better.

The tiller also affects the pressure translated to the grip via the bow hand. By altering the tiller, the angle of the riser in relation to the bow string changes, thus reducing or increasing the pressure on the grip.

E.g. Let's taken an extreme case scenario. An archer with a very low hand position is putting a lot of pressure on the bottom of the grip. He finds that by changing the tiller the bow aims steadier, but he gets poor arrow flight. This is because he must have taken the tiller to a point where the limbs do not bend equally.

By having the tiller level, he gets good arrow flight, but poor grouping because the bow is not aiming well.

The ideal solution for him would be to lower his grip height, which creates the same angle as if the tiller was different. This will improve the aiming, and also keep good arrow flight.

Even a perfectly matched set of limbs can be difficult to tune if the excessive tiller is put on the bow, giving the arc effect of the knocking point. On a matched set of limbs, to stop this scenario happening, a 1/4" difference is the maximum we would recommend, and by

far the better way, although difficult, is to experiment with the grip itself. This would give the same effect as changing the tiller without changing the travel of the knocking point.

The reason a matched set of limbs can become unbalanced as the tiller changes is because as you wind one limb bolt out, that limb then becomes more horizontal, the forces of the strings and cables are no longer pulling evenly on the same line as the limbs resulting in the more horizontal limb flexing further to achieve the same poundage as the other. The effect continues through the draw, and as one limb flexes over a different distance the knocking point arcs.

Some conclusions that can be made from the above information is that where possible work with as near equal tiller as possible, and to pay more attention on how well the bows aims within your given skill level.

If available, experiment with your grip height rather than making major adjustments to your tiller.