



EQUIPMENT SET UP RECURVE BOW

Archery Australia Inc
Coaching and Standards Committee

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EQUIPMENT SET UP

RECURVE BOW

It is important that equipment to be used must be set up correctly to allow the archer to obtain maximum accuracy and performance.

This article assumes a person has just purchased a new recurve bow and wants to set the bow up. This process is very straight forward and set out in clear steps that should be followed.

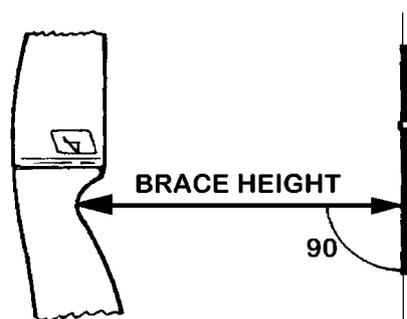
1. STRING LENGTH AND BRACE HEIGHT

Ensure the correct string length is being used. Usually these are purchased in lengths to match the bow length. By using the correct string this ensures the right amount of string is sitting around the recurve on each limb and the brace height is within the manufacturers specifications. Check the handbook that comes with the bow to ensure for the recommended brace height for a given bow length. This measurement can vary between brands and models.

The brace height of recurve bows is measured using a bow square. The brace height is the measurement between pivot point of the bow and the string measured at 90°.

The process for checking and adjusting the brace height is –

- a. Place the bow square into the pivot point of the bow (the throat or narrow part of the bow grip) and measure the distance to the bow string, keeping the bow square at right angles to the string for this measurement.
- b. Measure the brace height.
- c. If the brace height is too low (most common) unstring the bow and increase the brace height by putting 5 to 10 turns in to the string in a clockwise direction.
- d. Restring the bow and recheck the brace height. Repeat this procedure until the minimum recommended brace height is reached. Never put more then 20 to 30 twists into a string. If greater than this number is required you will need to replace with a shorter string.
- e. If the brace height is too high and the string has a large number of twists, you can lower the brace height removing a few twists thereby increasing the strings length. If the brace height is too high you will need to replace it with one which is longer.



Bow manufacturers recommend a brace height for each model and length of bow, but as a guide most bows fit within the following tolerances in brace height.

62" Bow	73/4 to 81/4	197mm to 210mm
64" Bow	8" to 81/2"	203mm to 216mm
66" Bow	81/4" to 83/4"	210mm to 223mm
68" Bow	81/2" to 9"	216mm to 229mm
70" Bow	83/4" to 91/2"	223mm to 242mm

Another method to determine the appropriate brace height is to measure the length of the bow and divide by 8.

Never use a bow with a brace height lower or higher than the tolerances specified. If you use a low brace height, this can damage the bow but most importantly can cause the string to hit the bow arm around the wrist. A bow with a high brace height can over stress the bow and cause damage.

2. TILLER AND BOW WEIGHT SET UP

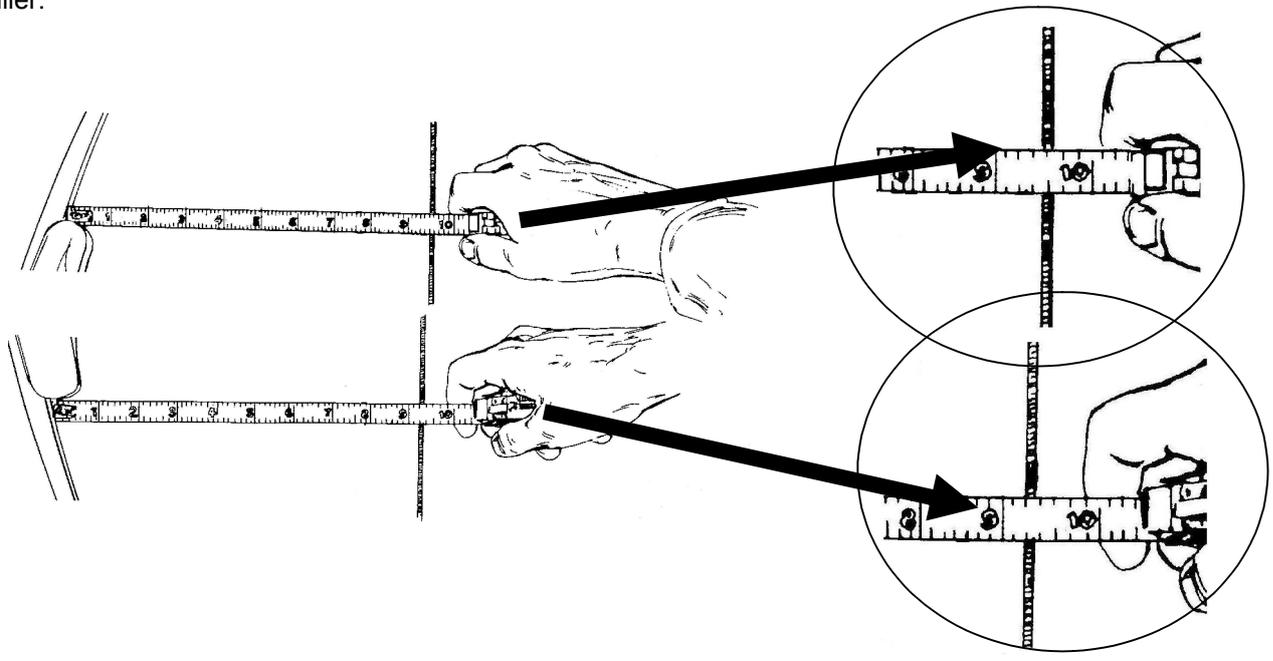
Most modern bows have the feature where you can vary the bows draw weight which in turn can change the bows tiller. To change the bow weight/ tiller you simply use an "Allan" key and screw in or out each limb. In to increase bow weight and out to decrease bow weight.

Ideally bows should be set up with the bow weight set in the mid setting.

The tiller is a measurement which indicates the weight difference between the top and bottom limb. It is important as the grip (pivot point) of the bow is usually in the centre of the bow but the arrow rest and nocking point are positioned above the centre. This means the bottom limb is longer than the top and should be set slightly heavier in weight to give a consistent bend at full draw.

The amount of tiller difference between top and bottom has an effect on the bows reaction upon release and the archer's ability to aim and hold steady at fully draw.

The amount of tiller difference will vary from archer to archer depending upon factors such as grip pressure, finger pressure etc. As a starting point, set the top tiller about 1/8" greater than the bottom tiller.



To set the tiller, firstly set the bow weight to the mid setting and then check the tiller measurement as shown above, remember we want the top limb measurement to be greater than the bottom limb.

Now screw the limb bolts either in or out until you obtain the required tiller (measurement). When doing this you may change the draw weight of the bow, to maintain the same draw weight, then make equal and opposite adjustments to the bottom limb, for example take one turn off the top limb and add one turn off the bottom limb.

This will change the tiller measurement but retain the same bow weight as you removing weight from the top limb and adding weight to the bottom limb.

Ensure you follow the manufacturers instructions when carrying out this adjustment. Some bows can be adjusted when strung while others must be unstrung to make adjustments.

3. LIMB ALIGNMENT

Most modern recurve bows come with the ability to adjust the bow weight/tiller and to adjust side-to side alignment of the limbs.

Most brands and models of recurve bows currently on the market have interchangeable limbs and risers. You can mix brands of limbs and risers, that is to say you can use one brand of riser with another brand of limb, as you need the ability to align the limbs and riser.

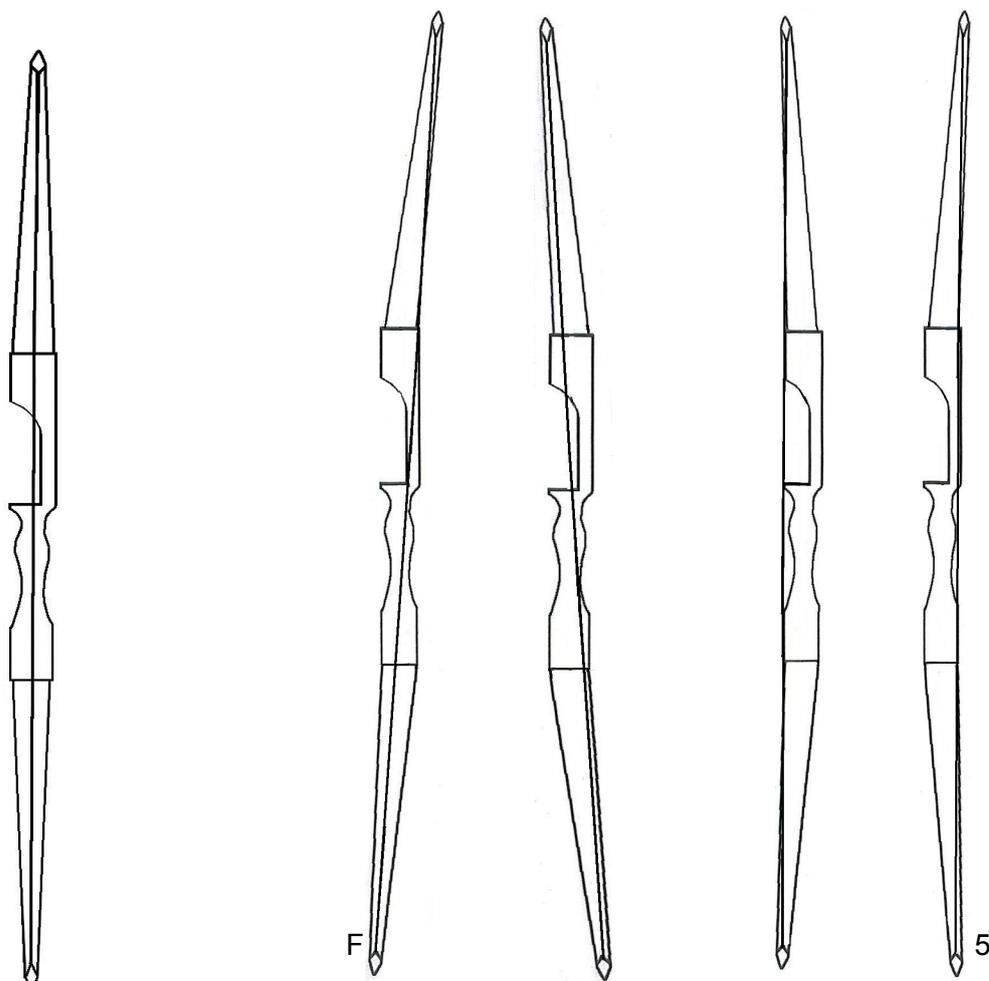
This ability to adjust side-to-side alignment of the limbs gives you the ability to accurately align of the limb and riser with the grip, increasing the bows accuracy. As part of the initial bow set up you should check this to ensure the bowstring sits down the centre of the each limb and (most importantly the centre of the grip) and that the riser is square to the bow string.

Each brand and model of bow comes with their own unique methods of aligning limbs and riser so you should carefully read the instructions which come with the bow.

To start, locate the centre of each limb. There are tools on the market for doing this or simply place a piece of tape on the face of each limb as it enters the riser, then measure finding the limbs centre and mark with a pen.

Align the limbs so the string passes through the centre of the upper/lower limb (using the marking on the limb) and the centre of the grip (fig 1).

It is very important that you give special attention to ensure that both limbs are not aligned so each limb is opposite each other (fig 2 and 3) or aligned equally or off to one side (fig 4 and 5).



It is very important that limbs are aligned straight and that both limbs are aligned with the centre of the grip.

You can also check this by placing a straight edge (arrow shaft, ensure it's a parallel arrow shaft and not a barrelled shaft) along the side of the bow window and the string. The straight edge should sit just inside the bow string (this is due to the fact that in most bows the sight window is cut just inside centre). If the straight edge is not square or sitting just inside the string this indicates the limbs are not aligned down the centre of the bow and grip.

You can also use the front stabiliser to assist in aligning the limbs and riser. The stabiliser mounting hole should be square to the riser so by fitting a stabiliser you can use this as a straight edge reference point for aligning the string

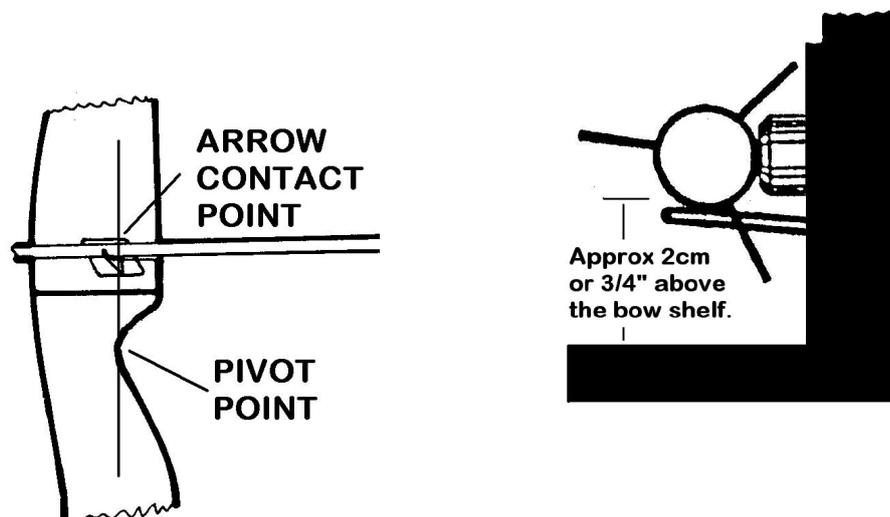
The process for checking and aligning the limbs is –

- 1) Stand the bow up (vertical as possible) on the lower limb supporting the bow by the front stabiliser. Stand behind the bow and align the string with the centre marks you have placed on each limb and the centre of the grip.
 - 2) Align the limbs using the instructions provide by the manufacturer (this will vary from brand and model of bow)
 - 3) Check that the string is aligned with the stabilizer and using a straight edge check the string is square to the riser (sight window).
- 3) By following the previous two steps listed, you will be able to adjust the-alignment of the limb and riser easily.

4. ARROW RESTS

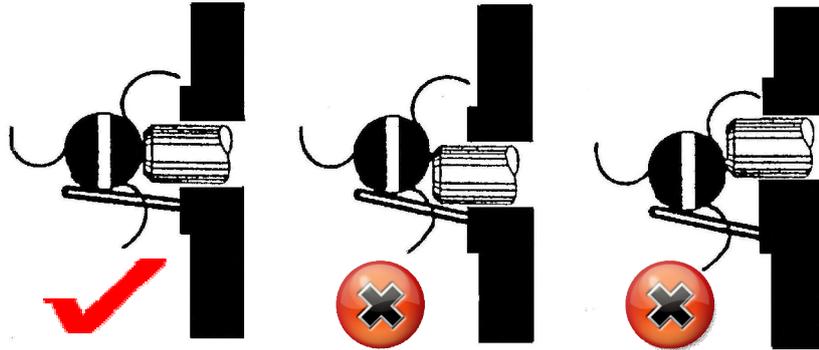
Arrow rests should be fitted to the bow window so the contact point of the arrow onto the rest is directly above the "pivot point" of the bow. Recurve bows usually come pre-drilled with a hole in the riser for the plunger button. If the riser comes with two holes always use the rear hole for the plunger button (the hole directly above the bows pivot point).

Always install the arrow rest before installing the "nocking points".

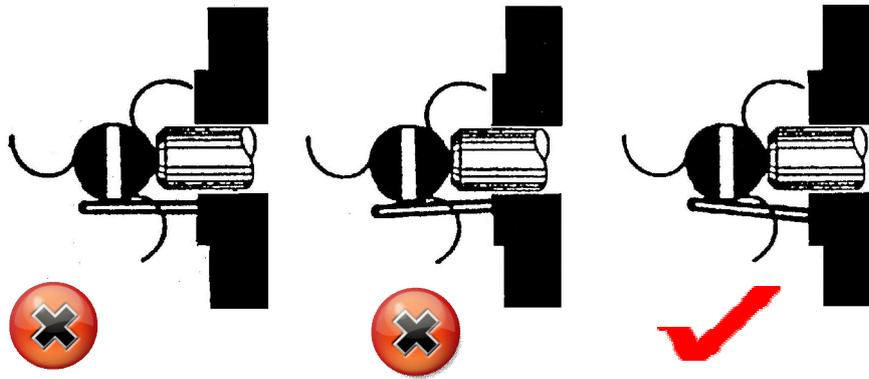


The arrow rest must be positioned correctly to ensure the arrow sits on the arrow rest square to the plunger button, this ensures even side pressure against the plunger upon release.

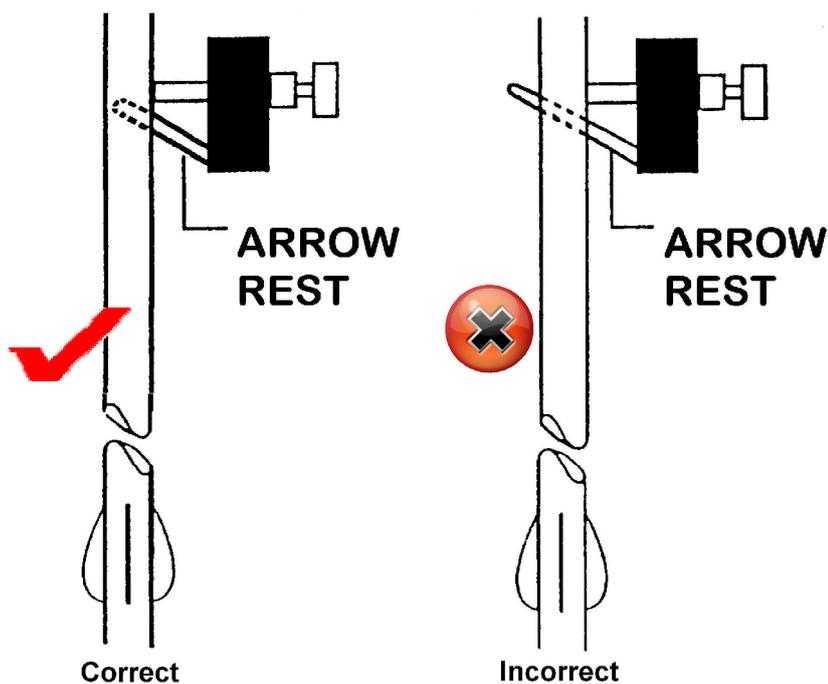
Install the arrow rest to ensure the arrow sits square against the plunger.



The arrow rest must also be positioned to ensure the arrow remains on the rest upon release and does not fall off the rest.



It is also important that a minimum amount of arrow rest arm protrudes out from the arrow; excess arrow arm may cause a clearance problem as the arrow moves forward.



5. NOCKING POINT AND NOCK FIT

To obtain consistent arrow flight, a point on the bowstring must be found at which the force of the string will act directly along the shaft of the arrow.

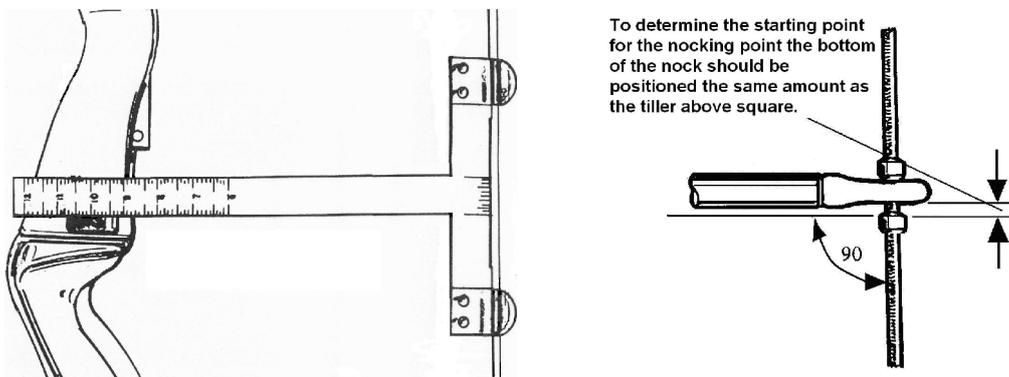
The archer holds the bow in the grip which is generally around centre of the bow with the arrow rest mounted above center of the bow. For this reason the bottom limb is usually heavier than the top limb, this is called the “tiller”. So the nocking points are positioned slightly above square to the arrow rest to balance the stresses on the limbs.

To determine the starting point for the nocking points, the bottom of the nock should be positioned the same distance above square as the bows tiller.

If the points are positioned too low the arrow will be forced down on the arrow rest upon release and cause the passage past the bow to be further complicated and cause undue wear on the arrow rest. It is therefore desirable to have a nocking point slightly higher than the arrow rest to avoid interference.

Setting the Nocking Points

- a. String the bow and set the string or brace height to within the manufactures recommended tolerances.
- b. Determine the bows tiller.
- c. Place a “Bow Square” onto the string and arrow rest.
- d. Using a marking pen, place a mark on the serving which is the same distance above square as the bows tiller, this represents the bottom of the arrow nock.
- e. Place an arrow on the string, locating the bottom of the nock on the pen mark and, using the marking pen, make another mark at the top of the nock. This represents where you will place the top nocking point.
- f. Now attach a top nocking point to the string.
- g. Remove the arrow and place a second nocking point onto the string leaving a gap of about 2mm between the bottom of the nock and the top of the bottom nocking point. This allows for movement of the nock as the string closes up when drawn back to full draw. You do not want the bottom nock point making excessive contact with the arrow nock.
- h. It is highly recommended that two nocking points always be used, a top and bottom nocking point.



There are two common types of nocking points used. A commercially available product called “Nok Sets” and a tie on type that only requires a length of bowstring serving material. Nok Sets are great for setting up the bow as they are easy to adjust but should not be used permanently, always use the tie on type of nocking points.

When setting up a bow it is important that the arrow fits correctly onto the string. Most nocks made are designed to snap onto the bow string but it is important the fit is not too tight or loose.

The nock should fit in such a way that it snaps onto the string but still has enough movement to freely slide up and down the string. As you draw a bow back, the string can rotate as you draw. The nock fit should be such as to allow this rotation without placing excess side force on the arrow.

You can carry out a simple test to determine correct nock fit. Firstly, place an arrow on the string and hold the bow in one hand so the arrow hangs down towards the ground. Now with your other hand using your thumb and first finger, rotate the string. The arrow should not move with the strings rotation but remain hanging. If the arrow moves with the rotation of the string then the nock fit is too tight.

Many brands of nocks come in two hole sizes - .88 mm and .98 mm also called small or large holes. Ensure you have selected the appropriate hole size that gives you a good nock fit.

You can also vary the nock fit by using different size serving material. Alternatively, you can increase the strings diameter by laying additional strands of string under the serving.

Never wrap material (usually dental floss or cotton thread) around the nocking point to build up the serving. This should be used as a temporary measure only and should never be used permanently. This material can quickly wear giving you a poor fitting nock.

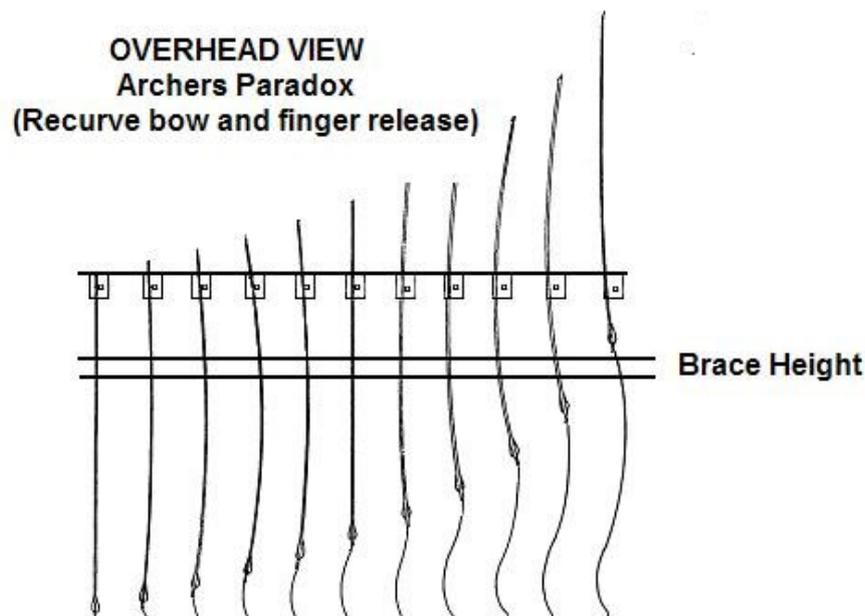
6. CENTRESHOT

Centreshot refers to the arrow sitting attached to the string and sitting on the arrow rest in the centre line of the bow.

As you shoot you want the arrow to travel forward in a straight line from the bow to the target. To achieve this, the arrow is not set up in centreshot, but initially set up with the point of the arrow positioned slightly outside of centreshot.

As you shoot and the arrow starts to move forward, the arrow initially places side pressure on the side of the bow. This is caused for two reasons, one is the rotation action of the release and the second is the flexing action of the arrow as it moves forward, this flexing action is known as the "Archers Paradox".

The Archers paradox initially pushed against the side of the bow for about the first 20 mm to 40 mm of the arrows travel. The arrow then moves away from the arrows rest and bow and it continues forward movement and clears the bow.

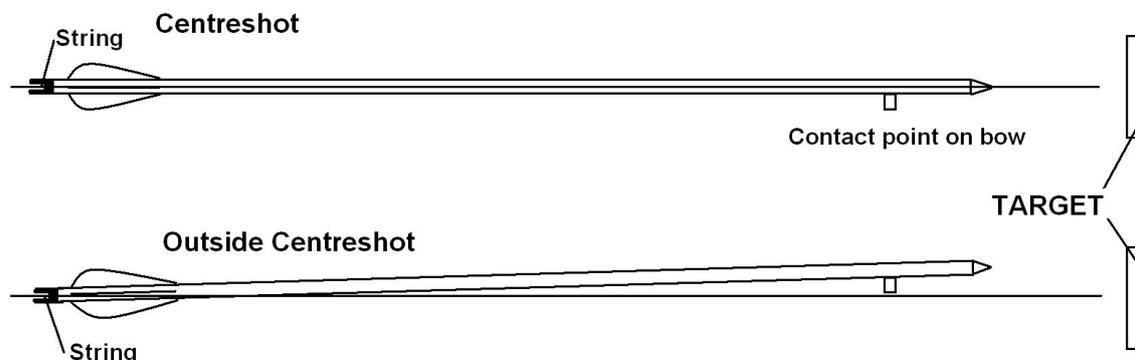


Most bows are fitted with a plunger button which is designed to initially absorb this side pressure allowing the arrow to move into centreshot as it commences its forward movement.

To achieve this, the arrow is set up so as at brace height it sits just outside (1/2 an arrow width) of centreshot as the arrow starts to move forward.

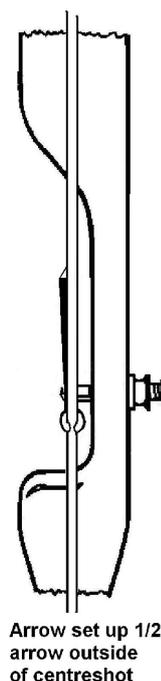
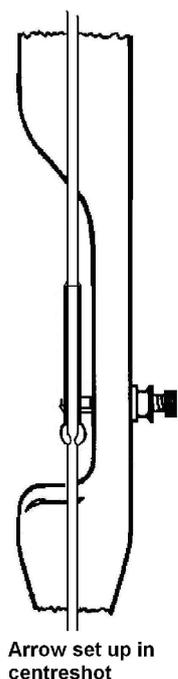
This is the best location to initially set up a recurve bow particularly for a new archer who is not skilled enough to undertake a detailed tuning process.

How you achieve the final set up and position of centreshot will depend upon the method you use.



To set centreshot -

- 1) Stand the bow up with an arrow on the string and rest. Place under the clicker if one is being used.
- 2) Standing in front of the bow line the string down the centre of the bow, it may be necessary to measure centre and mark on the bow limbs. To do this place a piece of tape on the top and bottom limb just above and below the handle. Measure the centre of the bow and mark.
- 3) Lining up the centre lines with the string, observe the position of the arrow point in relationship to the string.
- 4) Depending upon the tuning method you plan to use, either set the bow in centreshot or 1/2 arrow outside of centreshot
- 5) Now carry out the process of tuning following the recommended tuning method.



7. CLICKER

The use of a clicker is vital for consistent shooting. It is used as a trigger to shoot, in simple terms when it clicks you release. In saying this, you need to develop a shooting technique that allows you to control the shot and the clicker.

To use a clicker all arrows **MUST** be cut to exactly the same length.

The release should be a surprise and there should be no conscious thought in executing the release.

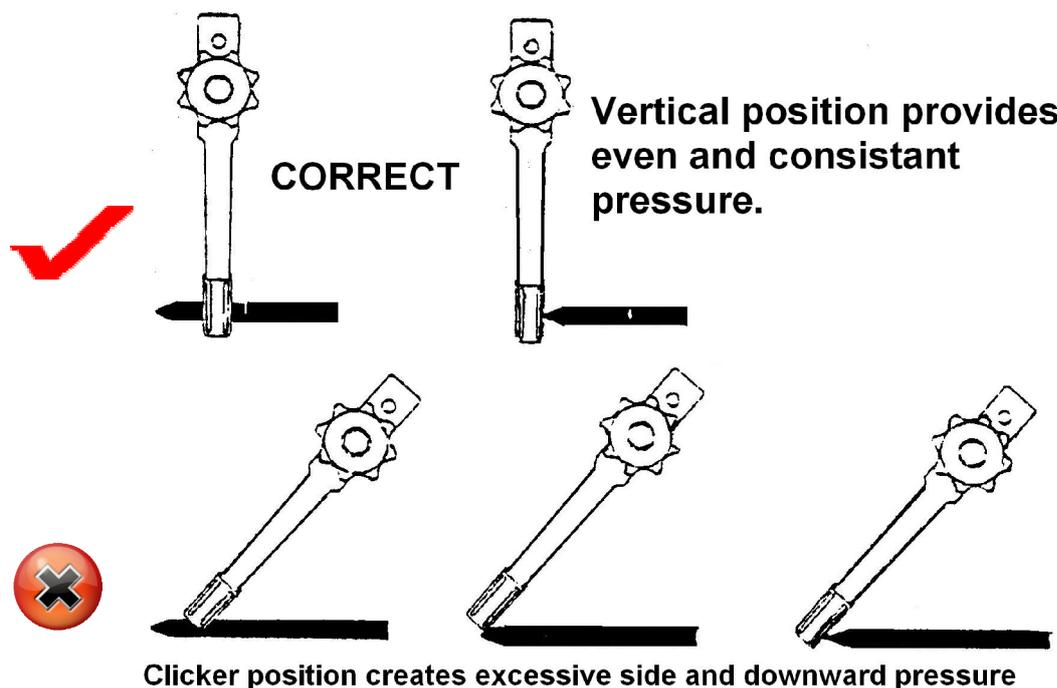
The clicker removes the need to think about releasing the arrow. The clicker is the signal for release.

To use a clicker, the arrow is placed under the clicker and drawn. When at full draw there should be about 1mm to 2mm of arrow point under the clicker. As the archer sights and finalises the draw preparing to release back tension is increased and the arrow comes through the clicker making an audible clicking sound. This is the signal to release the arrow.

When setting up the clicker it is vital that the clicker is mounted so as it does not place excessive tension (down and/or to the side) on the arrow (at full draw) which will cause the arrow to bounce (fall) off the arrow rest as the clicker "goes off". Also the arrow should not be held on the rest by the tension of the clicker, if it is this could be a result of excessive side pressure on the arrow at full draw due to finger pressure caused by the twisting of the hand or finger contact with the arrow. Use a tab finger spacer and check finger position on the string.

Ideally, the clicker should be positioned as vertical as possible and not sit on the top half of the arrow placing excessive downward pressure.

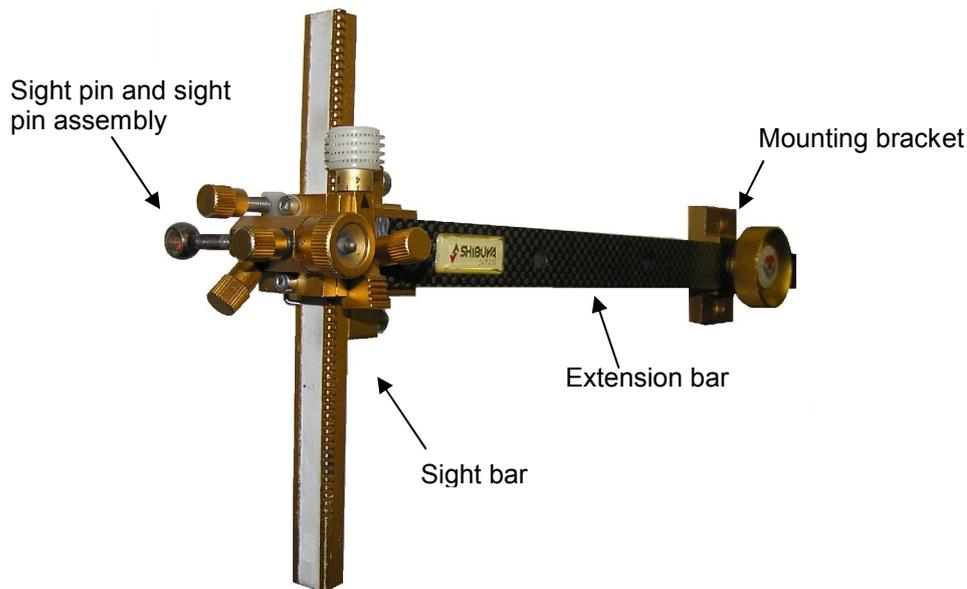
Clicker angle and tension



8. BOW SIGHT

On most bows the sight is attached to the riser on the opposite side of the arrow rest. Most sights are designed to have an extension bar which places the sight pin in front of the bow. On front of the extension bar and holding the sight pin assembly is the vertical sight bar, which allows the sight pin assembly to move up and down for elevation.

The front sight bar must be set up to ensure it is vertical to the bow string. Usually the sight bar is attached to the extension bar with two screws which can be loosened to allow the sight bar to be adjusted.



The best method for vertically setting the sight bar with the bow string is to:-

- 1) Lay the bow (strung) on a flat service.
- 2) Using a "Builders String Level" attached to the string, pack up either end of the handle until the string is level.
- 3) Without moving the bow take the "Builders String Level" and place on the side of the bar.
- 4) Now loosen the screws holding the extension bar to the sight bar and adjust until level, retighten the screws.

The sight bar is now level with the bow string.

You should now ensure the sight pin is set up so it is 90° to the sight bar. Using a square, check that the sight pin is square to the sight bar, if not there are usually two screws in the front of the sight pin housing, simply loosen these screws, square the sight pin and retighten screws.

9. TUNING YOUR BOW

For many people particularly a new archer the basic set up described above is sufficient to allow them to shot and to improve on their skills and ability.

Once an archer has been shooting for a reasonable amount of time and has gained a reasonable level of accuracy and ability it is then time to undertake tuning the bow.

To do this follow the Archery Australia recommended method of tuning for recurve bows the Recurve Tuning Method.

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Technical Information by James Park and Jim Larven