THE COMPOUND BOW : HISTORY : SETTING UP: TUNING: THE HOOTER SHOOTER.

- **Development of the Early Compound Bows**
- **Parts of a Compound Bow: Individual components and their features**
- **Timing Bows Cams**
- **Nock Point and D Loop set up.**
- **Arrow Rest Setting Up**
- **Peep Sights**
- **Bow Sight Axis**
- **Bow Tuning**
  - **Bare Shaft**
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  - **String / Cable Adjustments**
  - **Modified French Tuning**
- **The Hooter Shooter.**

M Lewis 2019

Holless Wilbur Allen

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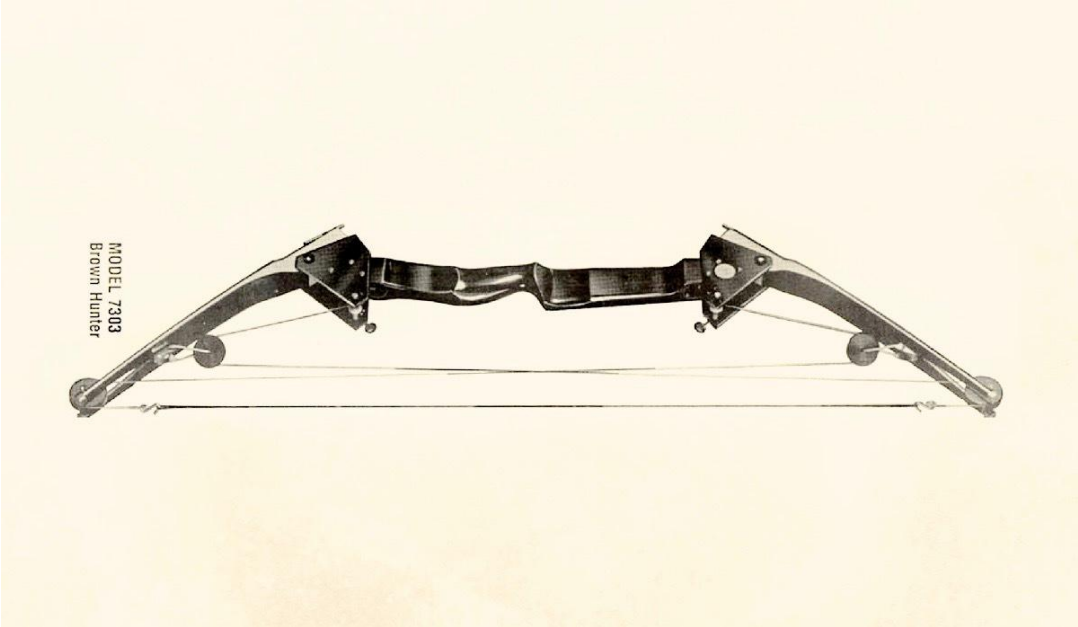
It's all thanks to an obscure Missouri innovator named **Holless Wilbur Allen**.

In the early 1960s, Allen was fiddling with the first compound bow, hoping to give the bows of the future a mechanical advantage over traditional bows. At first, Allen tried sawing the ends off the limbs of a recurve bow and attaching pulleys, which created a crude block-and-tackle system. This system didn't work well, however, as the bow then had a limited draw length due to the short limb-tip travel. After four years of tinkering and who knows how many design changes, Allen settled on a system of cams and eccentric wheels in place of the original pulley system. Allen filed for a patent in June 1966, and in December 1969 patent No. 3,486,495 was issued. Allen also approached several manufacturers about building and marketing his new bow, but found no one willing to accept the challenge. So, he began marketing the Allen Compound Bow — his "Archery Bow With Force Multiplying Attachments" — in 1967.

"All I was trying to develop was a bow that would get an arrow to a 10- to 25-yard target — a deer — before the target could move," Allen said.



Dec. 30, 1969 H. W. ALLEN 3,486,495

ARCHERY BOW WITH DRAW FORCE MULTIPLYING ATTACHMENTS

Filed June 23, 1966 2 Sheets-Sheet 2

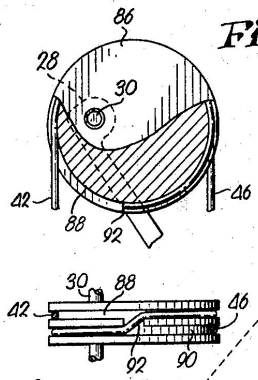


Fig.7.

Fig.8.

Fig.6.

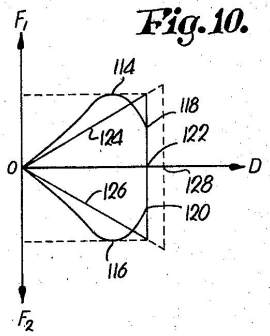


Fig.10.

INVENTOR
Holless W. Allen

BY Harvey, Schmidt, Johnson & Harvey
ATTORNEYS.

This first compound bow was not quickly accepted by the industry or the public, and sales were modest. It may have staggered along quietly, then died a slow death. Enter Tom Jennings.

In the late 1960s, Jennings was technical editor for the old *Archery World* magazine and Allen had sent Tom an early prototype of his compound bow to play with and report on. Jennings published his review in the magazine's May 1967 issue, giving it high marks. He said things like "reduction in peak draw weight," "more stable than recurves" and "the first really new concept to come into bow design in a thousand years." In addition to his writing, Jennings also made fine recurve bows. He quickly applied for, and was granted, Allen's first license, then began building and marketing his own version of the compound bow. Archery would never be the same.

By today's standards, the first compound bows were heavy, clunky and expensive. However, they generally shot their arrows faster, with a flatter trajectory and more consistent accuracy than any other bows around. Compound bows had another advantage not readily apparent to shooters — being made from separate parts, they could be tinkered with and improved more easily than carefully crafted traditional bows. Also, they could be manufactured on an assembly line, which made them potentially more profitable than traditional bows to aspiring manufacturers.

In 1972, only two companies — Carroll Archery Products and Olympus — were marketing compound bows. By 1974, eight companies were selling them to an expanding market. It was this year that Jennings "revolutionized the revolution" with the introduction of his legendary Model-T, a two-wheel compound with tip-to-tip cable harnessing. In contrast, most early compounds followed Allen's basic design of using either four or six wheels, resulting in an awkward, bulky bow that was hard to keep tuned. The Jennings Model-T was lighter and much easier to tune, making it ideal for the serious archer.

By the late 1970s, several archery companies, including Precision Shooting Equipment (PSE), Bear Archery, Darton, Martin Archery, Browning, Ben Pearson Archery and Hoyt, were challenging Allen and Jennings for the compound bow market. By 1976 all states except Georgia legalized their use during bowhunting seasons. In 1977, *Archer's Digest* listed over 100 different models of compound bows, compared to just 50 different versions of the recurve. It took less than 10 years for the compound bow to become the dominant force.

By the time Allen's 17-year patent expired in the mid-1980s, a truckload of bow companies had tried their hand at building and marketing archery's future star, the compound bow. Sadly, Allen died in a 1979 car accident, not living long enough to see how his compound bow would change the face of archery forever.

Modern compounds have continued to evolve, both in bow design and accessories like arrow rests (drop-away), how they're shot (release aid and string loop) and the arrows they launch (small-diameter carbon shafts).

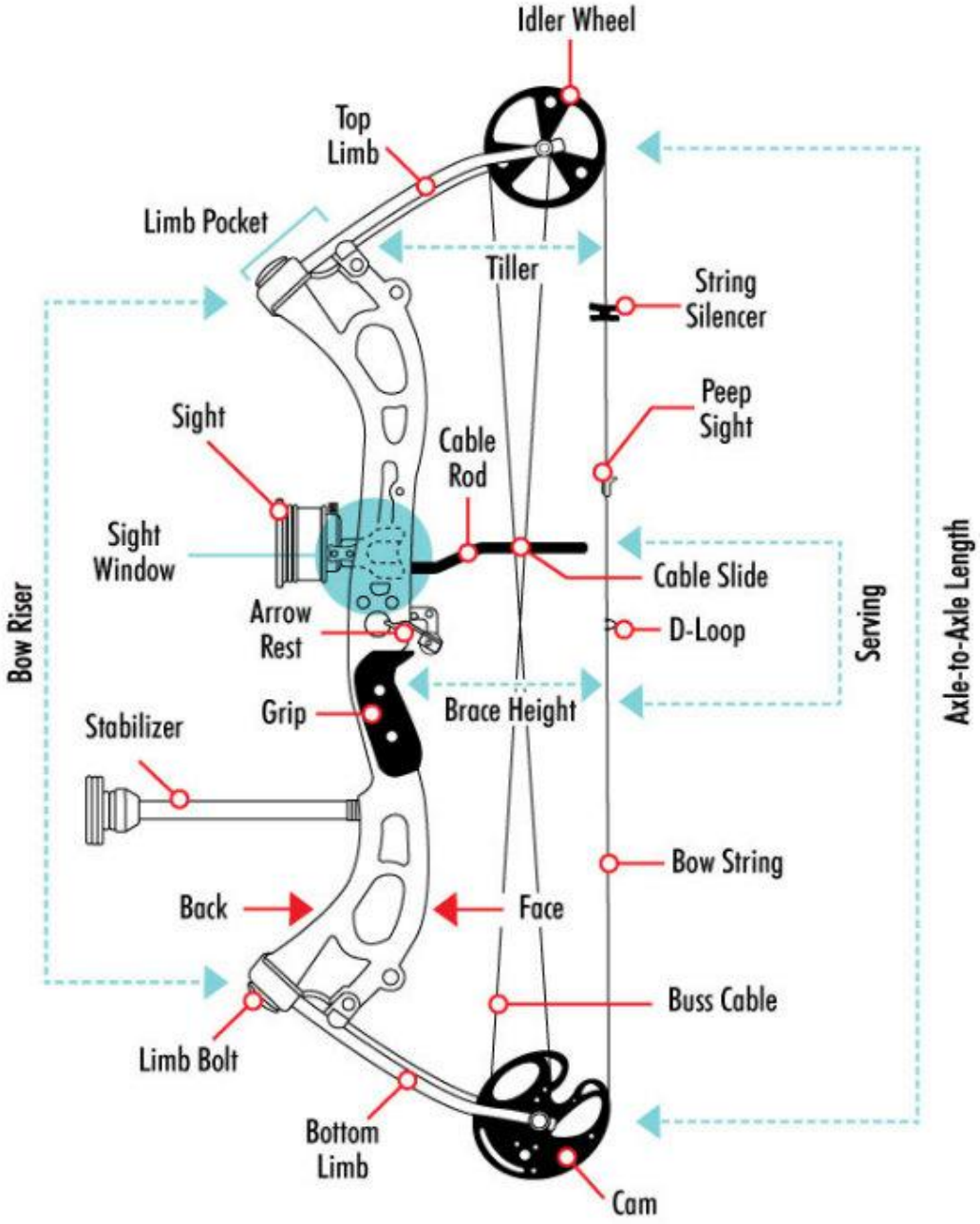
We owe it all to a man who loved to hunt and fish and whose love of machines and desire to know how they worked set the stage for the modern archery revolution —

Holless Wilbur Allen.

Parts of a Compound Bow: Individual components and their features

A compound bow might be in principle a simple piece of archery equipment, but using one, and getting familiar with all the parts of a compound bow and their function is an entirely different story.

Take a look at the compound bow parts diagram below to become familiar with the nomenclature and position of each element within a compound bow.



The central riser

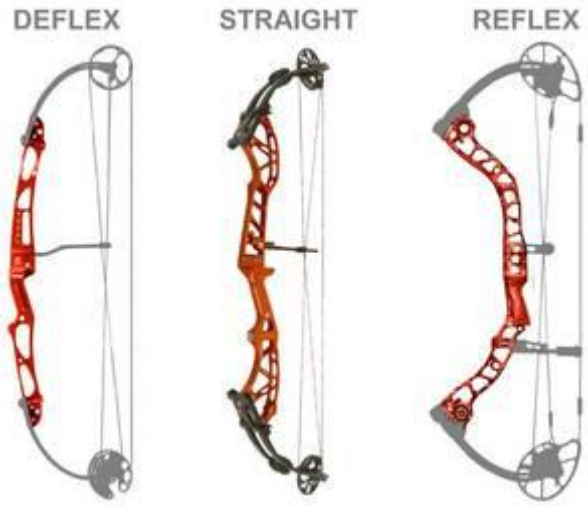
This is the central mount for other parts such as the sights, stabilizers, quivers and limbs. Risers are mainly made out of aircraft-grade aluminium alloy and designed to be as rigid as possible. Some compound bows feature carbon risers, which are lighter, stay warm and are stiffer.

Each type of riser will feature many subtle differences, but there are currently three main styles to choose from: straight, deflex, and reflex.

Reflex style risers can be spotted easily. This style curves away from the natural curvature of the limbs. This type produces a faster speed as it works to reduce a bow's brace height. Most new compound bows will feature a reflex style riser.

The exact opposite of the reflex riser is the **deflex riser**. This style will follow the curvature of the limbs instead of curving away from it. This will work to increase brace height and can also create slower arrow speed. This style of a riser is more forgiving to shoot and definitely more accurate. They're also the least common type of riser to use on modern compound bows that are used primarily for hunting.

The **straight riser** will fall somewhere in between the reflex and deflex styles. Straight risers are technically reflex risers, but they feature a less extreme curvature. They're also reasonably forgiving and fast. However, like the deflex riser, straight riser models are not so common in the bow world.



The materials used for a riser, as well as the size and weight, will affect the bow's cost. However, it doesn't really affect the longevity, accuracy, and performance of the bow. There are a couple of common ways that risers are constructed: machined and cast. Some risers are also made from a lightweight carbon fiber, however, these are not very common.

The cast riser is just as reliable, accurate and strong as machined risers, and are usually available for a fraction of the cost. But their weight and size can be a big disadvantage. Cast risers often feature a thicker grip section and are heavier than machined risers.

Off all the riser styles, machined risers are the lightest. These risers feature a smaller grip that will usually fit most hands better compared to a cast riser. However, this style is also pretty expensive to produce.

The Bow Limbs

The limbs are the flexible fiberglass planks made of composite materials or composites, which are made out of two or more constituent materials with different chemical or physical properties engineered to be capable of taking high compressive and tensile forces. The draw weight of a compound bow is adjusted by turning the limb bolts, which are usually locked into the riser with locking bolts located just below the top limb or above the bottom limb.

Much like the riser, limbs also come in different styles and shapes. **Solid limbs** are made from just one fiberglass part, which constitute both limbs and riser in one piece. **Split-limbs** are made up of two thin limbs connected to the riser. Split-limbs are claimed to be more durable and vibrate less than solid limbs (which in turn helps reduce the noise).

Most modern compound bows, feature **parallel limbs**, as opposed to more traditional bows that have a "D" shape. Parallel limbs are usually more silent and have less recoil when firing the arrow.

The bowstring and the cables

The bowstring is responsible for launching the arrow, while the cables run from cam to cam, moving the cams as the bowstring is drawn.

The bow string and the cables are mainly made of high-modulus polyethylene. This is a high impact-strength material, highly resistant to corrosive abrasion and chemicals, self-lubricating, has extremely low moisture absorption and has significantly lower coefficient friction as compared to nylon. It is comparable to Teflon and is tasteless, non-toxic and odourless. This highly modern material is meant to have superior tensile strength and minimal stretch ability. This is what makes the compound bow able to transfer all the stored energy of its limbs as durably and efficiently as possible to the arrow. Models of compound bows made earlier had plastic-coated steel cables.

The cable guard and the cable slide

The cable guard is a fiberglass / metal rod that holds the cables aside to clear arrow fletching and to prevent the cable from interfering with the arrow line of fire. Attached to the cable guard is the cable slide, a small plastic piece that is attached to the cable guard and then mounts to the cables. The cable slide, along with the guard, helps keep the cables away from the arrow and prevents cable coating wear by isolating the cables from

the cable guard. Cable guards also can incorporate rollers to reduce wear on the string and the strings and cable can have serving to again reduce string wear.

The eccentric system

The mechanical parts making up these units create the main difference in style and functionality. There are cables used to connect cams that create draw strength; this compounding action can produce great amounts of thrust and apply it smoothly to the projectile. Some cams are round, and others are elliptical in shape some have single cams at each end, and some designs incorporate double cams.

A common configuration of the compound bow presents a wheel or cam at each end of the limb, which may vary from different bow types. There are different design concepts with different ways by which the cams store power in the limbs. Four different mechanical styles are available today: single cam unit, twin cam unit, hybrid cam model, and the binary cam.

The **single cam** system is the best compound bow for beginners, as this type of bow is the most basic of its class having the advantage of not needing to be synchronized as that of a twin cam bow. The idler wheel at the top of the limb does not provide any mechanical advantage but serves only to unroll the string when the bow is drawn. The bottom cam controls the cable as the string is drawn, and at the same time letting out the other end of the string at a controlled rate to keep the nock move straight back and forward. The changes in power cable length do not affect this type of system; when the power cable is stretched, the bow stays in tune with a single cam.

The **twin cam** system bows are more difficult to use due to their high sensitivity to synchronization problems. The cams will not turn over properly if either one of its harnesses is not of equal length. Twin cam bows need regular check ups and timing-tuning in order to being kept in top performing condition.

The **hybrid cam (or 1.5 hybrid)** are a combination of single and dual cam style. They feature two asymmetrically elliptical cam, a control one on the top, and a power one on the bottom. Their speed is often compared to that of dual cams. This type of compound bow will function the same as a solo, as the idler wheel will be replaced with another cam. But adding the second cam works to offset the movement of the nock when compared to a solo model.

Binary cams on the Infinite Edge Pro

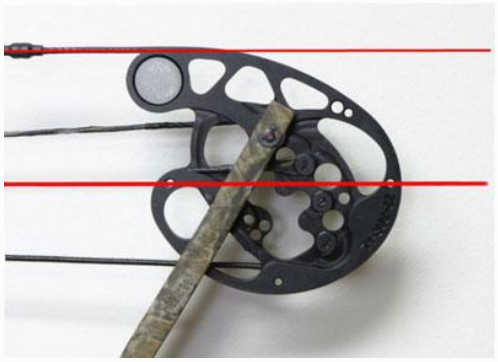
The **binary cam** overcomes the problems of the twin cam by implementing a special rotation correction system that synchronizes the two cams with each shot cycle. This type of cam is also less time-consuming to maintain and requires little or no timing-tuning.

Timing Bows Cams

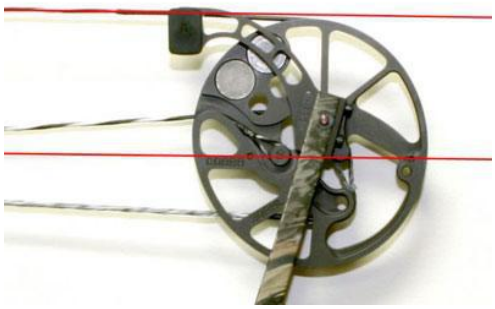
Solocam Bows

Made famous by Mathews, the solocam bow operates off one cam (on bottom) and an idler wheel (on top). In order for the cam to deliver maximum performance, it should be properly set while the bow is in the static position. While the bow is pressed, the cam rotation can be changed by twisting or untwisting the bowstring and or cable. Here are a few examples of the suggested timing of certain solocam bow cams.

Max Cam



Switchback Cam



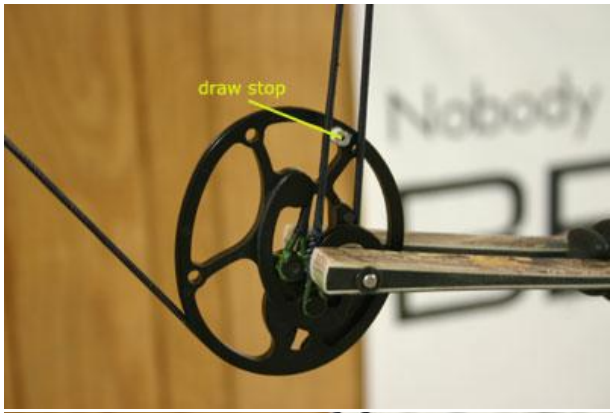
Timing a Bow – Two Cam Bow Systems

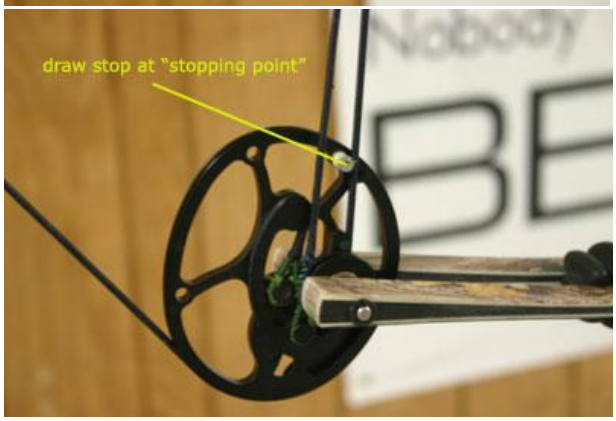
With two cam systems (names of two cam systems vary among different manufacturers), the static position is normally suggested by the manufacturer by lining up "timing marks". When the cams are set at the proper timing marks, you should also have an equal tiller measurement; this is due to the oval shape of the cams. If the cams are not set the same, one may be pushing the string further from the riser than the other cam thus upsetting the equal tiller measurements.

To find out what timing marks you should go by, you should contact your manufacturer or research on your own. When bows ship from the manufacturers, they are normally timed properly but not always. Still, it is not a bad idea to mark your cams, for a point of reference in the future, as to how the timing of your bow was when you received it.

If your bow's cams are in the proper position when the bow is at rest, you can now check the physical timing of the draw stops. Timing a bow with two cams will require a friend to observe your draw stops while you are drawing the bow. You can also use a draw board which mechanically lets you crank the bow back to the full draw position.

When you are coming to full draw, in many two cam bows, your cam's draw stops are what establish the "wall" at full draw. It is very important that these draw stops are hitting the cables at the same time during the draw cycle. If they are not, you will have to press the bow to untwist or twist the cables (while keeping the bow in spec) to synchronize the draw stops. Below are a few pictures of the a draw stop in action.



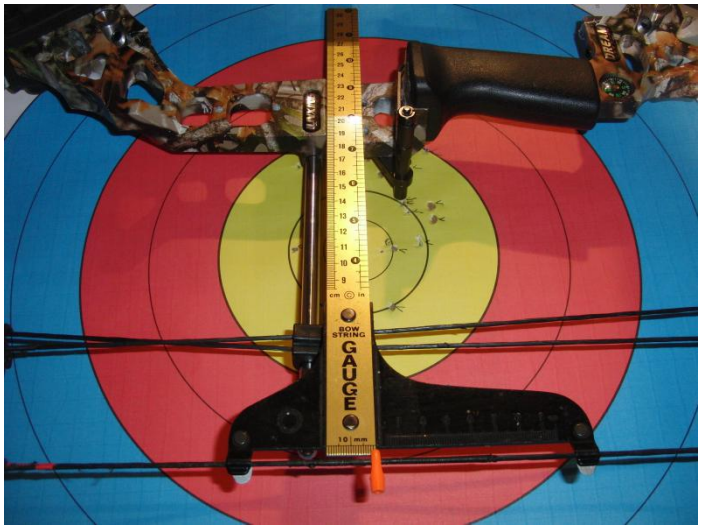


Nock Point and D Loop set up.

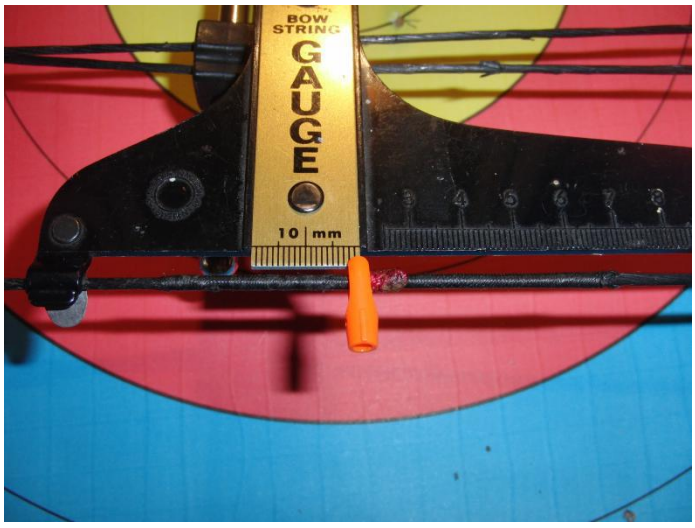
(Images shown are for a left handed bow)
All compound bows are engineered to project the arrow through the centre line of the berger hole (usually the screw hole that fixes the arrow rest)

Points to note are that not all bows are constructed the to the same design with regards to the centre of the bow being either at the hand grip or arrow / berger hole. They are engineered with solid or split limbs and with these in particular the limbs are designed to fit in the limb pockets in a particular order to allow for the alternative designs and to project the arrow with a balance manner.

First set up the bow square on the string with the bottom edge running through the centre of the berger hole and fit a nock on the string serving so as to be central with the center of the berger hole.

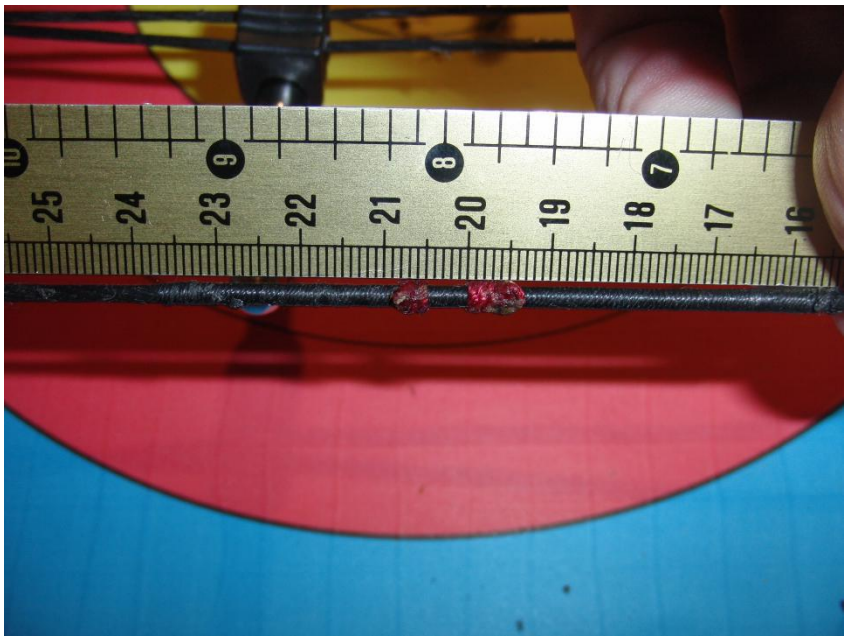


Next take a length of centre serving material or good quality serving Halo for instance and below the nock begin a series of 1/2 hitch knots each side and built up around 6mm in length of a bottom nocking point and then form a reef knot and then cut and burn off ends. I also rub the serving material prior to this process with hot melt so when burning off ends it helps to form a solid serving.



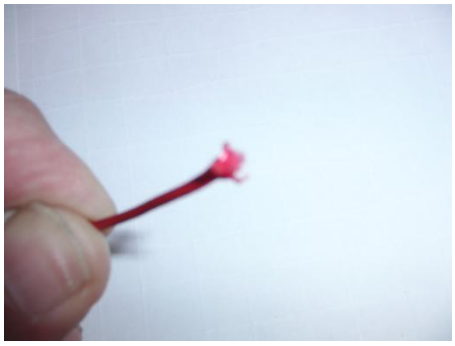
We then repeat the process forming a top serving but only around 3mm in length. When the D Loop is fitted this difference helps adjust to get the release aid pulling through the line of the arrow. There should be a very small amount of play with the nock between the serving points.

Also the centre serving should be the correct diameter to allow for the nock to grip but be loose enough to slide along the serving freely. The serving diameter will depend of the string material and the number of strands. A normal option would be Halo .019 serving.



Next we need to fit the D Loop
I will tend to use BCY D Loop material around 1.60 - 2.5 mm dia

First take the end and tap down on the material to form a bushy end and then with a lighter placed below melt the end material until it forms a soft bulbous shape. Try not to let it catch fire.
Leave it for a few seconds and the flatten the end.



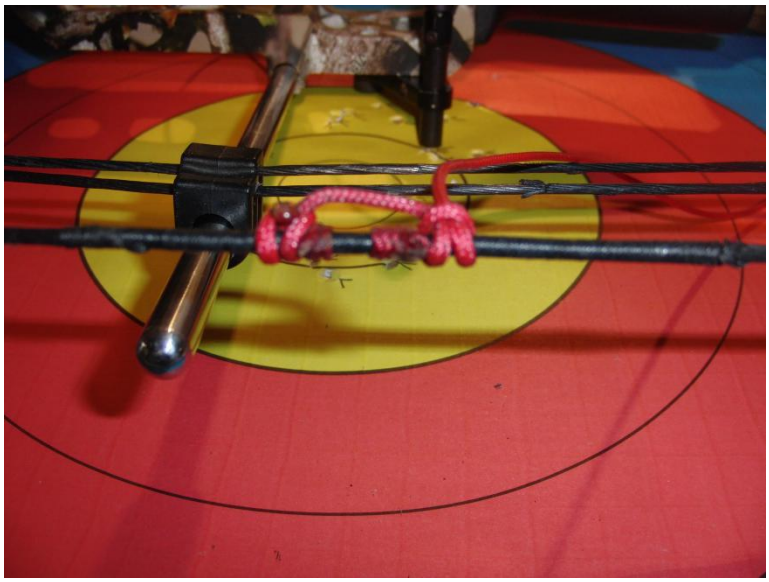
If you know the length of your normal D Loop you can cut it and then form the bulbous end to each end.

Next take the D Loop and place it around the serving above the top knot and starting to the riser window side of the string.

The D loop is then wrapped round the string back over the D loop material and then back around the string and the end tucked under and then pulled tight.

The process is repeated taking the D loop diagonally across the string and repeating the knot in reverse.

If you have a given length then you need to push through the melted end to get the fit or as shown you can use the full length and then cut off surplus and the melt the end as described.



Once the knot is formed then the D loop can be adjusted to a logical location to draw the string keeping the peep sight to the correct location.

The use of D Loop pliers will ensure a good tight fit and consistent D Loop size which should be around 18-19mm.

The D Loop can in some circumstance be used to control the rotation of the peep sight if that becomes a problem particularly with a new string.

A point to note with any D loop is that if it shows signs of wear then fit a new one. Also if the wear continues to be a problem then check the jaws of the release aid for any edges that will cause this problem.

Likewise on strings and servings keep an eye open for wear it is likely to be caused by contact between strings and bow parts or arm guards etc. Serving can easily be applied to areas as long as string strands are intact.

String on Halon X Comp going past cable guard and making contact with axle end shown covered and causing wear on top of centre serving.
By adding string speed nocks this stabilised string to reduce contact.

With wear on the string itself it is important to keep an eye on it and undertake regular waxing say every 2 weeks at least for regular archers.
Wax should be applied to surface rubbed in with cloth and then with string to create friction heat to get the wax into the strands.

Surplus surface wax should be removed with a further strand of string material.

Arrow Rest Setting Up

Setting up the arrow rest in the vertical plane is now straightforward in that it should align through the centre of the berger hole.

This can be done visually by adjusting the arrow rest up or down but remember with blade type arrow rests and spring loaded launchers that the weight of the arrow at will, in the undrawn position, load the rest which will drop it below the berger hole centre. At full draw with less weight the rest will rise so use of the Hooter Shooter or a friend to advise on the arrow berger hole position at full draw is advisable. You could also rotate the bow forward again to reduce the weight on the rest.

On the horizontal plane manufacturers provide information on the location from the bow window and Matthews bows are generally 13/16".
PSE bows will have lines inscribed on the window and arrow shelf.

Not all bows have the string running in a vertical alignment between cams and I find it useful to use a bow vice and levels to rotate the whole bow and let the arrow hang vertically to show its natural centre shot position.

Tuning the bow may adjust this location.

Use of masking tape on the outer limb tips scribed with a line to the edge of the limbs and string location, and then relocated to the inside face at the riser pockets will also allow a visual check to align the string and correct the arrow rest horizontal position.

Peep Sights

Peep Alignment

Even with grooves, correct alignment can be a concern with these peep sights. The bowstring is twisted and under a lot of tension. To put the peep sight into the bowstring, the limbs are put in a bow press to take the tension off the string. The string can then be untwisted slightly and opened in the middle. The sight is then seated in the middle of the string and held in place by the grooves on the outside of the sight.
The difficulty is the strong tension on both sides of the peep sight and the twisted string. It reminds me of pressing hard on the edges of a quarter between your thumb and middle finger. It wants to flip over. If the peep sight has good, deep grooves, it can withstand the tension of the strings on the sides. Sights that don't have deep grooves can slip out of the bowstring and become misaligned.

Alignment tube with peep sights

New archers have asked if they can use the alignment tube on their compound bow peep sight. The quick answer is that if it's a metal peep sight, no. If it's a plastic peep sight, maybe. The plastic sights that use alignment tubing are made with a peep aligner attached to the sight. Some have an optional peep aligner that can be attached, but this is a part of a kit.
The reason some sights use tubing and some don't is because there are two different designs. The plastic sights that use the alignment tubing have straight grooves on the outside with the aperture made at an angle. The other design, used by all the metal and

some plastic sights, are straight apertures, with angled grooves on the outside. The angled grooves make this types of sight "self-aligning."
To achieve correct alignment with the straight grooved sight, they are made with a peep aligner which is just a small plastic tip that sticks out. The plastic tip fits inside rubber or silicone aligner tubing. The tubing is then tied around the bus cable. When you draw the bow, it stretches the aligner tubing which pulls on the aligner tip and correctly aligns the sight.

What size peep sight

There are different sizes of peep sights available typically ranging from 1/32 to 1/4 inch aperture. The smaller sized apertures are used for target archery, and the larger sizes are used for bow hunting. Looking at the chart below will give you an idea of the different sizes and the categories they are used for. 3/32 is one of the most used sizes, and it falls in the middle of the size range.

Determining Correct Sight Size

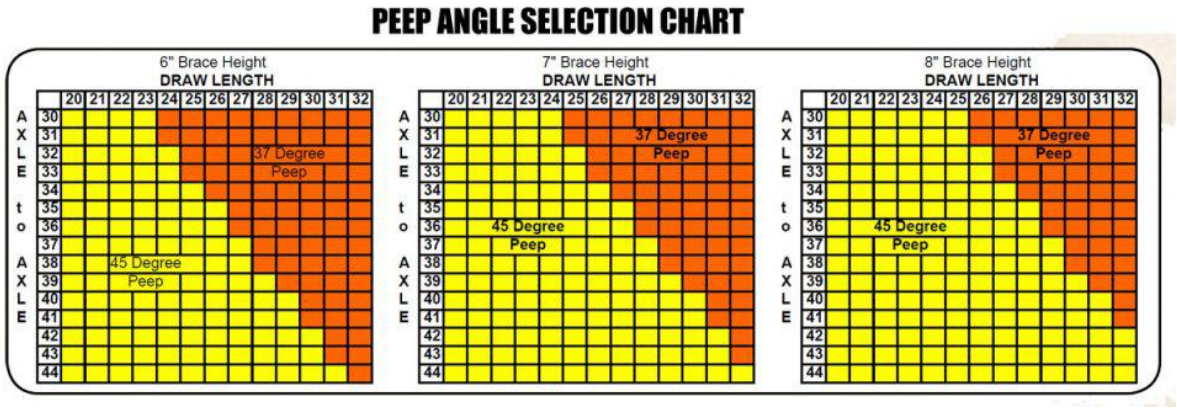
Hole size	Indicated
1/4"	Bow hunting
1/4"	Bow hunting
7/32"	Bow hunting
3/16"	Bow hunting
1/8"	Bow hunting, Target archery
3/32"	Target Archery
1/16"	Target Archery
3/64"	Target Archery
1/32"	Target Archery

You might be curious why there are different size peeps in the first place and what determines what size you will need.One of the first factors is your sight picture. You want your view through the peep sight to barely capture the outside ring of the front sight you are using. The reason for this is the sharpness of the picture. If you are familiar with camera apertures, you may already understand some of these principles.
You need light to see your front sight through the peep. It may seem like the more light you have, the better, but too much light floods your sight window and reduces the sharpness. If your peep sight is too large and you can see beyond the housing of your front sight, too much light is being let in, and it makes it harder to get a clear view.
Smaller peeps are used for target shooting because the front sights for target shooting are smaller. They are a single pin or aperture sights. This means that you can utilize the sharpness of a small peep sight and still get a good view of the front sight.
The front sights used for bow hunting are often larger, multi pin sights. Because of this, compound bow peep sights used need be able to view all of the pins.
Another factor in bow hunting and field shooting is available light and takes place in wooded areas, blinds and tree stands and is often done in low light situations. Thus, a larger aperture is what is needed.

If you only want to participate in one type of archery, you may have a good idea of what size peep sight you need. Of course, depending on the sight manufacture, you may be able to choose between eight different sizes with two or three being close in size. So how do you choose? In this case, it comes down to the front sight you are using. Front sights come

in many different sizes which is why many peep sight manufactures offer the different sizes as well. Your local archery shop can likely help you in getting your peep sight sized correctly.
Another option available is the use a peep sight kit. Hamskea and Specialty Archery are two manufacturers that sell a peep housing that comes with changeable apertures. These are nice for a lot of reasons. One that it's much easier to find the exact size aperture you need for your front sight. You are also able to switch the apertures, depending on the lighting conditions.

Peep Sight Angles
When you are looking at different compound bow peep sights, you may be given a choice between a 37-degree peep sight and a 45-degree peep sight. The one you need is based on the axle to axle length of your bow as well as your brace height. If you know your measurements, you can check out the chart below to figure out your correct peep sight angle.



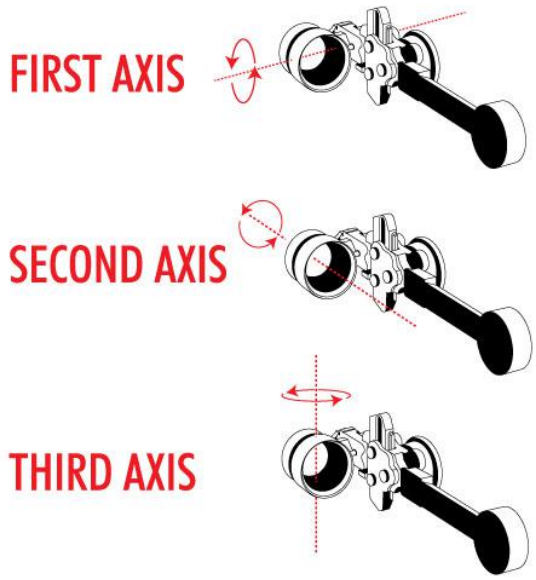
Bow Sight Axis

An axis, of course, is an imaginary line around which an object rotates. To achieve a truly level sight – which is critical for accuracy - you have to account for all three axes.

Not all sights allow you to do this. Some are made to be simple, and so you have to hope that the three axes are level or close to it, based on the construction of the sight.

But many sights – especially those designed for target and 3-D shooting – do allow you to level all three axes. Do that, and you'll know your sight is aligned for maximum accuracy.

You'll know if you can level the axes on a sight because the manufacturer will proudly announce that you can. Or you might see set screws in strategic locations on the sight labelled with "2nd axis," or something similar. If you don't know if your sight can be adjusted to level the three axes, look it up on the manufacturer's website.



The first axis runs from left to right in front of you, parallel to the ground. If you have a scope around your sight, then this axis would allow it to spin bottom over top.

The second axis, which many consider to be the most important, runs straight through the centre of your scope as you would look through it. The scope would spin like the hands of a clock around it.

Failing to level this axis can lead to shots similar to canting your bow left or right. It might not make a huge difference at 20 yards, but the problems will grow the farther you shoot.

And the third axis runs parallel to your body through the centre of your sight, so that your scope would spin around it like a top. When you're shooting on level ground, the third axis means nothing, as long as your second axis is level. This axis comes into play when you have to shoot uphill or downhill. If it's not level, the effect will be similar to canting your bow.

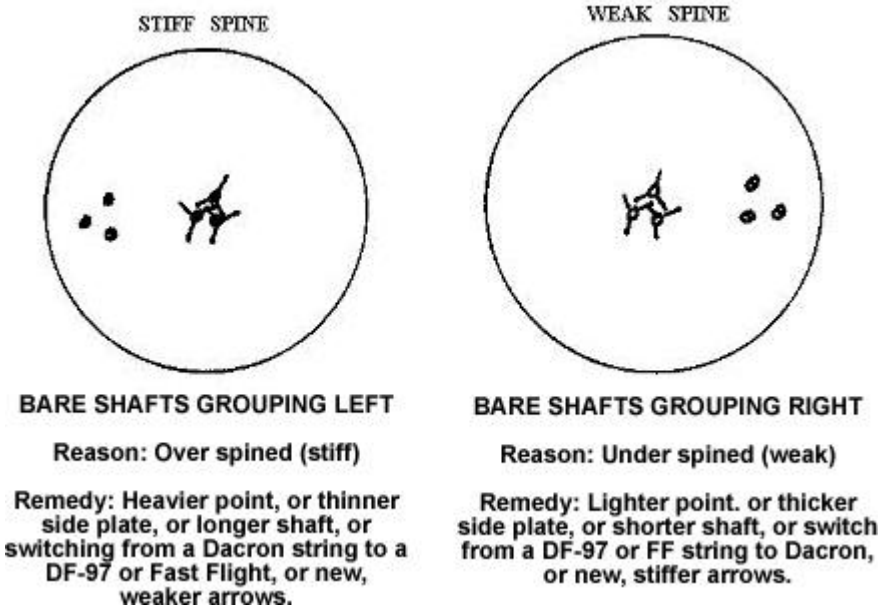
How do you adjust them all so they're level? By using levels, of course.

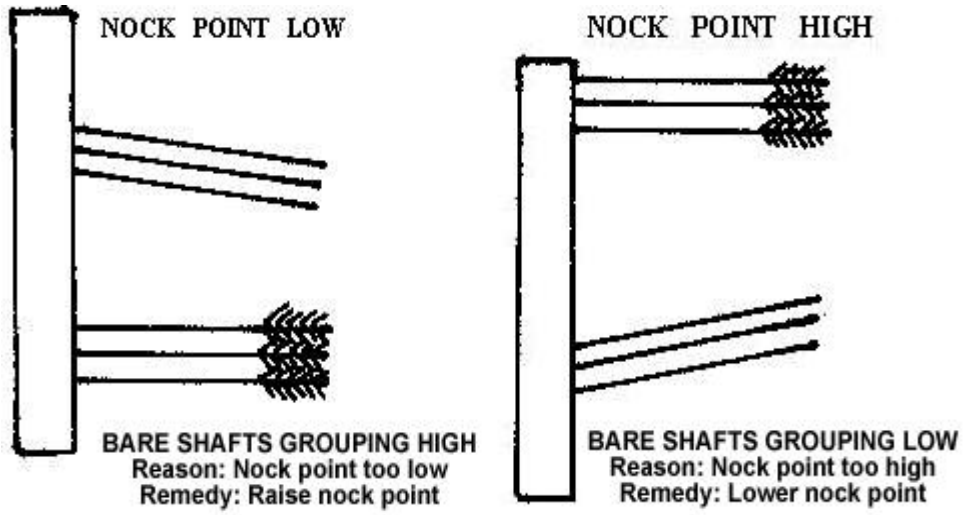
There are many levels on the market made just for setting the axes on a bow sight. Most compound sights today have a level built into the scope housing, and you will use it in conjunction with others to get your sight straight. If your sight doesn't have a built-in level, you're going to have to find a way to attach one to your scope or sight housing through the levelling process. You'll want it to sit on top or underneath the scope, perpendicular to the sight bar.

Use vertical and horizontal levels attached to your bowstring or riser to level your bow. It's best to do this by clamping your bow into a bow vise.

Bow Tuning

Bare Shaft Tuning





Paper Test Tuning

These paper tuning instructions will assist you in achieving good arrow flight. Even though paper tuning is not the end-all method of gaining perfect arrow flight, it is a guideline and a good starting point for achieving that goal.

To begin paper tuning your bow you must set up a frame covered with paper. Newsprint or other large-sized paper will work fine. Make sure your backstop is far enough behind the paper to allow the arrow to pass completely through the paper. For your first test stand about 10 feet away from the paper. Make sure the arrow is level when shooting. After you have made your test shot, compare the hole in the paper with the following samples:

Note: The following corrective steps apply to release aid shooters and are only the common causes for arrow flight problems.

High Tear: If the fletched end of the arrow tears the paper above where the tip penetrates. This may indicate that:

• Vane clearance problem. Check to see if vanes are making contact with the arrow rest.

• Nocking point too high. Place nocking point lower on the string.

• Wheel timing may be off. Check timing.

• Arrow rest launcher may be too stiff. Following the arrow rest instructions, reduce spring tension.

• Tiller may be off. Check tiller and adjust as necessary.

• Inconsistent shooting form. Have your shooting form and technique checked by a qualified archery coach.

• Drop-away rest coming up too early. Adjust the length of the length of the rope so that the rest will drop sooner

Low Tear: If the fletched end of the arrow tears the paper below where the tip penetrates. This may indicate that:

• Nocking point too low: Place nocking point higher on the string.

• Wheel timing may be off: Check timing.

• Tiller may be off: Check tiller and adjust as necessary.

• Inconsistent shooting form. Have your shooting form and technique checked by a qualified archery coach.

Left Tear: If the fletched end of the arrow tears the paper to the left of where the tip

penetrates. This may indicate that:

• Arrow rest is adjusted too far to the left. Adjust arrow rest to the right.

• Arrow shaft is too stiff (right handed archers): Although very unlikely, it is possible that the spine of the arrow shaft is too stiff. Using an arrow selection chart, select an arrow with the proper spine or increase draw weight of the bow. For left- handed archers: Arrow shaft too weak.

• Arrow making contact with the cables. Adjust cable guard to achieve more clearance.

• Inconsistent shooting form. Have your shooting form and technique checked by a qualified archery coach.

Right Tear: If the fletched end of the arrow tears the paper to the right of where the tip penetrates. This may indicate that:

• Arrow rest is adjusted too far to the right. Adjust arrow rest to the left.

• Arrow shaft is too weak (for right-handed archers): Although very unlikely, it is possible that the spine of the arrow shaft is too weak. Using an arrow selection chart, select an arrow with the proper spine or reduce draw weight of the bow. For lefthanded archers: Arrow shaft too stiff.

• Cable guard adjustment too far out. Adjust cable guard to achieve proper vane clearance.

• Inconsistent shooting form. Have your shooting form and technique checked by a qualified archery coach.

Angular Tear: If the fletched end of the arrow tears the paper at an angle to where the tip penetrates, this indicates that there is more than one problem with the adjustment of the bow or accessories. Using the above tear pattern instructions, make adjustments until a horizontal tear is corrected and then make adjustments to correct the vertical tear.

"Bullet" Hole: When the fletching enters perfectly around the hole made by the arrow tip, the bow is ready to shoot. Further "fine" tuning may be desired.

Creep Tuning (Hoyt Cam ½ System)

The test does give reliable results in the hands of a reasonable competent archer. Reasonably competent because how well you shoot determines to what degree the test will yield optimal feedback for you to make your adjustments. The test is a variation on the old twin cam creep tuning methods.

• Begin with the even (Zero) tiller.

• Set the cam timing as close as you can by eye. Remember we are talking about the full draw position of the cams relative to each other. It's extremely useful to a full length mirror to assist you with getting this right…or and experienced archer.

• Start with my sight zeroed at 18m.

• Place a horizontal line on the butt using a ½" strip of masking tape.

• Shoot 3 or 4 good shots aiming at the tape but making sure that you only draw to the stops (i.e.: the wall). Do not pull hard into the wall.

• Now shoot 3 or 4 more good shots at the tape line, but this time drawing your bow hard into the stops.

• If your cams are in perfect time all your shots will hit the line, and wall will feel "solid".

• If the shots fired, whilst pulling hard into the wall, hit high; apply a ½ twist to the control cable.

• If the shots fired whilst pulling hard into the wall hit low apply a ½ twist to the buss cable.

• Repeat this test until all shots hit the tape.

Typically start this test at 18m and then move back to 30m and repeat it. Once happy shoot at 30m FITA target at 70m and repeat the test paying careful attention to any height variation of my arrows on the target (That's why it's a good idea to have your arrows numbered). The more proficient an archer you are, the further the distance you can perform the test from.

This test provides a practical method in order to optimise the nock travel of the Hybrid cam system. The nock travel has to be "level" 5mm either side of the full AMO draw position in order to negate any high or low shots caused by varying forces into the wall. The "levelness" can actually be measured using a draw board that securely fixes the bow in position (i.e.: zero degrees of freedom for the riser). The bow is drawn with an arrow to the full draw position. You can use a laser levelling device which projects a line through the centreline of the arrow. Once full draw is reached I carefully monitor the nock of the arrow to see if it moves above or below the laser line when the bow is slackened 5mm off wall or draw 5mm past into the wall. Adjustments to the control and buss cables are made in ½ turn adjustments accordingly. A maximum deviation of 1mm above the laser line is permitted and 0mm below the laser line.

String / Cable Adjustments

Manufacturers use a number of alternative systems to ensure synchronisation of each cam. This can be markings on cam that allow the cables or limbs to be positioned.
The chart below shows the changes that occur when cables and string lengths are adjusted.
Hoyt bows will have generally marks on the cam to locate the cable or limb locations, whilst Mathews bows may have timing marks to locate the cam parallel to the string, and all relate to the bow when they are not drawn up.

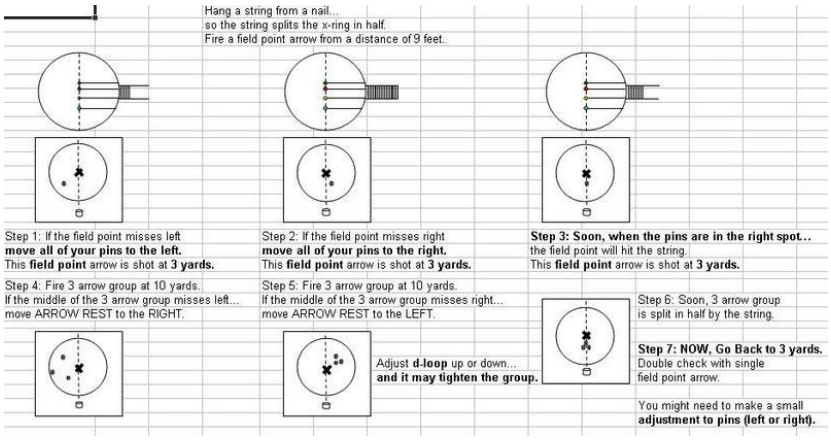
String/Cables Adjustment Results

Adjustment	Drawlength	Holding Weight	Draw Weight	ATA	Brace Height
Twisting Cables	Increase	Decrease	Increase	Decrease	Increase
Untwisting Cables	Decrease	Increase	Decrease	Increase	Decrease
Twisting String	Decrease	Increase	Decrease	Decrease	Increase
Untwisting String	Increase	Decrease	Increase	Increase	Decrease

Modified French Tuning.

Another way to do this, is what I call "Modified French Tuning".
You only need 10 yards of space in front of the target to do this.
John Dudley talks about the French Tuning method on his website.
These are modified his instructions to make it simpler, and this "short version" will help you set the left to right position for your pins (windage), and help you set the left to right position of your arrow rest (centershot).

First, tackle the centre shot for the arrow rest and find the correct windage (left-right adjustment) for the sight.



Hang a target face so the gold is at your shoulder height.
Put a nail at the top,
and hang a weighted string,
so the string splits the gold in half.

Start at 3 yards.
Fire an arrow.
If the arrow misses the string to the left,
then move all the **sight** to the left. (Adjust the entire sight housing).
If the arrow misses to the string to the right, then move all the **sight** to the right.
The goal is to hit the string perfectly.
You want your arrow to be exactly below the centre of the gold.

Go back to 10 yards.
Fire a 3 arrow group.
Find the centre of the arrow group.
If the centre of the arrow group is to the left of the string,
move the arrow **rest** to the right.
If the centre of the arrow group is to the right of the string,
move the arrow **rest** to the left.
Goal is to have the hanging string split your arrow group in half.

Go back to 3 yards.
Fire a arrow.
If the arrow does not exactly nail the hanging string,
then adjust all of your sight to the left or right,
until the arrow is dead centre under the exact centre of the gold.

Go back to 10 yards.
Adjust the arrow rest in tiny amounts, until the hanging string splits your 3 arrow group in

half.
When you are done, you can fire an arrow from 3 yards and it will be exactly underneath the centre of the gold.
Your 3 arrow group from 10 yards, will also be split in half by the hanging string.
Now, your centre shot (arrow rest) and your windage will be perfect.

Yoke Tuning

Some bows will have a Yoke system on both or top cams, and this is where the cable splits into two ends around 150mm long and has the end loop supported onto the ends of the axle through the cam and limb tips.
With the cable guard system on most bows this will exert side loading to the cables and in order to reduce torque created by the cable guard and also align the cam with the string to reduce the possibility of de-railing the string from the cam when drawing or at the release, twists need to be added to create the correct alignment.

A rough guide is to have 3 twists in the cable guard side as against 1 in the opposite side.

An arrow placed on the side of the cam will allow you to check the alignment with the arrow running parallel to the string.

The yokes can also be used improve left right tears in the paper testing tuning with twists added to the side that the nock runs through the paper.

Arrow placed on face of cam out of alignment with string.

The Hooter Shooter :

The Hooter Shooter is a machine that can shoot most bows with perfect form. So closely simulating an individual, without the human variables that a person can learn to shoot like the machine with the same sight settings.

The Hooter Shooter shoots with such precision that it will place the same arrow into the exact hole at 18 metres (20 yards) even on a poorly adjusted bow.

This precision causes any changes in the bow, variations in arrows and arrow rest,

- variation of release,
- changes of heel pressure,
- bow orientation and
- draw length

to be reflected by where the arrow hits.

The Hooter Shooter will shoot most 2 cam and single cam bows using most hand held releases or releases using a wrist strap. However, not the back tension type releases.

If all your arrows will not use the same hole, then you know for sure it is not the shooter but the equipment that has a problem.

This machine is engineered to shoot a bow the way an archer should with adjustable high/low wrist, universal release holder and unique grip which emulates the human hand.

Of what value is it to an archer to know absolutely, if their equipment is the cause or

their shooting is the cause for missed shots.

With the Hooter Shooter, you can offer undeniable proof that their bow is capable of shooting the same arrow in the same arrow hole repeatedly.

Are all your arrows flying identically.

Now you can test them with unerring accuracy.

Using the Hooter Shooter, you will have the tool you need to find out and tune your bow to accomplish the results you desire.

This precision makes it possible to see the effects of any adjustments that are made to the individual's equipment.

The effects that can be seen are:

Arrow variations. (Why don't they all use the same hole)

- Clearance differences
- Spine differences
- Fletch differences
- Weight differences
- Nock differences
- Nock alignment
- Arrow straightness

Bow variations. (What affects the bow's shootability)

- Effect of cam timing
- Effect of cam lean
- Effects of string and cable stretch
- Arrow rest adjustments
- Cable guard adjustments
- Effect of nock point styles
- Effect of release changes
- Tiller adjustments
- Stabiliser type and style
- Draw weight
- Draw length variations
- Bow orientation (Is it level)
- Heel pressure (on most bows)
- The effect of the 3rd axis
- Changes in friction (axles & sliders)
- Things vibrating loose

The Hooter Shooter Name

Spot-Hogg are often asked how they came up with the name Hooter Shooter. Contrary to what you may have thought, it is actually quite respectable. While shooting the NFAA Nationals in Detroit Lakes, Minnesota, USA, the term "hooter" was used by folks spotting for the Spot-Hogg shooters, when the shooters shot "X"s.

Now Spot-Hogg would like to tell you they heard this on every shot! Unfortunately, that is not the case. However they did hear it often enough that the name stuck and the Spot-Hogg guys figured what a great name for our shooting machine! Hence the name Hooter Shooter was born! Now you know!

- It helps archers shoot better
- Improve your shooting skills and experience accuracy like never before.

The Hooter Shooter is a machine that will shoot the compound bow with perfect form, so that you can really look at the equipment, and identify whether the bow is performing to the level that you want.

The Hooter Shooter so closely simulates individuals, that most people can learn to shoot like the machine with the same sight settings.

The Hooter Shooter shoots with such precision that it will place the same arrow into the exact hole at 20 yards. This allows you to really evaluate your equipment, and identify if there is a problem, and if so what it is causing it, make an adjustment, then test to see if the changes you made resolved/improved it.

This precision causes any changes in the bow, variations in

- arrows and arrow rest,
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- bow orientation, and
- draw length to be reflected by where the arrow hits.

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