EQUIPMENT SET UP
COMPOUND BOW

Archery Australia Inc
Coaching and Standards Committee

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COMPOUND 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 compound 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

Compound bows come set up from the factory and you should not make any adjustment to string length or brace height.

Such changes will take the bow outside the manufacturers design specifications and may affect the bow weight range and draw length and also void any warranty.

2. TILLER AND BOW WEIGHT SET UP

All compound bows come with the facility to can change bow weight and tiller set up. For most bows the bow weight range is around 10 lb.

With most modern compound bows, by changing the bow weight you do not change the draw length. With older style compound bows as you changed the draw weight you also changed the draw length and alternatively when you changed the draw length you changed the bow weight.

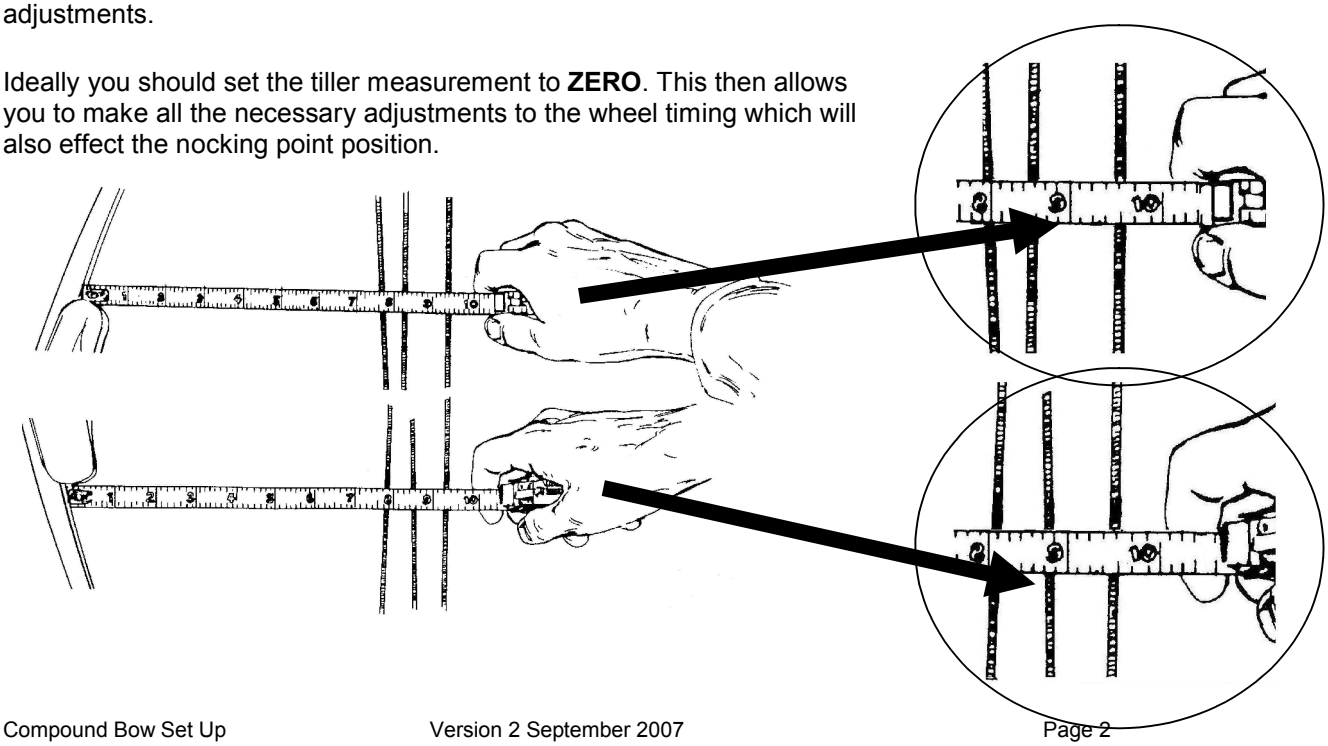
To change the bow weight/ tiller you simply use an “Allan” key and screw in or out each limb, in too increase bow weight and out too decrease bow weight.

Compound bows work more efficiently when set at or close to the maximum weight.

Set the bow weight at your desired 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.

With compound bows there a three adjustment points, tiller, cam (wheel) timing and nocking point. If you change any one of these you will change the other two, so it’s best to only make controlled adjustments.

Ideally you should set the tiller measurement to **ZERO**. This then allows you to make all the necessary adjustments to the wheel timing which will also effect the nocking point position.



3. ARROW REST AND BALANCED LIMB CENTRE

Arrow Rest

Unlike a recurve where the arrow pushed against the side of the bow upon release the action of the arrow from a compound bow (shot using a release device) is downward, this is due to the action of the cams and wheels.

Arrow rests for compound bows principally come in three styles, rigid, downward spring actions and drop-a-way.

Which one is best is a personal choice.

RIGID (Blade type) REST

The rigid rest has a blade (with slight downward spring actions), simple, reliable and accurate, used by many top archers. You can experience clearance problems with the tail of the arrow striking the arrow rest as it moves past the rest.

SPRING REST

This is possibly the most popular style rest. It has an arm which is spring loaded downward and moves down as the arrow moves forward. Simple and easy to use but you can experience clearance problems with the tail of the arrow striking the arrow rest as it moves past the rest.

DROP AWAY REST

The drop-a-way rests design has the rest lifting into position as the archer draws and then dropping away as the arrow moves forward giving a clear path for the arrow. This rest gives good arrow clearance but it is critical that the rest lifts early in the draw and drops late in the passage of the arrow past the bow. If the rest drops too early the result can be variable low arrows.

Arrow rests can also be described as “Shoot Through” or “Shoot Over”.

“Shoot Through” usually means (found mainly on the spring loaded rest) the arrow rest can have two arms and the arrow sits between the arms. In this case the “Index” fletch of the arrow must be positioned **DOWN** when the arrow is nocked on the string, this allows for fletch clearance as the arrow passes the rest.

“Shoot Over” can be found on both the rigid and spring rests. The “Index” fletch of the arrow must be positioned **UP** when the arrow is nocked on the string, this allows for fletch clearance as the arrow passes the rest.

Drop away rests can be either “Shoot Through” or “Shoot Over” design. Ideally you should position the arrow with the index fletch pointing up but in theory the rest should have dropped away as the fletches pass and clearance should not be a problem.

Ideally arrow rests should be fitted to the bow window so the contact point of the arrow on the rest is directly above the “pivot point” of the bow. Recurve bows usually come pre-drilled with hole in the riser for the plunger button.

Balanced Limb Centre

Unlike recurve bows, arrow rests on compound bows are not set up in centreshot but should be set up in the “Balanced Limb Centre”.

To find the “Balanced Limb Centre” :-

1) Place a piece of tape on the inside of each limb as it leaves the riser. Accurately measure and determine the centre of the limb (drawing 1), now place a pen mark on the tape for the centre of the limb, on a recurve bow this would be the centreshot.

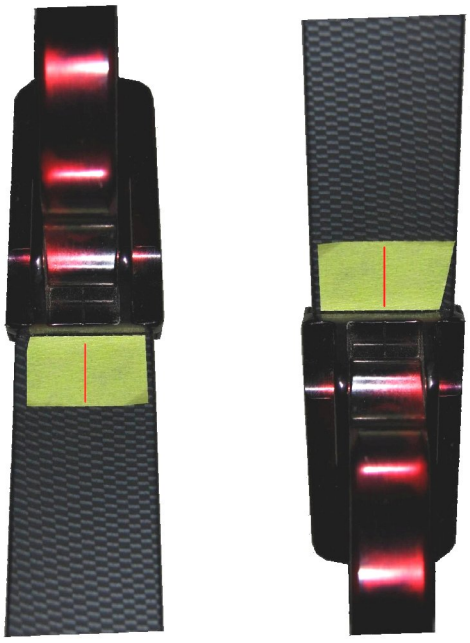
2) Next measure and determine the limbs centre at the top and bottom of each limb (see A in drawing).

3) Now measure the difference between the centre of the limb and the centre of the string (see B in drawing 2), on most bows this will be about 3/16” or 4.8mm.

4) Now place a pen mark on the tape which will indicate the difference between the centre of the limb and the string (drawing 3).

5) This second mark is the “Balanced Limb Centre” and should be used as the reference point for setting up the rest.

Drawing 2



Bottom Limb **Top Limb**

Drawing 1

Bottom Limb **Top Limb**

Drawing 3

For single cam bows carry out the same test using the single cam. As the string on many single cam bows sits at an angle across the bow, set the rest up using the "Balanced Limb Centre" marks as a best guess.

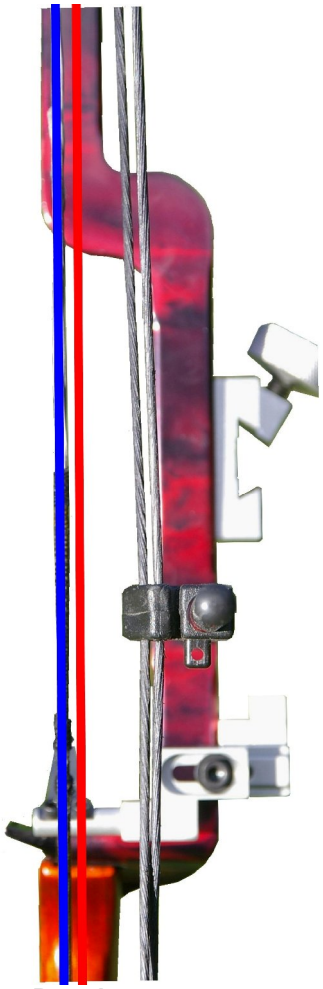
To set up the arrow rest: –

1) Stand the bow up (with the long stabiliser attached and acting as a support) vertical with an arrow attached to the string and on the arrow rest.

2) Stand behind the bow and line the string down the "Balanced Limb Centre" marks on the limbs, observe the position of the arrow shaft and point in relationship to the string.

3) Adjust the arrow rest position so the arrow is centred to the bow string.

4) The arrow rest has now been correctly adjusted with the string.



Drawing 4

The other point that must be considered is the position of the arrow rest in relationship to the bow shelf.

Arrow rests on recurve bows are usually set up in relationship to the mounting holes used for the plunger button.

This is the reason why we must have the nocking point mounted above square on a recurve bow. The centre of most recurve bows is the grip where the hand touches the bow, but the arrow rest is mounted high on the riser to allow for adequate clearance for the arrow. Effectively this results in the top limb being shorter than the bottom limb.

This is why we then must have different tillers on recurve bow limbs. The bottom limb must be slightly heavier in draw weight (giving a smaller measurement) then the top limb.

Most compound bows are made in the same traditional manner as recurve bows. That is the centre of the bow is the grip (drawing 5) with the holes which are used to attach the arrow rest position is the same point as a recurve bow. The common practice is to have the centre of the arrow sit over the centre of these holes the same as a recurve bow.

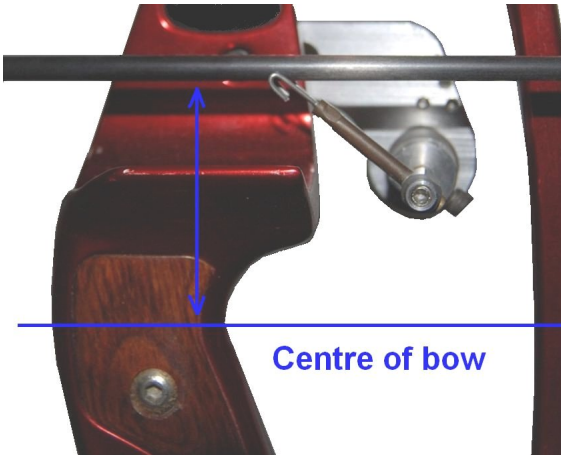
In more recent times some compound bow manufactures have changed this practice and are making the centre of the bow just above the arrow shelf and moving the mounting holes for the arrow rests lower toward the bow shelf.

Why is this important? When we tune a compound bow we want to have both cams reach full draw together and ultimately move forward together and release the arrow at the same time reducing up or down forces on the arrow. By having the centre of the bow and the arrow close together makes timing the cams much easier.

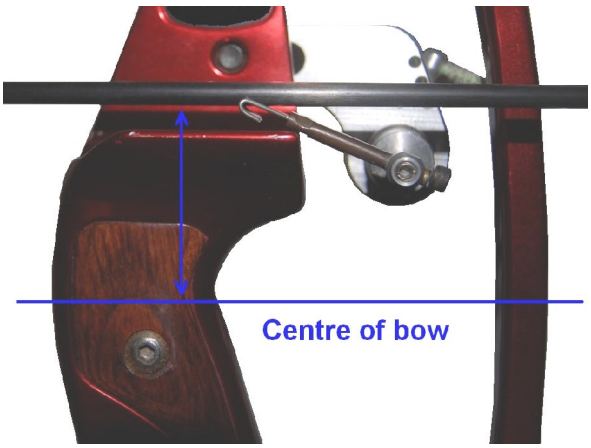
If your bow is manufactured with high arrow lower rest mounting holes, there is nothing stopping you adjusting the arrow rest lower and closer to the bow shelf bringing the arrow closer to the bows centre, of course you need to ensure you obtain clearance for the arrow as it passes the bow upon release.

In many cases the lower you can install the arrow rest toward the centre of the bow the easier you will find the cams (wheels) can be timed.

For single cam compound bows the same principle applies, although for a slightly different reason. With single cam compound bows you don't have to worry about cam (wheel) timing but you do need to ensure the arrow is leaving the bow in a straight line and not with an up or down action. It is much easier to obtain straight nock travel when you have the rest as close to the centre of the bow as possible.



Drawing 5



Drawing 6

Of course we need to ensure there is no interference with the arrow rest and bow shelf and the arrow has clearance as it passes the bow.

4. NOCKING POINT AND NOCK FIT

Nocking Point

Now that you have set up the arrow rest it is time to set up the nocking point.

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 upon release.

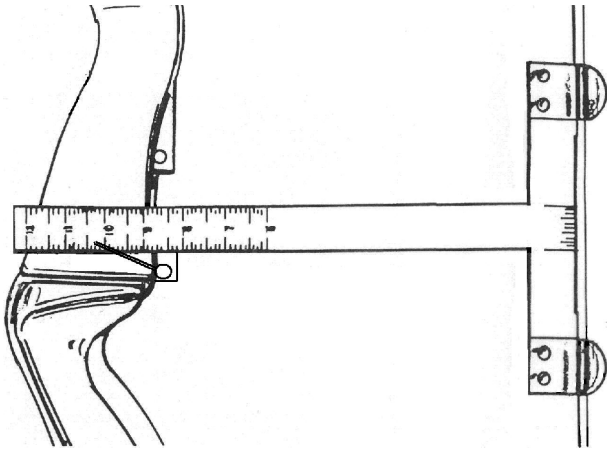
Initially this is only a temporary setting as it may change as you time the cams and carry out tests to determine the correct nocking point position.

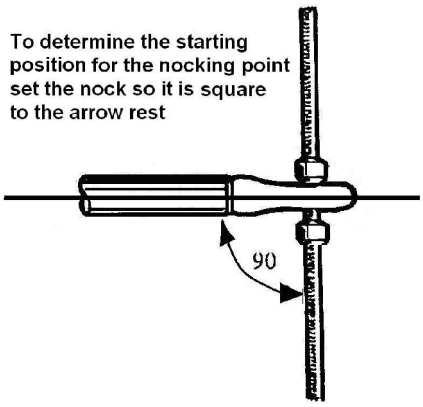
Setting the Nocking Points

a. Place a “Bow Square” onto the string and arrow rest, taking into account how the arrow sits on the arrow rest.

b. As a starting point, install the nocking points so the centre of the arrow is square to the arrow rest or slightly above square.

c. It is highly recommended that two nocking points always be used, a top and bottom nocking point.





There are two commonly used types of nocking points, a commercially available product called “Nok Sets” (made of metal) and a tie on type that only requires a length of bowstring serving material to be applied.

“Nok Sets” are very popular when setting up equipment as they are easy to move, but tie on nocking points are recommended for long term use.

Refer to the Archery Australia “How to Manual” to find directions on tie on nocking points.

String Loops

String loops have become very popular in recent years. Usually the release device has a string loop which fits around the string and onto the release jaw to hold the string.

String loops replace the string loop on the release device and are attached directly to the string. The jaws of the released device then attach to the string loop.

There are two different loop designs. One that attaches to the string on each side of the arrow and one that attaches to the string below the arrow.

It is important that you use string loops in association with nocking points, never use a string loop on its own.

The theory behind string loops, particularly the one that attaches above and below the arrow, is that the string is being drawn directly behind the arrow and not below the arrow which is the case with the loops attached to a release device.

It is believed that string loops reduce string wear, give a more direct draw behind the arrow and if there is the need to let down the arrow remains in the string, it is common for arrows to fall of the string when being let down.

Refer to the Archery Australia “How to Manual” to find directions on attaching string loops.

Nock Fit

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. It is important that the fit is not too tight or too 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.

This is particularly important on compound bows as the string rotation will affect the “Peep Sight”

Many brands of nocks come with two hole sizes, .88 mm and .98 mm also called small or large hole. 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 laying additional strands of string material 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.

5. CABLE GUARD

Compound bows come fitted with a "Cable Guard". These are fitted either at the lower half of the riser or more commonly on the upper half of the riser.

Cable guards are designed to keep the cables under tension and away from the path of the arrow as it moves forward.

Many cable guards are adjustable and you should make the necessary adjustment to ensure adequate clearance as the arrow moves forward but you should also ensure you do not have excessive side force on the cables.

Cable guards are also fitted with a "Cable Slide" these are designed to hold the cables and to keep the cables apart to eliminate wear.

6. DRAW LENGTH

At this stage in the setting up of a compound bow you should set the draw length. Each brand of bow and model may have different methods of adjusting draw length such as adjustable modules or replaceable modules.

Some brands have no adjustment and to change draw length you must purchase different size cams and cables which can be an expensive exercise. When purchasing one of these bows you must know exactly the draw length you require.

Follow the manufactures instructions for changing draw length. With most brands of compound bows you can make draw length changes without the need to take any pressure of the bow.

7. Peep Sight

The next step is to install the peep sight. Peep sights sit between the strands of the string. To hold the peep in the string we attach moveable knots to either end of the peep sight.

To install –

1) Split the string evenly in half. It may be necessary to place the bow in a bow press to remove tension off the string to enable you to do this.

2) Draw the bow back to your anchor point and move the peep up or down until you can clearly see through the sight.

NOTE - Unlike recurve bows, the anchor point using a compound bow and peep sight, floats and is in a different position on the face for each distance. At long distance the anchor is low on your face and at short distance is high on your face. For comfort it is recommended that you set the peep sight aiming at a mid range distance.

3) Now tie the peep into the string by tying knots above and below the peep. Don't tie around the centre of the peep it is not necessary and will prevent you from making adjustments later to ensure the peep is always square to your eye when at full draw.

It should be noted that the manufacturer of peep sights recommends that they be tied around the centre but this is not necessary.

4) The peep sight is now installed. You will possibly find as you draw the bow back the peep will rotate. This is normal and it may be necessary to make adjustments to prevent this from happening. Ideally the peep should be square to the eye at full draw, you should be looking through a perfect circle.

If not, to correct, pull the knots apart holding the peep in place and move one or two strands from side of the peep to the other, changing the balance of the string. Now move the knots back into place and try again. This is a trial and error process, there is no set method as to which way you should move the strands.

Points to consider: –

1) The fit of the nock on the string will affect the rotation of the peep sight.

2) When moving strands from one side to the other use a tool that will not cut or damage the string. A piece of arrow shaft about 100 mm long with an Easton G nock fitted to the piece of arrow shaft works well, as the ears of the nock are smooth and will not damage the string material.

QUESTION – Why do peep sights rotate?

There are many different opinions and theories related to this question many relate to the manufacture of bow string and the tension of each individual strand. But these theories are not correct. The simply explanation is the cables and string are under tension up to the point where the cams (wheels) roll over. At this point the cables maintain their tension (and in most cases increase the tension) but the string looses tension very quickly due to the let off and the result is the string rotates due to this loss of tension.

Just like tying a piece of string to a stationary object and pulling the string tight, then have someone cut the string and when the tension is quickly released the string twists and flexes as the tension is removed from the string. The same applies to a bow string although maybe less dramatic, as the tension comes off the string the string twists as a reaction to the loss of tension, it is unavoidable but can be controlled.

In the old days when Dacron strings were used on compound bows the twisting was not consistent and difficult to maintain a square peep sight. But with the modern non stretch strings the twisting is consistent and predictable.

It should be noted that changes in temperature and humidity over a days shooting can change the amount of rotation of the string. With practice, this can be corrected simply by pulling the knots (holding the peep sight in the string) apart and moving one or two strands from one side of the peep to the other, remembering to move them back after shooting.

8. WHEEL/CAM TIMING

The critical element of setting up and tuning a compound bow is timing of the cams (wheels). Ideally both cams (wheels) should reach full draw at the same time and move forward together reaching brace height and releasing the arrow at the same time.

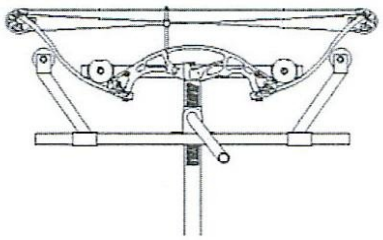
It should be noted that cam (wheel) timing is usually not required with single cam bows. These are self aligning although it is necessary to ensure the limb tiller is correct so the handle is vertical when at full draw.

To check wheel timing draw back the bow with the release device and observe the cams as they come to full draw. Both cams should arrive at full draw and roll over together, if not then you need to make adjustments.

Place the bow into a bow press and remove tension off the bow.

Remove one of the cables from the cam (wheel) and either add or remove twists as required.

Replace cable on cam (wheel) and remove tension and re-check timing again.



Before you check the timing again it is important to reposition the nocking points as they may have altered position in relationship to the arrow rest.

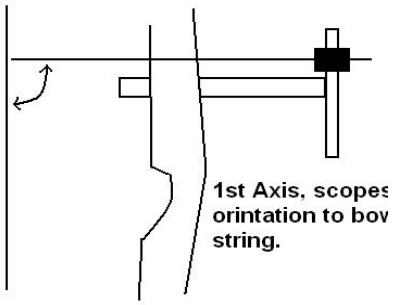
You must check and if necessary re-adjust the nocking points after each time you add twists to the cables.

9 BOW SIGHT

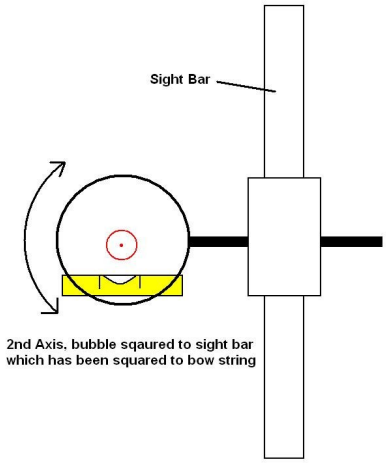
Compound bows use a sight and scope combination. The scope is a magnifying sight with a bubble level to help in holding the bow vertical.

You need to set the sight up to ensure the sight bar and the bubble is square to the bow string.

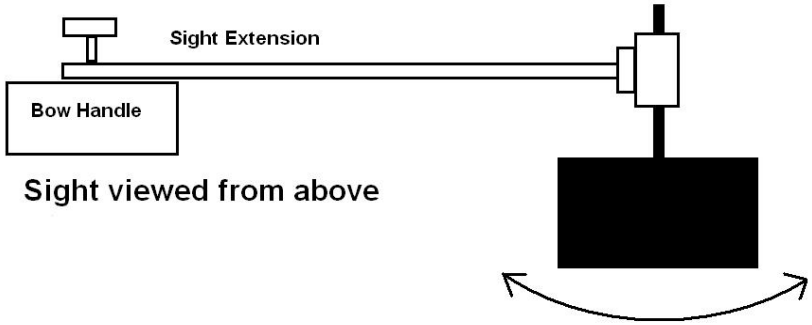
Scopes have three axis planes and these need to be set up to ensure accuracy.



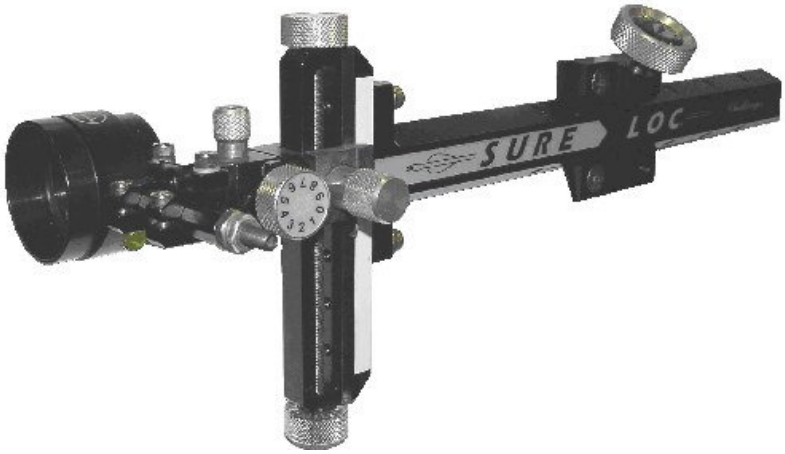
1st Axis — This is the basic axis and relates to the scopes orientation to the string. Ideally the scope should be aligned to the peep sight position at full draw so it may need to be angled about 2° to 4° above square.



2nd Axis — This is the most critical of the three axis adjustments as it effects day to day shooting. The 2nd axis relates to the bubble being square to the sight bar and bow string. If the bubble is not square to the sight bar you will get inconsistent left to right arrows.



3rd Axis This axis is critical when shooting up and down hills such as in Field Archery and relates to the scope lens being square to the eye.



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

1) Fit the scope onto the sight, and set the 1st axis.

2) Lay the bow onto a flat surface, a table or bench.

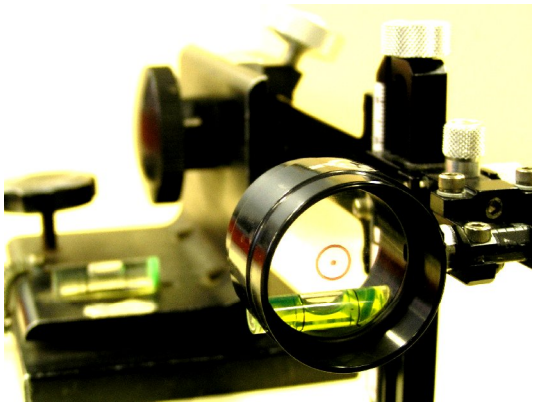
3) Using a "Builders String Level" attached to the string and pack up either end of the riser until the string is level (picture 1)

4) Without moving the bow's position remove the "Builders String Level" from the string and place on the side of the bar.

5) Now loosen the screws holding the extension bar to the sight bar and adjust until level. Retighten the screws (picture 2).

   The sight bar is now level with the bow string.

6) The next step is to set up the 2nd axis. Ideally you should have a scope levelling device to do this but you can use a straight, vertical surface.



   Adjust the scope in the 2nd axis until the bubble is square with sight bar (picture 3).

7) The final step is to set the 3rd axis, but not all bow sights come with this feature. To check the 3rd axis raise the sight to about 30° and then lower to about 30°. Check the bubble is still level, it may vary in the 3rd axis from the 2nd axis. Make the appropriate adjustments to set the bubble in the centre at the 3rd axis. Adjusting the 3rd axis will not change the 2nd axis setting, although this may depend upon sight design.

Picture 4

10. TUNING YOUR BOW

Where to from here?

For new archers setting up their first bow this should be all you need to do. The bow has been set up and is good enough to shoot and for them to gain experience and raise their ability.

If you wish to tune your bow further you should follow the “Paper Test” method to check and fine tune the bow, but it should be remembered the results you obtain are directly reflected by your ability and your shooting standard. Before making major changes and adjustments to your equipment always check for clearance and in particular your shooting technique.

Written and images by Jim Larven

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