

Olympic Recurve Bow Setup

Introduction

1. Limb Weight Adjustment
2. Limb Alignment
3. Bow Tiller
4. Strings
5. Arrow Rest
6. Pressure Button
7. Nocking Point
8. Stabilisers
9. Bow Sight
10. Clicker
11. Bracing Height
12. Evaluation of the Set up
13. Bow Setup Data Sheet
14. Further Reading

Introduction

The objective of this guide is to run through the bow set up process from an “out of the box” starting point to a bow assembly with an associated arrow that is near to the point at which one could start tuning. i.e. a good set-up.

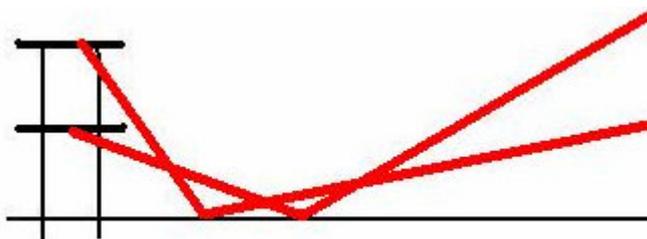
Some aspects of the bow set up e.g. nocking point and pressure button spring settings are default settings only and will no doubt need some modification if and when you go on from bow set-up to bow tuning. In section 12 some criteria on how to improve and evaluate the set-up of the bow/arrow combination are presented. Essentially these determine whether the set-up is at a point where starting the process of “tuning” could be considered.

For making adjustments to a bow a very convenient method is to rest the bow on its stabilizers over the back of the chair. This leaves both hands free and does not put any stresses on any moving parts of the bow e.g. the limbs. Even if you are intending to shoot bare bow stabilizers can be temporarily added.



1. Limb Weight Adjustment

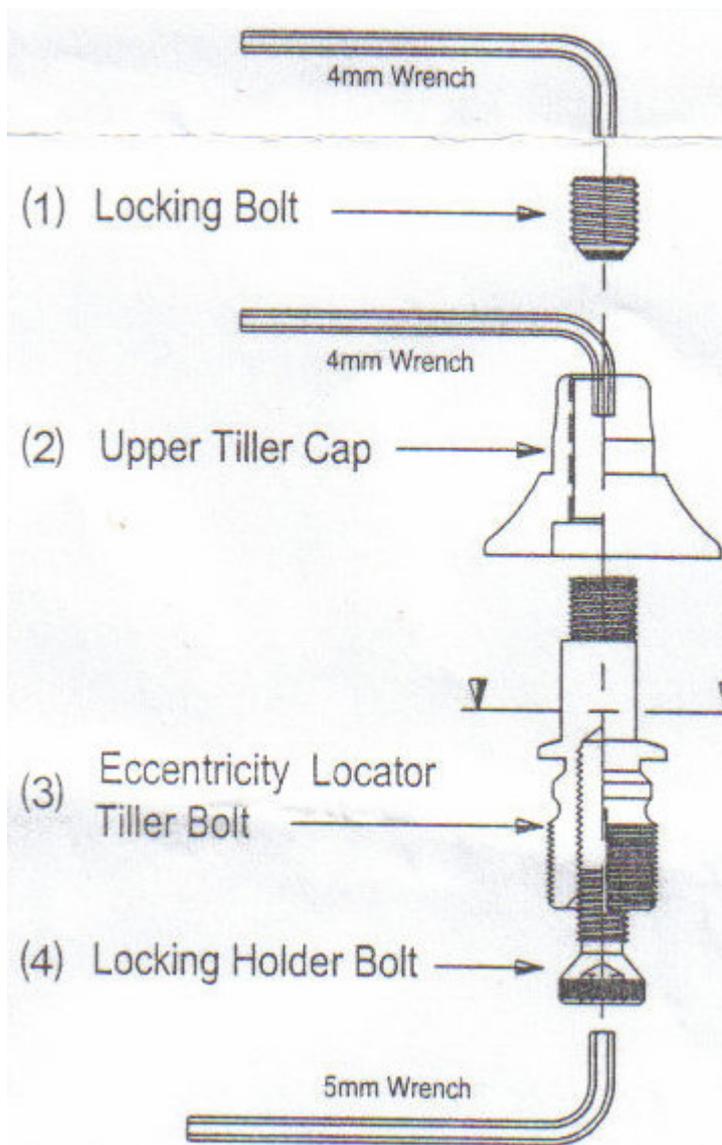
Most Olympic recurve bows have adjustable “tiller” bolts with which you can adjust the angle between the butt end of the limb and the riser limb pocket. Screwing the bolt in increases the angle the limb makes with the riser. As you vary the limb angle you change slightly the limb geometry at bracing height (as the limb tip to tip distance is defined by the string length) and hence the associated limb pre-stressing. This has a knock on effect to the load on the fingers at full draw.



The actual detail of the limb bolt adjustment/locking varies between makes of riser but what they all have in common is screwing the limb bolt in (clockwise) increases the limb angle and hence the draw weight and the limb bolt is locked in place with a second bolt (locknut or rawlplug arrangement) acting from the opposite side. While some manufacturers are OK with limb bolt adjustment for specific risers with the bow strung its recommended that limb bolt adjustments (from both a safety and bow damage point of view) are always made with the bow unstrung.

The actual draw weight required is archer dependant and the limbs purchased reflect what the archer considers right for him at the time. Typically the limb bolts provide around 4 pounds variation in draw weight. If an archer has a specific draw weight in mind then it's a good idea to select limbs where that draw weight lies around the mid point of the draw weight adjustment. This gives room to maneuver of plus/minus a pound or so when it comes to matching the selected arrow to the bow. Bear in mind that the marked weight on the limbs depends on the where the limb bolts were positioned by the manufacturer on whatever riser was used when the marked weight was determined. These can easily result in a couple of pounds difference between limbs from different manufacturers with the same marked weight (to be added to the normal production limb weight variability)

So first remove the limb bolts to check no junk left in the threads (and to see how the bolts work) and check the bolts run in and out freely. Then screw both bolts in to about mid point (the tiller cap is usually about level with the sides of the limb pocket) and lock both bolts into position. Locking the bolt usually requires one bolt/spanner to stop the main bolt rotating and a second allen key to tighten up the locking bolt.



Above is an example of a limb bolt system (the original Samick Masters - about as complicated as they come). The main bolt is locked in place by a rawlplug type “locking holder bolt”. A second limb adjustment facility the “upper tiller cap” is locked in place by a locknut arrangement. The double adjustment arrangement is used as the main bolt is eccentric to provide a limb alignment function. Most limb adjustment systems just comprise a main bolt and a locking bolt and have no limb alignment function.

2. Limb Alignment

What is wanted is for when the bow is drawn for the limbs to bend only in the vertical plane of the bow (at ninety degrees to the direction of travel) thus avoiding any torsion build up in the limbs. If the limbs are twisted at full draw then it's bad news for the arrow (and the archer) as the result of excessive torsion during the power stroke makes for a very unforgiving system as regards putting arrows in the centre of a target. The purpose of limb alignment is to minimize this torsion effect. You can't avoid it altogether as the power stroke itself generates torsion in the limbs.

The initial alignment of the bow limb in the pocket uses a two point system. At the butt end of the limb is a slot which engages the tiller (weight adjustment) bolt. Near the other end of the limb butt is circular cross section cylinder which engages a slot in the limb pocket. The bottom of cylinder has a spring loaded ball bearing which engages a détente in the limb pocket. You can change the alignment of the limbs to the riser by moving the limb slot/tiller bolt contact point from side to side or by moving the cylinder/limb slot assembly from side to side. Both options exist and how they work varies between bows but the approach to limb alignment is the same.



The objective is that an imaginary straight line can be drawn down the centre of both limbs from limb tip to limb tip which also passes through the grip pressure point.

As usual hang the bow on a chair. Make sure that the limbs are "settled in" with a few pulls or shot arrows. Look along the string to check that the limbs are not twisted and correct (by twisting the limb) if needed. How the string runs in the limb grooves can indicate whether the limb tips are twisted or not. On the side of the limbs facing the string across each limb place two strips of masking tape one near the limb tip end and one near the limb pocket end. With ruler and pen measure and mark the centre of the limbs on each of the four strips. Looking down on the bow see how the string lies with respect to the four alignment marks. Ideally the string should line up with all four marks and the centre of the grip. (the long rod and the holes in the riser for the locking bolt allen keys can often be used as additional alignment references).

If something doesn't line up then the top limb bottom limb or both limbs need adjustment. Which is it? A simple check is to hold the riser with one hand and push the string sideways with the other near one end of the riser to align with a mid riser point reference (locking bolt hole, end of pocket – it depends on the riser). Check if the string aligns through the grip and the two far limb reference marks. If everything lines up then that limb is ok. If the string runs to one side of the reference marks and/or the grip then the limb alignment requires adjustment in the direction to move the string towards the

alignment marks. Repeat the process in reverse with the other limb. You end up knowing which limb or limbs require adjustment and in what directions.

Unstring the bow, make the required adjustments, restring and recheck the alignment. A number of iterations are required (most of which are required to get the hang of how much effect changing “the adjustment” has on the alignment).

The end of the process is the string lining up with all 5 references (and the long rod as a check you are not too cross eyed). At this point lock everything up. Put appropriate reference marks in the limb pocket with a permanent marker as it will save you loads of time if you have to repeat the process at some point in the future.

A quick limb alignment check you can make is to raise the bow as normal, align the end of the long rod with a distant mark and draw the bow slowly backward to your face trying to keep the bow hand in the same position in space. If the limbs twist during the draw in one direction then the riser twists in the opposite direction and the long rod end will be seen to track laterally away from your distant mark. The drawback (apologies for the pun) with this method is that if your bow hand is incorrectly placed, and hence the pressure point is out of line you get the same effect (you are generating bow hand torque in the archery jargon).

3. Bow Tiller

A great deal is written about bow tiller, mainly because no-one has much understanding about what it is and what it does. For the initial set-up of an Olympic Recurve bow all you really need to know about is “Static Tiller” and how to adjust it.

Most modern recurve bow limbs are what are called “zero tiller” limbs. This means that the top and bottom limbs are identical (in shape, weight, strength etc.). Some limb manufacturers make “tillered limbs” by which is meant the bottom limb is stronger than the top limb.

Adjusting the limb bolt changes the angle at which the limb exits the riser pocket. If both limbs exit the riser at the same angle (i.e. the two limb bolts are in the same position) then if the two limbs are identical (zero tiller limbs) the strung bow is horizontally symmetrical around the grip i.e. the perpendicular distance from any point on the string above centre to the limb is the same distance as with the equivalent point below centre. For tillered limbs with the same identical limb exit angle then the bow is not horizontally symmetrical as the limbs have different strengths.

The usual method to measure Static Tiller is to use a limb gauge to measure the perpendicular distance from the string to the riser at the point the limb projects out of the limb pocket. This measurement is made for both the top and bottom limbs. There is usually some feature on the end of the riser you can use to measure to. Alternatively you can measure to the edge of the limb butt itself.



If the top limb measurement is greater than the bottom limb measurement this is referred to as a “Positive Tiller”. If the top limb measurement is less than the bottom limb measurement this is referred to as a “Negative Tiller”. Usually the difference between the two measurements is specified i.e. +5mm positive tiller means that the top limb measurement is 5mm greater than the bottom limb measurement. If the two measurements are the same this is called “Zero Tiller”.

For riser stability during the shot having identical limb exit angles is currently generally considered as being the best configuration. For zero tillered limbs therefore we want the top and bottom measured distances to be the same (zero static tiller) and for tillered limbs we want the difference between top and bottom measurements to be that specified by the manufacturer for that specific limb (typically up to +5mm positive static tiller).

So how do we adjust the limb bolts (preferably with the bow unstrung) to get the required static tiller if the two measurements aren't initially what is required. The simple rule is that screwing the bolt in decreases the associated limb pocket tiller measurement and vice versa.

If we have a positive tiller then to reduce the static tiller we can

1. screw the top bolt in
2. screw the lower bolt out
3. screw the top bolt in and the lower bolt out by equal amounts.

The reverse applies if we have a negative tiller or want to increase a positive tiller value.

The advantage of option 3 is that the bow draw weight stays the same. Option 1 gives you a higher draw weight and option 2 a lower draw weight.

How much the bolt(s) need turning for a specific amount of tiller depends on the specific limb and riser. As the starting position was with the bolts about the same position hopefully not a lot. We are talking about fractions of a turn not complete turns. (as ever with limb bolt adjustment always keep an eye on having a safe amount of bolt in the riser thread).

After adjustment and re-locking the bolt, restring the bow and recheck the tiller. Usually two or three iterations will suffice to get the tiller to within say 1mm of what you want. Small variations in tiller +/- will have no noticeable effect on the bow performance.

The only possible problem in setting the static tiller is that the limb tiller is not what the manufacturer says it is, a mismatched pair of limbs or the limb manufacturing tolerances being off. Buying expensive limbs rather than cheap ones doesn't guarantee acceptable construction quality. In this case it may be required to measure the "Natural Tiller".

If you put your nominally identical limbs into a riser where the limb exit angles are exactly equal and you end up with say 5mm negative tiller then obviously the two limbs are not identical and -5mm is the natural tiller. The usually quoted criteria is that if your new limbs are supposed to be identical and the natural tiller is greater than 0.25 inches then the limbs should be replaced (under warranty).

There are two suggested ways of measuring natural tiller:

a) Screw both limb bolts all the way in to the stops. The assumption is this gives you same angle with the riser for both limbs (and as long as the riser is made near perfectly a reasonable assumption). String the bow, measure the tiller and this is the natural tiller.

b) Adjust the bow to zero tiller as normal as described above. Then just reverse the limbs putting the top limb in the bottom pocket and vice versa. If the limbs are identical then the tiller should remain at zero. Any measured +/- tiller is roughly twice the natural tiller.

If the top limb turns out to be significantly stronger than the bottom limb it may be worth shooting the bow with the limbs reversed i.e. the stronger limb at the bottom. For an Olympic Recurve bow the Static Tiller should be between zero and the natural positive tiller. Any static tiller should be small and positive. Bare bow, string walking archers may use a negative tiller but this is a completely different bow set-up regime.

Once the correct static tiller is obtained then record the measured values of the tiller distances. If for some reason you take everything to bits then you can reassemble the bow to the same static tiller (e.g. same draw weight).

4 Strings

At this point in time you have probably bought a bow string. String making is for the future. Strings usually have a top and a bottom identifiable by the centre serving. There is more centre serving at the bottom end (as this is where the bow arm is) than at the top. Number of twists is not important. Have enough twists so that the string holds together as a unit, typically around 20. The more twists you put in a string the heavier and more springy it gets so keep the number of twists down.

The centre serving should make a nice fit with your arrow nocks assuming the nock type/size was specified when buying the string. If not then the options are to replace the string or fit a new centre serving.

The nock fit on the string should be good enough so the arrow doesn't fall off when drawing, aiming etc. but doesn't require excessive force to separate from the string. Too tight a fit will increase the string effect on the arrow nock when the two separate probably resulting in variations in the arrow characteristics at launch.

The normal test is to hang an arrow from a horizontal bowstring. It should require a sharp tap on the string to get the arrow to drop off.

5. Arrow Rest

To begin with the plastic Hoyt Super Rest is recommended as it's a good basic rest, it's cheap and you don't have to buy a pressure button immediately. At some point a better rest (to go with your new pressure button) will probably be wanted.

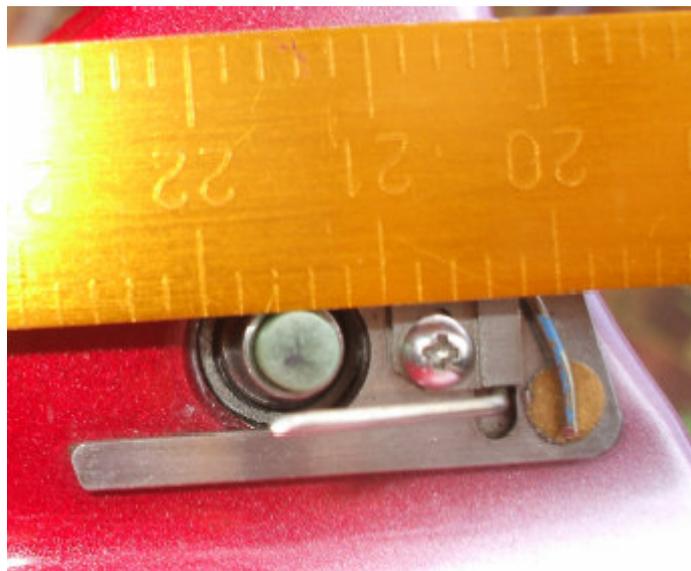
The rest is used to support the arrow on the bow up to short time after releasing the drawn arrow. After that its purpose is stay out the way of the arrow and if it does contact the fletchings have a minimal effect on the arrow. So the arrow rest wires are as light and short as possible and free swinging.

If your rest comes with a plastic sleeve on the wire then first thing is to remove it and throw it away. The arrow will quickly wear a groove in such a sleeve and this will cause interference.

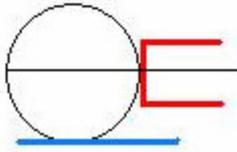
Install the pressure button to give you a reference point for rest attachment. Rests usually come with a hole or cut out to accommodate the button. Have some strips of masking tape ready for use as positioning guides on the riser along the rest edges.

Basically slide the rest around to find the correct position based on the following criteria and then position masking tape guides on the riser for the actual rest attachment.

- The rest wire should be horizontal: - use a bracing height gauge to align the wire at 90 degrees to the string. The wire should not slope upwards or downwards.



- The rest wire pivot point (hinge) should be as close to the pressure button as possible. This shortens the wire and increases the angle the wire makes with the riser – both desirable. Most rests have a button bushing alignment facility.
- An arrow on the rest should contact the pressure button at its vertical mid point: - lay the arrow shaft you plan to use horizontally on the rest wire and adjust the rest height as appropriate. Some arrow rests include some wire height adjustment, some don't.



It's possible for an arrow to jump up and down on the rest during the draw and on release. If the arrow horizontal diameter goes over the top/bottom edge of the button plunger during release then an unwanted vertical force up/down will be generated on the arrow. You will get "fliers" and possibly damaged fletchings.

I.e. three alignments are needed: rotation, lateral movement and vertical movement. Once the right position is found keeping the rest pushed firmly in place put strips of masking tape at strategic points on the riser to locate the rest position. Remove the rest and then replace it against the masking tape guides. Check that all three reference point above are valid. (You really, really don't want to have to remove a rest that's stuck on in the wrong position).

Once you are happy with the positioning remove the pressure button and the rest adhesive backing strip. Hold the rest clear above the riser and visually align with the masking tape guides. When aligned ok press the rest firmly to the riser.

The final step is to cut the rest arm to length but this can only be done after the pressure button has been set up. (Item 6)

With the centre shot adjusted fit an arrow to the string and lie across the rest in contact with the button. The wire needs to be cut to a length so that it just doesn't project outside the shaft when viewed vertically. The shorter the wire the less chance of it hitting the arrow as it goes past.

Wrap around rests are not recommended for the Olympic Recurve bow as their characteristics don't comply with many of the above rest requirements.

6. Pressure Button



The pressure button is a spring mounted plunger against which the arrow shaft rests. During the bow power stroke the arrow shaft for a short time (around three thousandths of a second) pushes against the plunger which is depressed into the barrel (typically 1 – 2 mm).

The pressure button has two adjustments:

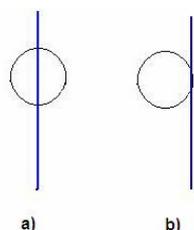
- How much the button is screwed into the riser i.e. how much it projects out of the riser.
- The plunger spring tension

The projection of the plunger is controlled by screwing a nut up and down the barrel. In better buttons the spring tension is controlled by rotating a second barrel, usually with a scale. Cheaper buttons often use an allen key operated screw at the rear of the button.

How much the button plunger extends outside the riser changes the initial alignment the arrow has with the bow. It is commonly referred to as the “Centre shot”. There are accepted guidelines on this for initial bow set up.

The usual method to adjust the Centre shot is, with e.g. the bow supported on a chair:

- locate an arrow on the bow
- line up the string with the centre of the limbs
- determine the visual position of the arrow point with respect to the string
- screw the button barrel in/out to adjust the arrow point to the required setting
- without rotating the button barrel screw the adjustment nut hard up against the riser and lock in place with the grub screw(s).
- Check the result and adjust further as required. A simple check is to line up visually with the long rod and confirm that the arrow runs at a slight angle to it in the right direction but the point does not go excessively outside the rod.



The visual picture of the string with respect to the point should lie between (a) the string bisects the point and (b) the string aligns with the edge of the point on the side closest to the bow;

(a) is the recommended set up for a barreled carbon arrow, (b) is the recommended set up for an aluminium arrow. For non barreled carbon arrows the set up should lie somewhere between these two extremes.

The suggested reason for having this offset arrow alignment is that during the release when the string force is being transferred from the fingers to the arrow the arrow nock is displaced sideways by a few millimeters. By having the arrow point offset, when the load comes onto the arrow the arrow is aligned with the bow plane and the string force is running more or less down the arrow shaft rather than at an angle to it. This results in reducing the sensitivity of the arrow behavior to variations in the archer’s release.



As long as it is not too soft or too stiff the spring tension is irrelevant to bow set up (it only becomes a factor when/if you get into bow tuning). It is recommended that the spring tension be set to something around 300-400 grams using the weakest spring that gives you around this value with the spring compressed around half way. The way to measure spring tension is to slowly push the button down onto a set of e.g. kitchen scales and record the value when the plunger starts to move into the barrel. Only a rough spring setting is required so don't spend much time with spring adjustment.

Note: cutting the arrow rest to length can only be done after the adjustment of the pressure button centre shot.

7. Nocking Point

Nocking points are put on the string to locate the arrow nock in a constant position. You need two nocking points, one above and one below the arrow nock else the arrow can slide up and down the string.



The recommended initial position for the nocking point is around 5mm above centre. Use a bracing height gauge on the string and resting on the arrow rest. Using the bracing height gauge scale mark a point on the string about 5mm above the rest position. This is the position for the lower nocking point. To create the nock point use dental floss or string serving either using alternating knots or wind and pull the loop through approaches. Metal nocking points are to be avoided. Once made place an arrow nock on the string for reference and create a second top nocking point. Trim any loose threads and apply glue to the nocking points.

Nocking points should not be a tight fit on the arrow nock. Leave around 1mm of vertical play. Don't make the nock points too wide else your fingers will destroy them. Around 3mm width is about right.

In the short term masking tape can make reasonable good (and easily removable) nocking points. With some glue coating they also become reasonably waterproof.

8. Stabilisers

Stabilisers were first permitted on Olympic Recurve bows around 30 years ago and the optimum configuration was established very quickly and has remained in place ever since with inevitably a minority who feel that something else is their preference.

Stabilisers serve two functions

- Aiming stability
- Riser stability during the shot

The “standard” configurations meets these two requirements. It comprises a long rod (sometimes called a poker) an extender a V bar and twin rods. Only thing to establish are the dimensions and the weights on the ends of the long rod and twin bars.

The only significant relationship is that the higher the bow draw weight the longer the various rods are and the more weight you need on their ends.

The extender is very rigid rod section that connects the riser to the V bar. Length varies (with draw weight) from 4 to 7 inches.

The V bar is the joint between extender, long rod and twin rods. The usual V bar angle is 45 degrees. Narrower then this cramps the archer, wider then this and you annoy the archer standing next to you. Normal V bar is flat. Archers sometimes have a downward angle on their twin rods but this is less efficient from the riser stability point of view. Probably often the result of having twin rods that are too long.

The length of the twin rods is determined by the extender length and the V bar angle. If you imagine holding an arrow across the throat of the grip at right angles to the bow then the twin rod weights should lie on this line. A little longer or shorter than this doesn't matter much.

Long rod lengths typical vary (with draw weight) from 22 inches to 33 inches. A limitation on rod length is as you lower the arrow speed the end of the long rod rises (lower sight mark) until it ends up on the line of sight between you and the target. Low frequency vibrations of the long rod can interfere with aiming and the more expensive long rods are designed to discourage this. i.e. tube rods can have a variable wall thickness and multi-rods have variable “tuner” spacing.

Having got the rods sorted out need to put weights on their ends. Roughly you have the same weight on the end of the long rod and the twin rods (it's balancing the overall mass usage between rotational and lateral stability). Equally roughly if you divide the draw weight by 6.5 you get a rough value of the overall required bow weight e.g. if your draw weight is 45 pounds then the overall bow weight needs to be around $45/6.5 \sim 7$ pounds.

A better way to determine overall bow weight is by feel. Pile a lot of weight on the rods and draw the bow. Determine if the bow feels heavy in the bow hand. If it does reduce weight until the bow feels weight neutral or removing weight does not seem to have any perceived affect on the weight on the bow hand. This the “balance” point which minimizes the work the bow shoulder has to do, it helps with aiming stability. Having said that quite a few archers use “heavy” bows because of the increased riser stability. Fine if you are strong enough to handle the weight and the additional energy burn.

Adding bits of rubber all over your stabilizers makes no difference to the bow performance, what it does do is dissipate the energy left in the bow after the arrow has gone protecting the archer from potential injury. If you shoot a lot of arrows they are not a bad idea.

Additional weights and rods can be added to the stabilizer system, it comes down to archer preference.

Much is talked and written (and much of it incorrect) about where the balance point of a bow should be. The way to determine the bow balance point is to turn the bow upside down and rest the extender, near the riser end, on the finger of one hand. Then move the finger up/down the extender until the bow balances with the long rod horizontal. This is the balance point. It should be at least around 4 cm along the extender from the riser end. It's actual position is irrelevant as long as it's far enough forward from the riser. The vertical position of the balance point will be below the grip due to the weight of the stabilizer assembly. It's position doesn't matter. Just leave it below the grip and don't (as sometimes suggested) try to deliberately move it upwards.

9. Bow Sight

Whatever the make, there are three checks/adjustments required when fitting a bow sight.

Vertical Track adjustment

When you change shooting distances the sight is moved up or down the sight bar. If the sight bar is not parallel to the plane of the bow (read bow string) then as you move the sight up and down you also move the sight left or right. Not useful when changing distances in the middle of a round. Sights come with an adjustment to vary the vertical track alignment to the bow. There are many ways to check track alignment using lasers spirit levels and plumb bobs but let's keep things simple.

Side Bar parallel to bow plane

If the extension bar is not parallel to the bow plane then changing the length of the extension will result in left/right movements of the sight pin. Same problem as moving the sight block up and down a misaligned track .

Hang the bow over a chair as normal. Move the sight bar extension fully out. Move the sight block to the bottom of the track. Align the string up with the centre of the limbs/grip using masking tape as for limb alignment and note where the string cuts the end of the long rod (or you can add a piece of card to the rod end for marking). Add a reference mark to rod (or card). This gives you two "pilot lights" (string and mark) to reference the bow plane alignment. (You can use the limb centre marks for alignment but being able to view string, pin and mark along one line of sight is easier).

Note: when looking from the string side the further your eye is from the string when doing pin/string alignment the less room the pin has to hide behind the string. Looking from the long rod end is more precise but more awkward.

With the string lined up with the long rod mark adjust the windage to move the sight pin into alignment with the string. Now move the sight block to the top of the track. Re-align the string with the long rod mark and check for any left or right movement of the pin. If still aligned all OK, the sight track is correctly aligned. If the pin is left/right of the string use the sight track adjustment to bring the pin into alignment. Recheck no lateral movement of the pin when moving the sight block from bottom to top of the sight track.

Having got the sight track aligned check the sight extension bar is parallel to the bow plane by changing from maximum extension to minimum extension. The pin should still be aligned on the string – end of long rod mark. You can again check with the sight block at the top and bottom of the sight track. If the pin is still in alignment it means that there is no sideways movement of the pin when changing the length of the extension. If there is lateral movement of the pin when changing extension length the only usual solution is to shim the sight mounting block at the front or rear end as appropriate. Many archers choose an extension length that can accommodate all required distances to avoid this problem. If you have enough arrow speed then a fixed extension length is the preferred solution.

Sight pin alignment

The arrow leaves the bow traveling parallel to the vertical plane of the bow but slightly outside it. So your eye to pin to target line of sight is slightly outside the plane of the bow. It follows that the default pin position needs to be outside the plane of the bow.

If you line the string up with the limb centers in the usual way then the sight pin should be visually a few millimeters outside the string. Typically the bow side edge of the pin housing should line up with the string.

10. Clicker

The clicker has two functions a) a draw length check and b) an audible release signaler. All Olympic Recurve bows come with the thread in the riser to fit a clicker and a clicker plate to accommodate the very long 120 grain points that thin carbon arrows use.

There are only two considerations with installing a clicker (other than it matching your draw length):

- The clicker should be as vertical as possible
- The clicker should extend to the bottom of the arrow shaft

Both points relate to consistent clicker operation. If the clicker is at a big angle to the vertical or the bottom end of the clicker is near the point of the pile then it's possible for the clicker to click not off the end of the point but over the curved face of the point end. Result is variation in the "click" draw length.

It's sometimes mentioned that the pressure of the clicker can affect the arrow behavior by pushing the arrow into the plunger or down onto the rest. These are in reality non issues on a practical level. The only feasible theoretical clicker pressure problem is where the clicker bends the arrow around the pressure button, but you need an arrow shaft extending a long way past the button for this to be significant. (A similar physical arrangement to the measurement of arrow shaft static spine).

11. Bracing height

At this point we now have everything installed on the bow and at long last arrow shooting can begin. The next item on the bow set-up list is the bracing height.

The bracing height is the perpendicular distance from the string to a fixed point on the riser. The fixed point is often quoted as the throat of the grip but have it wherever you want. In general the top of the pressure button is the most convenient point. Adjustment of the bracing height is made by changing the number of twists in the bow string. Adding twists increases the brace height and vice versa. A good initial position is to adjust the brace height so that the string comes off the limb just before/at the end of the string groove. This gives you a low brace height to start with. If when shooting the bow it is obviously noisy then add twists to the string, a few at a time, to increase the brace height until the noise reduces. Record the brace height setting so you can check it next time you assemble the bow.



12. Evaluation of the Set up

Having completed the basic set-up of the bow the next step is to add the arrow. The arrow has been selected from the manufacturers charts or local advice based on the (hopefully measured) archers' draw weight and draw length. Manufacturers don't make a continuously variable arrow series, there is a limited number of types of shaft of a given brand name so inevitably some adjustment to the bow is required to get the bow and arrow in sync. Changing archer draw length would require radical surgery so the parameter you change is the bow draw weight.

The initial bow set-up put the limb bolts near the centre of the range so we have plus or minus a couple of pounds draw weight to play with.

So how do we evaluate the set-up and how do we establish that we have a good enough set-up.

Checking Arrow Clearance

With modern metal/carbon fiber bows arrow clearance (i.e. the arrow making contact with the bow other than the initial pressure button contact) isn't much of an issue but it's worth checking if it is your first set of arrows and you don't really know if you bought the right ones.

The modern method, now quite widely available, is to fit a high speed camera on top of a target and film the archer shooting arrows from a few meters distance. You directly see any contact. A simple poor man's approach is to dust/spray the bow window (after removing the button) with foot powder/talc or apply lipstick to the edges of the fletchings. After shooting a few arrows then any contact can be seen by looking for the relevant tracks on the riser.

Minor fletching contact can often be resolved by a slight increase in bracing height. Major contact between the arrow shaft and the riser will require an adjustment to the draw weight.

Draw Weight Adjustment

The method used rather depends on the archer's level. A reasonably good archer (good bowman classification) would go straight to a 30 meter, 80 cm target, bare shaft approach and draw weight adjustment using bare shafts would be the preliminary to a basic bare shaft tune. (as a rough guide moving the bare shaft from white to gold needs about 3-4 pounds change in draw weight). The novice archer needs something simpler and probably doesn't have any bare shafts available anyway.

a) Align the sight pin windage

We have already put the pin in around the right place but worth checking as a wrong setting can confuse any other checks made when shooting arrows.

- Place a target at around 10 - 15 meters distance and on it place a vertical line (face edge/hanging string). Adjust the vertical sight mark position as appropriate.
- Being consistent about the position of the string image (sight picture) and not canting the bow, shoot some fletched arrows aiming at the line. Spread the arrows vertically on the line to avoid smashing them together.
- Adjust the sight pin in/out as required to move the arrows so they are hitting (or grouped about) the vertical line.

- Set the "zero windage" to the resulting pin setting or record value as appropriate to the sight.

Basically the sight pin is now set such the arrows leave the bow in the direction you are aiming. Don't move the sight pin windage from this point on. The "sight picture" is where the blurred image of the string lies with reference to the bow when aiming. It's one of those technique things you need to learn. By default align the string image with the bow side of the sight ring.

b) Adjust the Draw Weight

- Place the target (122cm assumed) at the maximum distance at which you get reasonably sized, identifiable, groups. (40,60,80 yards as appropriate)
- Adjust vertical sight mark position as appropriate for the distance. Do not adjust the sight pin windage.
- Shoot your fletched arrows at the target centre, again being careful about sight picture position and canting the bow.
- For a right hand archer if the estimated centre of the arrow group is to the left of the gold increase the draw weight. If the group centre is to the right of the gold then decrease the draw weight. Reverse of the above if you are a left hand. The aim is to move the centre of the group as close to the gold as possible.

How close to the centre you can get the group depends on your group size and the target distance. If your arrows are all over the target at 60 yards then your time should be spent improving your shooting technique not tinkering with the bow. As a rough guide to the minimum requirement for group centers; 40 yards – inside the 8 ring; 60 yards – inside the 7 ring; 80 yards – inside the 6 ring.

As regards an evaluation criteria of how good your bow set up is then the one suggested by FITA in its coaching manual seems reasonable. Their definition is that a good set-up is one at which you can start bow tuning. i.e. major factors like the draw weight are now fixed and small adjustments are made mainly to pressure button spring tension and the arrow nocking point with the objective of reducing the statistical spread of arrows (the group size) on the target. As a quantitative measure of having a "good set-up" FITA suggest having the bare shaft within 2 -3 inches of a fletched arrow at 20 yards. The group center positions in the draw weight adjustment methodology described above approximately correspond to this FITA criterion.

13. Bow Setup Data Sheet

Archer: _____ Date: _____

Riser:

Make: _____ Model: _____ Size: _____

Limbs:

Make: _____ Model: _____ Length: _____

Draw Weight: _____ Marked weight: _____

Overall Bow length: _____

String:

Material: _____ Strands: _____ Length: _____

Tiller Measurement:

Top: _____ Bottom: _____

Arrow Data:

Make: _____ Model: _____

Shaft Length: _____ Nock to Button Length: _____

Point Type: _____ Point Weight: _____

Fletching Type: _____ Position: _____

Nocks:

Type: _____ Size: _____

Nock Point Location: _____

Pressure Button:

Spring Tension: _____ Point Visual Offset: _____

Bracing height: _____

Stabilisers

Extender Length: _____

Long Rod Length: _____ End Weight: _____

Twin Rod Length: _____ End Weight: _____

Clicker Position: _____

14. Further Reading on the Web

<http://www.archersreference.co.uk/download.html>

The Archers Reference by Murray Elliot

A good introductory guide to all aspects of archery

<https://sites.google.com/site/archerybibliography/recurve-bow-setup>

A collection of web links to articles on Recurve Bow set-up