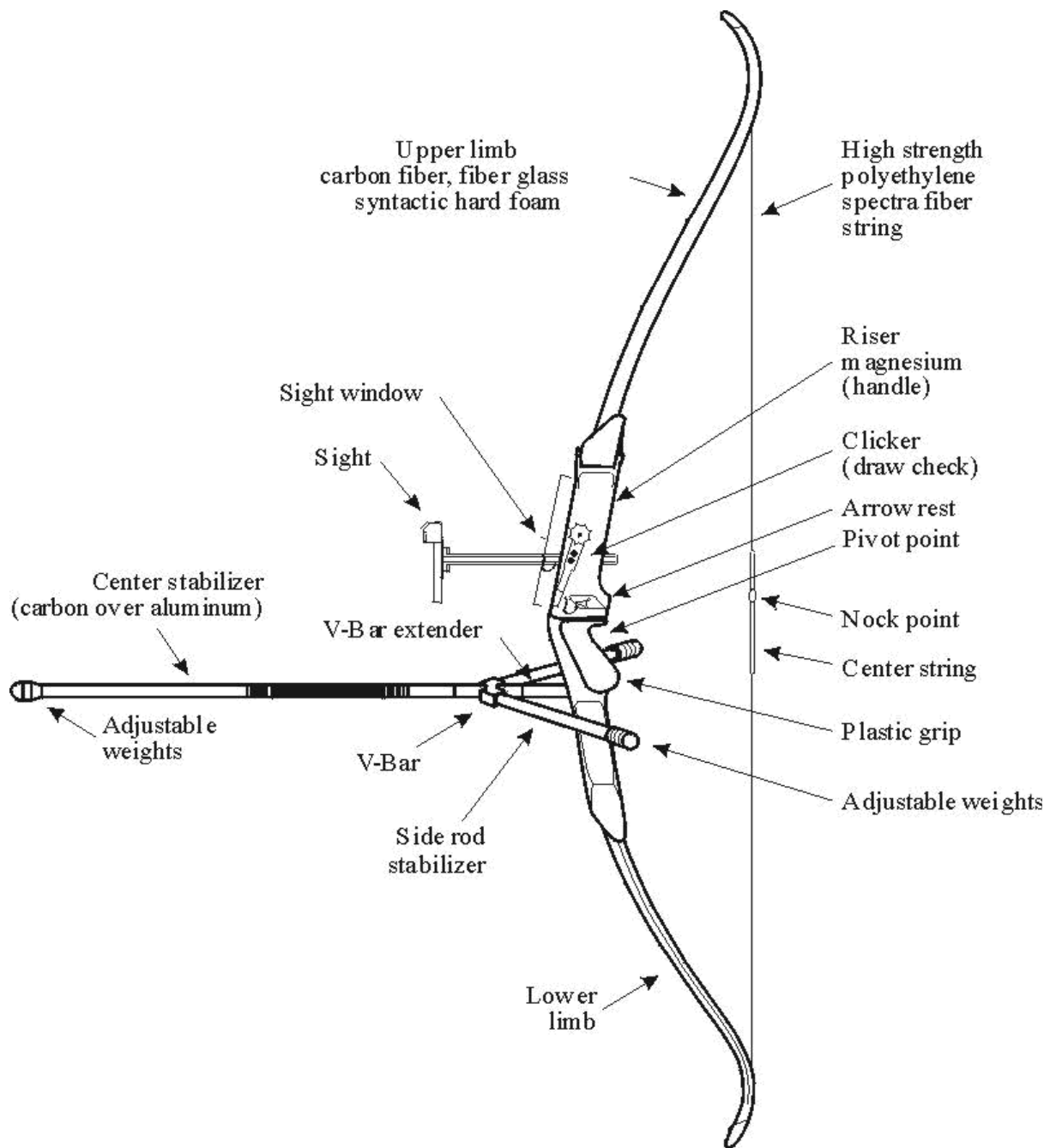


## **Welcome To the Bowmen of Minchinhampton**

### **Bow Tuning**

#### **Setting up your Equipment**

- 1: Examine the bow, checking for any defects:**
- 2: Fit the limbs in the riser and string bow:**
- 3: Fit the Stabilisers to the riser:**
- 4: Find true centre of limbs:**
- 5: Align the limbs to the true centre:**
- 6: Set up tiller:**
- 7: Fit and adjust arrow rest:**
- 8: Fit and adjust sight:**
- 9: Set the nocking point:**
- 10: Adjust the arrow alignment:**
- 11: Set clicker:**



Picture from the Hoyt manual

### **1: Examine the bow, checking for any defects:**

When you first get your bow, take a good look at it, check the riser for any damage or cracks and that all parts are accounted for. Make sure that all screws have been fitted and are tight. Check the limbs carefully. Most limbs come in matched pairs, so ensure that the serial numbers on both limbs match; look at the edges of the limbs and string grooves for any sign of damage to the lacquer coat. Check string grooves are equally cut and at the same height. Familiarising yourself with the riser and limbs at this stage will help you to get to know the bow and the attachment points that are for fitting weights and stabilisers and so on.

### **2: Fit the limbs in the riser and string bow:**

The limbs need to fit accurately to the riser. Some may be a little tight initially, which can be alleviated by putting a thin smear of Vaseline in the "U" cut outs at the base of the limbs. There should be no lateral movement of the limbs in the riser, as this will cause the bow to shoot inconsistently. It must therefore be remedied before proceeding with the set up, either by replacing parts or if possible by adjustment. Check the bracing height at this point, there are two points where the bow sounds good and feels smooth, but personally I always find that a bow shoots better at the high end of the bracing height. Low brace height can make arrows stiff; high brace height makes the arrows weaker.

### **3: Fit the Stabilisers to the riser:**

Fit the Stabilisers at this point. I normal use a 4" V Bar extender, 10" side rods and a 32" long rod but that is my preference, when they are fitted its easier to rest the bow on the back of a chair. But more importantly, a long rod is required to find the true centre of the bow in the next set up, so borrow one from the club if you do not have one.

### **4: Find true centre of limbs:**

We need to find the true centre of the bow so that, in the next stage, the limbs can be aligned to ensure that the power stroke of the limbs, moving forward, is directly through the centre of the bow. To set the bow true centre is the most important thing; this is the basis for setting up the rest of the equipment. To find the true centre of the bow I use the long rod as a visual guide. If needed a card with a hole can be attached to the long rod by means of the weights. The card can then be marked to indicate the true centre of the riser. This can aid you when setting the limbs to the true centre.

### **5: Align the limbs to the true centre:**

Risers these days incorporate a system for the lateral (side to side) alignment of the limbs in the bow. This is to allow for discrepancies in manufacture. These can be changed by moving washers or on some bows, by the use of cams, depends upon the manufacturer which type they use.

**Stage one.** You'll need to pluck the string 3 or 4 times. This involves pulling back the string approximately 3" then letting go. This is required so that the limbs fully settle into position. This needs to be done every time the limbs are taken out and replaced during the set-up process. With the bow resting on the back of a chair, stand behind it and see how the string aligns with the riser.

This can be facilitated by using Bieter limb gauges, which should be placed on the limbs close to the riser, if they are not available, look to the centre line of the riser. The bolt holes for the limb attachment should be in the centre of the riser and this can be used to help align the string to the centre. If possible, rest your head against a door jam, wall or even on the end of a broom stick, so as to keep your head steady while looking up and down the riser and limbs. If the limbs do not line up with the centre line of the riser top and bottom, it will need adjustment. If I'm setting a bow up from scratch, I will initially ensure that the alignment system, whether cams or shims, is set to the centre position. Once you have read the instructions that come with your bow, pick any direction to move the limbs. Either it'll be the correct way, or it will not - if it is the correct direction carry on, if it is not, then move in the other direction. In the first stage, you will have to move the top and bottom adjusters in opposite directions to align the string up with the riser. Once you have adjusted the limbs so that the string runs through the centre of the riser, you can move onto the second stage.

**Second Stage:** Although the limbs are aligned with the centre line of the riser, they will now need to be adjusted so that not only does the string pass through the centre of the riser, but is also aligned with the "true centre of the bow". To keep the string running parallel to the riser, the limb adjusters need to be moved in the same direction. Pick a direction and move them. If it moves away from the true centre then move the adjustment of both limbs the other way. Once you have finished, the string should not only cut through the centre of the riser, but it should also run through the true centre of the bow.

#### **6: Set up tiller:**

Tiller is the term used to describe the distance that the string is from the top and bottom limb at the point they both join the riser and is the difference between these two measurements. Changing the difference between these two measurements adjusts the power of each limb in the riser, so as to take into account the fact that the bowstring is not pulled from its centre. When a tiller is set correctly, it allows the top and bottom limb to work in unison, so that once the string is released, both limbs finish the power stroke at the same time. In older one-piece bows, the tiller was adjusted by the bowyer, who made the bottom limb stronger than the top limb. It is set in modern bows by adjusting the angle that the limbs are set in the riser, when viewed from the side. If the measurement at the top and the bottom are the same this is "Zero" tiller. In most cases the tiller is set as a positive, which means that the gap between top limb and the string is bigger than the gap at the bottom limb and the string. Most bows seem to shoot well between 4-6mm (0.16"-0.23") positive (top gap bigger than the bottom), so a good initial setting is 5mm (0.2") positive.

When adjusting the tiller, refer to the manufacturer's instructions for the individual bow type. Most bow types utilise the poundage adjustment bolts to adjust the tiller. Adjusting the tiller can therefore alter the poundage of the bow by small amounts. Remember to take care when doing this adjustment, as there is usually a limit to how light the poundage adjustment bolts can be set. Therefore, if the bow is on the lightest setting, you will only be able to increase the adjustment/poundage on the lower limb. So increasing the poundage of the bottom limb will decrease the gap between the bottom and the string.

### **7: Fit and adjust arrow rest:**

Fitting the rest and button is reasonably simple, depending on the type of rest you are using. The rest needs to be fitted so that it takes into account the size of the arrow. The button will be one of two types: it will either be a one-piece plunger (the point which comes into contact with the arrow), or have interchangeable tips. Myself, I use a Bieter Button and fit the rest so that the arrow shaft contacts the plunger on the centre. This means that any time while I am shooting, I can check the arrow position on the rest and as long as the arrow is central on the plunger, I know that the rest set up has not moved. If it has moved, it can easily be reset back.

Once the arrow position against the plunger has been decided, the rest can be adjusted. Many of the wire type rests have a raised end to, apparently, keep the arrow on the rest. Before I fit the rest to the bow, I straighten the wire using two pairs of pliers; once straightened, it will give a better clearance to the arrow as it leaves the bow. Once the rest is fitted, there should be a slight angle on the rest in relationship to the arrow, looking from the side. This needs to be adjusted so the arrow touches the rest under the plunger. If the rest is too flat, the arrow may move away from the plunger just prior to the shot, giving erratic groups. Looking down from the top onto the rest and the button, the adjustment needs to be made so that you can only just see the end of the arrow rest sticking out from the arrow. You may need to cut the end off the rest wire to shorten it, otherwise the rest can interfere with the arrow when it leaves the bow. Remember that you have to tune the bow first, so do not be too hasty cutting the end off. Once these two parameters have been set, you need to make sure that the rest arm stays just below the plunger. If it catches on the underside of the plunger as it moves in towards the riser, as the arrow leaves the bow, it will change the operation of the plunger action, making the groups larger.

### **8: Fit and adjust sight:**

There are many types of sights, but in all cases they are there to hold the sight pin, with an adjuster mechanism so that it can be moved for the different distances and be adjustable from side to side. Once the sight has been fitted onto the bow, it will need to be aligned vertically with the bow's true centre, so that as you move the sight block up and down the track for different distances, the sight pin should remain parallel to the centre line, if it doesn't, then we need to alter the vertical/ upright of the sight till it does.

### **9: Set the nocking point:**

The vertical placement of the nocking point is not critical at this time, as its placement will be adjusted during the initial tuning. Using a bracing gauge fit the nocking point approximately 5mm above the centre line of the rest and button. If you have had your own bow before, you can set it to the same height as the nocking point of your old bow. Initially, a temporary nocking point can be made using insulation tape. Cut a 25mm length of tape, then cut it down the centre; this can be put on the string as top and bottom nocking points. However, even with a temporary nocking point the fit of the string needs to be correct. If it's too tight or too loose, initial tuning will be less reliable. Too loose and the arrow will leave the string too early, too tight and the arrow will stay on the string too long, affecting the arrow's flight. This is more critical the lower poundage, as with a tight fit you will find that the arrow will release from the string inconsistently, making the groups bigger than expected. To test the nock fit on the string, place the arrow on the bowstring and on the arrow rest,

against the plunger. Point the arrow at the ground just in front of you. Lightly tap the string with the inside of your index finger. The arrow should stay on the string. Then tap the string firmly from about 3" distance; the arrow should now disconnect from the string. The nock is designed so that the throat of the nock groove is narrower than the base of the nock groove. Therefore when the nock is fitted onto the nocking point and the nock is fully located on the string, you should be able to rotate the nock on the string a very small amount. (If you're using the Bieter nocking system, you will get the correct nock fit every time.)

#### **10: Adjust the arrow alignment:**

The bow will now be set up so that everything is aligned along the centre line. You now need to set the arrow so that it shoots correctly from the bow. As the fingers release the string, the string and the nock end of the arrow move out of the left (for right handed archers), inducing the first bend into the arrow, as the string moves towards the bow and the arrow moves out of the bow, the arrow is still attached to the string. As the arrow reflexes from the initial bend and the string crosses the centre line, the arrow flexes the opposite way to the initial bend.

To allow the arrow to exit the bow in line with the centre line of the riser, the front of the arrow needs to be set in relation to the riser. This will be dynamically set during tuning and is only set statically at this time. To achieve this, initially the arrow needs to be set so that the arrow points left of the centre line (right of centre for left handed archers). To set the arrow, taking into account the length of the arrow that you are using, you will need to envisage the point of the arrow divided into three segments from the centre to the edge of the point. The centre of the point to the right hand edge is divided into three. For arrows up to a length of 26½in, the centre third is used for alignment; for arrows longer than 26½in, the outer third is used. This means that for the different arrow length something missing here????????????

#### **11: Set the clicker:**

If you are using a clicker, it can be fitted to the riser. If you have used one before, you can set it to approximately the same distance as the clicker setting on your old bow.

#### ***Clicker draw length check***

At some stage later, the use of a draw length check, such as an audible clicker *may* be seen as a benefit to some archers. An audible click signifies to the archer that each arrow has been drawn back to exactly the same distance.

#### ***Bare shaft tuning to set the nocking point***

To find the best position for attaching a nocking point, one method of testing is by shooting a series of fletched arrows at a target about 10 – 15 yards away, in as tight a group as possible. Then shooting a "bare" shaft at the same aiming point.

To prepare the bare shaft remove all the fletchings and wrap masking tape around the shaft at the fletching position. Add enough tightly bound tape to make the "bare" shaft weigh and balance like the fletched arrows.

Take note of where the bare shaft hits the target in relation to the fletched shafts.

Initially the aim is to get the bare shaft to be at the same height as the group of fletched arrows (*perhaps a touch lower*). If the bare shaft hits higher on the target, then raise the nocking point. If the bare shaft hits lower then lower the nocking point. Keep adjusting until the bare shaft hits

at about the same height as the fletched group. Then fix the nocking point securely at that point. The next test is to get the bare shaft within the group of fletched arrows. If the bare shaft is left of the group (stiff) then try backing off the spring tension of the button. If the bare shaft is to the right of the group (weak) then increase the spring tension.

Testing for arrow clearance

The type of rest chosen may affect the orientation of the arrows' fletching.

Stand about 5yds from a boss. Have your sight set correctly for this distance.

Spray the back part of the arrow and fletchings, with dry white powder. (Available from welding accessory dealers) Nock the arrow carefully making sure not to mark the white powder.

Shoot the arrow into the boss.

Before touching the arrow inspect it carefully, particularly around the fletching, to see if there are any signs of contact with the bow or rest.

If there are signs of contact then try adjusting any or all of:-

Button tension and position

Buttons centre shot position

Nocking point height

Nock and fletching orientation

All these adjustments are only the start of testing for best arrow flight.

When it is clear that you have good arrow clearance, then go on to:-

Walk back tuning

Make sure that there is plenty of overshoot behind the target for this method.

At 20 yards set your sight so that the fletched arrows hit the target at the centre point at which you are aiming

Reverse a target face on the boss, exposing a completely plain white sheet. Now mark a dark spot of about 2 inches diameter on the paper about 5 inches from the top of the target at the 12 o'clock position.

Standing at 20 yards away, shoot a series of 3 to 6 arrows at the spot. You should have a nice tight group in or around the spot. (Remember that the more experienced archer will shoot tighter groups than a newer archer)

Mark a pencil line around the group

Walk back another 5 yards. Without adjusting the sight, shoot the same series of arrows at the same spot.

Walk back and shoot at the same spot at each 5 yards interval, right back to about 50 yards.

Each time draw a line around the group.

You will notice that each group has travelled down the face of the target. Even if the group has spread a little you will be able to mark the group centres.

Ideally each group centre down the target face will be in a vertically straight line.

If the line is vertical then the setting is probably correct.

If the line is straight but working out to the bottom left as you walked back, then the button spring tension will need to be backed off a little.

If conversely, the line is to the right, then increase the button tension.

If the line is curved like the letter " ( " then move the button tip in towards the bow.

A reverse " ) " will need the button tip winding out from the bow.

These actions are relating to a right handed archer. Left handed archers would reverse these instructions for button adjustment.

### Other tuning tests

There are several other methods for testing and optimising your bow and arrows' performance.

Tiller adjustment

Nocking point tune for groups at a middle to long distance.

Be prepared to read and listen to other archers' ideas. Try things for yourself. Much more useful knowledge may be gained.

Some methods may suit your particular style more than others. (It may be that your perception of some methods will give you more confidence).

However, don't get too hung up on "tuning". Frequent good form practise will do more for good shooting than continual and frustrating testing.

Hope you found this interesting.

Keith Parsons