

The setting up and tuning of a Compound bow

Malcolm Grant January 2005

Firstly: there are several cost and design differences to be considered when deciding on an individual archer's equipment.

Budget:

These notes are aimed at the archer who after a short time in the sport, seeks to learn about setting up and tuning a Compound Bow. This may involve a higher level of financial commitment.

Eye Dominance

Check to see which eye is most dominant. It is usual to shoot with the dominant eye over the arrow nock. This will determine which hand will be holding the bow. Some people have an inability to shoot the usual way and may require assistance to overcome their difficulties.

Style of Compound:

Is the compound bow to be shot using a release aid, or by using the fingers?

For this article I will be assuming that a pistol grip Release aid and "D" loop is to be used.

The bow's draw weight and draw length, axle to axle length, reflex or deflex handle design, as well as determining the style of camsingle cam, twin cam or a hybrid cam, are all to be considered. Also, you can choose either a shoot through or cable guard system.

Before and during set-up *always record the measurements of and changes to* the bow.

Cable guard position

The cable guard needs to be checked and if necessary, adjusted to give the arrow fletching the clearance it needs, but not so great that unnecessary torque is put on the cams.

Set the correct draw length (this is crucial)

The draw length can be adjusted by several methods:

By using draw length modules where they are available.

By adjusting string length

By adjusting cable length

All these methods should take into account the parameters of the manufacturers recommended limb pre-bend and cam options.

The draw length should be comfortable to the archer and be such that a definite reference point at full draw allows a good draw force line. The front shoulder should remain correctly placed and not be pushed upward. Allow room in the draw length for the draw elbow to continue with the backwards pressure, needed to activate the release aid.

n.b. It may be possible to shoot comfortably at more than one draw length. Some top archers will change their draw length slightly for shooting indoors and shooting outdoors (*article by George Ryalls IV: Glade Summer 2004*)

Release aid

Decide which type of release aid you intend to use. If you are to use a pistol grip type, you also have to decide whether to use a rope on the release or whether to use a “D” loop on the string.

Draw weight

After setting the draw length by using any modules or alternative pegs on the cam (s) Firstly wind the limb bolts *fully in* to give maximum poundage. Then *wind out* both top and bottom limb bolts an equal amount of turns so that the number of turns out can be counted and recorded. (**Warning: Manufacturers will state the maximum number of turns out of the limb bolts to ensure safety**) Do this until the peak weight has reduced to your required setting. Don't forget to use any locking mechanism to keep the setting.

Don't be narrow minded and determined to shoot at a “macho” high poundage just for bravado. Keep the weight comfortable and suitable for the *best arrow performance*.

Generally shortening cables will increase limb bend and poundage and possibly increase the draw length. It may be necessary to twist the cables to correct the cam alignment.

Remember that adjusting any of these will mean that the whole bow's relationship will have to be checked.

Tiller

The tiller of both bottom and top limbs needs to be checked and if needed, one or other of the limb bolts screwed in or out to give about even tiller. Start at the manufacturers recommended settings. (On solo cam bows you may need to measure the tiller to a line stretched between the axles, rather than to the string).

The tiller needs to be checked again when any stabilisation is added. The bow needs to hold steady at full draw and neither pull down or float up when on aim.

Changing the tiller may affect the related cam timing and therefore also the nocking point position.

Arrow rest

Put on your chosen arrow rest and set the height to put the chosen arrow at around the button position and centre shot about $\frac{3}{4}$ ” out from the sight window. The centre shot position can also be measured from the edge of the limb to the string track of the cam, with a ruler. Transfer this measurement to the inside of both the limbs near the pocket and make a mark on masking tape. Now align the string from the arrow nock and position the rest in the same plane. Affix a temporary nocking point to put the bottom of the arrow about square to the string from the arrow rest. Tie on your “D” loop.

If using a *Launcher type* rest it is best to *start* with the spring tension just strong enough to hold up the weight of the arrow.

If using a *Drop away* rest it needs to be adjusted so that the rest lifts up about one and a half to two inches from full draw. (Conversely it will drop away soon and quickly on release)

Cam Timing

Now the synchronisation (timing) of both cams should be checked.

If an adjustment is needed, a bow press may have to be used to allow twists to be put in or taken out of one or both cables.

n.b. Use a bow press with great care and only after receiving lessons from a person with experience in using a bow press!

Peep sight

A peep sight has now to be put in the string.

The approximate height of the peep can be ascertained with the help of another archer watching you draw the bow to the full draw reference point.

Make sure that the peep is put into the string with an equal amount of strands on each side, and so that the angle is set correctly and square to your eye. Always tie in the peep for added safety.

You may find that the full draw / peep references change slightly from extreme short distance to extreme long distance. Find the most comfortable average positions.

n.b.

Whilst tuning later on, one or all of these steps may have to be repeated.

When the draw length, draw weight and these other adjustments are satisfactory, then check by using the charts that you have the most suitable arrow spine for your settings. Test shooting will confirm if the correct arrows are being used.

Sight mounting

Make sure that the sight is securely mounted and that the extension bar is square and the elevation bar is set truly upright and square when the bow is truly square.

The scope should be adjusted so that it is square to the eye and the bubble is level.

The third axis also needs to be checked and set so that when elevating the bow (particularly when field shooting) the bubble stays truly level.

It is worth experimenting with the sight extension position. There will be a certain distance from the bow that seems to give the clearest sight and also possibly affect the perceived torque of the bow at full draw.

When setting the centre shot of the scope at brace height, it may be that the increased pressure put on the cable guard, by the cables at full draw will affect the centre shot position. (unless shooting a “shoot through-split cable” system). The full draw centre shot position is probably the best position to use.

i.e. The scope centre may seem to be left of centre at brace height but will *become* centre shot at full draw. (For a RH archer)

Bow sling

By using a bow sling the archer is secure in the knowledge that as the bow jumps forward from the relaxed bow hand upon release, the bow will not drop to the ground.

This would in itself allow even more relaxation of the bow hand.

The choice and fit of a bow sling could make some difference to your shooting performance

If using a wrist sling, make sure that it is not so tight as to pull the bow hard into the hand. Also not so loose that the bow drops from the hand and lands on the ground.

About half to three quarters of an inch play should be about right.

Some prefer to use a finger sling. There are some who think this is a preferable type.

There can be no wrist strap induced torque with this type.

The fit of the sling should allow the archer to place the bow hand in the correct position with no hindrance.

Don't be worried about trying different ideas to see if your form and results improves.

Bow balance / Stabilisation

With the sight window offset to one side of the bow and by adding the further weight of the sight and arrow rest to the same side, it is probable that a back weight added out to the opposite side will be needed to balance the bow.

Test the bows' balance by balancing the bow on a finger at the other side of the throat with the bow pointing towards the ground. The bow should be evenly balanced in both planes. Long rod and rear side rod should be changed to give this even balance.

Also with the bow held in a vertical but upside down position, place a finger under the long rod stabiliser at the point square to the line of the limb pockets. This should also balance perfectly.

Watch the scope bubble whilst carrying out these checks. If needed, add or subtract weight or length to the appropriate stabiliser.

Again, try anything and use what suits your own style the best.

Testing for arrow clearance

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

Stand about 3yds 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 fletchings, 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 :-

Rest tension

Rest centre shot

Rest height

Nocking point height

Nock orientation

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

Paper tuning

Stand a paper frame about three feet in front of the target.

Whilst standing about three yards back from the target, shoot an arrow through the paper and into the target at your natural shoulder height.

Inspect the tear hole in the paper, made by the arrow passing through. Ideally you are looking for a tear as small as possible. Either, a bullet hole with equal fletch tears or, (If right handed), a tear with the fletch tears slightly high and left of the bullet hole and about half to three quarters of an inch long. Again, the adjustments as in the arrow clearance testing should correct the arrow flight if the arrow is near a good match.

Don't be hung up over this test. It is only one method of measure. The true test of good flight is when all your 'good shots' group in the target at all your shooting distances.

(See the Easton arrow tuning technical notes)

Alternative vertical / horizontal flight test

Pin a square piece of paper on the boss so that there is a choice of either vertical or horizontal edges.

Stand ten to fifteen yards away and shoot a series of arrows *along* the top horizontal edge. A well tuned bow will place all the arrows along the same line.

Next shoot a series of arrows along the vertical edge. Again, a well tuned bow will place all the arrows along the same straight line.

Small adjustments to the rest tension – height – or centre shot position, should be enough to bring the arrows in a better line.

Tiller group tune

Have to hand nine, six inch paper plates. Write on each plate:-

(Even) – (1/4 top) – (1/2 top) – (3/4 top) – (1 full turn top)

(1/4 bottom) – (1/2 bottom) – (3/4 bottom) – (1 full turn bottom)

Pin the first (Even) plate to the target. Stand about fifty yards from the target.

With the tiller of both top and bottom limb equal, shoot six arrows into the (Even) plate.

Now wind the top limb bolt out a quarter of a turn. (adjust the nock point and peep to the normal position at each tiller adjustment). Shoot six arrows at the plate marked (1/4 top). Proceed with each plate and adjustment on turn.

After using each of the “top” plates, put the tiller back to even. Now start adjusting and shooting at each of the “bottom” plates.

On examination you will find one of the plates with the smallest group of arrow holes. This may be your best tiller setting for that set of arrows.

Other tuning tests

There are several other methods for testing and optimising your bow and arrows' performance. Try as many as you wish. Some methods may suit your particular style more than others. (It may be that your perception of some methods will give you more confidence). Certainly, experimentation will improve your knowledge over a period of time. However, don't get too hung up on “tuning”. Frequent good form practise will do more for your shooting than continual and frustrating testing.

Guide to reference material

A great variety of sources