



Selecting correct bow

Speed can be an advantage! Yep, we all know that and that fact has been driving bow design for the last 20 years. It is a great thing to be able to misjudge the distance by a few yards and still hit reasonably close to where you're aiming BUT (you knew this was coming, didn't you?) a fast miss is still a miss!

Let me clarify that a little for you. If your skill level isn't high enough to consistently make the shot then even 400 ft per second isn't going to help put the arrow in the middle.

Or how about this issue; if your bow doesn't fit you properly then your chances of making that one, all-important shot at that all-important time is not likely to happen. A bow that is not the correct draw length for you will not allow you to use your body to its best advantage and therefore shoot consistently. Instead it will promote poor and ineffective use of muscles resulting in missed shots when the risk/reward is highest. In other words, you'll miss that big buck when he finally steps into that open shooting lane. Or you'll miss that last shot in the tournament allowing your competitor to win all because you use too much muscle to shoot your bow and that muscle tightens in stressful moments and doesn't perform.

I've been on both sides of all of these situations and, yeah, the mental game has a lot to do with hitting or missing. Sometimes we're going to miss, we're only human and that's part of the mental side of archery but, having a bow that does not fit properly is totally avoidable and shouldn't be the reason that we miss. The sad truth of this matter is that I see far too many archers that are using bows that don't fit and, I'm sure, you do too. This article is one way I can help them all to get "fit" for archery.

The heart of the problem is too many archers buy bows for speed! That's what they talk about, that's what their buddies talk about and that's what they see in the advertising. So, that's what they buy. Don't get me wrong here, speed is fine, I like speedy arrows, but there is a higher priority – getting a bow that fits your body size!

I will say here that I have seen more common sense find its way into the market place over the past several years. There are more bows in the 34-inch to 38-inch axle-to-axle length being produced in order to fit the taller guys that need the 32, 33 and 34 inch draw lengths.

So, here are some tips about fitting axle-to-axle lengths of bows to archers of all sizes.

MEASURING DRAW LENGTH

Measuring an archer's draw length is easy but getting it measured correctly requires a little knowledge of proper full-draw-position. An archer can stand in many different positions when he/she draws their bow but only one position uses the back muscles most efficiently to hold and release the bowstring.

Proper full-draw-position requires that the archer stand erect, shoulders level, the bow arm extended (no bent elbow) and the drawing arm/elbow in line with and behind the arrow. This is easy to check from behind the archer's elbow as shown in the illustration. If the elbow is not rotated behind and inline with the arrow then the



Matching any archer to a bow must begin with their body posture in the optimum position for shooting consistently. That position should have them standing erect; chin level, bow arm bones aligned and the drawing arm and elbow in line with the arrow. This alignment will place their draw-side shoulder and shoulder blade in the best position to, first, hold the bow and, second, to tighten back muscles in order to consistently execute the release of the arrow.

DEALER WORKBENCH

By Larry Wise

length

holding of the bowstring must be done with the arm muscles – holding with back muscles is far more consistent. Holding with arm muscles promotes inconsistent releases with the release hand pulling out to the side instead of straight away behind the arrow. (See the series of three photos on the bottom of this opening spread.)

The elbow can be rotated too far around. In this over-rotated position the back muscles are compressed and rendered near useless for providing that rotational force on the elbow that is necessary to cause a consistent release.

With the archer in the correct position shown – release arm in line with the arrow - use a measuring arrow to determine the distance from the nock to the pivot point in the grip. This distance matches the arrow rest-mounting hole in most compound bows. This distance is defined as the True Draw Length of the archer.

The ATA standard is calculated by adding 1-3/4 inch (1.75 inch) to the True Draw Length. This measurement takes into account the width of the riser between the pivot point and the back of bow (target side) and is how bows must be ordered. The ATA standard must be used so that your customer buys arrows long enough to avoid



Measuring an archer's true draw length is easy with a marked arrow. Have the archer draw the measuring arrow to full-draw position as defined earlier. Read the measure from the nock to the grip pressure point or to the arrow rest-mounting hole (they usually match). This measurement is the true draw length and can be used to determine the ATA Standard by adding 1-3/4 inches (1.75 inches). The illustration shows a true draw of 27.5 inches to the grip pressure or pivot point. The ATA draw length would be $27.5 + 1.75 = 29.25$.



Many archers draw short of the proper full-draw-position. Here the draw-side elbow is not rotated behind and in line with the arrow resulting in the archer's holding the bow with his/her arm instead of the back muscles. In this position the drawing arm never gets to relax and releasing the arrow is inconsistent at best – it fails under pressure!



Some archers overdraw the bow. In this position, the drawing elbow is rotated beyond the line of the arrow so that the back muscles needed to hold and execute the shot are compressed and not fully useful. Once again, shooting with this posture produces inconsistent results.

pulling them off the arrow rest – short arrows are just too dangerous so we must avoid any confusion on the issue.

Most of the archers I coach, about 70 percent, do not have the correct draw length setting when they arrive at my door. Most have their bow set too short for them because they are not postured correctly at full draw as defined above. As they learn and understand what is required from the back muscles and skeleton they quickly align their drawing arm correctly and feel the difference in consistency. Loading the skeleton and relaxing the drawing arm also pays big dividends in accuracy and that, I assume, is what we all are after.

Let the archer's body position determine the draw length that they need. I could give you several mathematical formulas to use but none of them take into account all of the anatomy and release aid variables encountered so rely on the archer's body to tell you what he/she needs.

BUILDING & DESIGNING DIFFERENT DRAW LENGTHS:

I'm six-foot, two. Well, I used to be that tall (I think I'm 6 foot 1 inch now) so the years have taken their toll although I still shoot a 31 inch draw length bow. That can be a reference for you to use with all the tall guys that come into your shop. If they're over 6 feet tall they will need at least a 30 inch draw length bow. If they're 6 feet 3 inch to 6 feet 4 inch then you should be

thinking about a 32 inch draw length bow. If they're even taller then you'll need to special order a bow that is 33 or 34 inches in draw length.

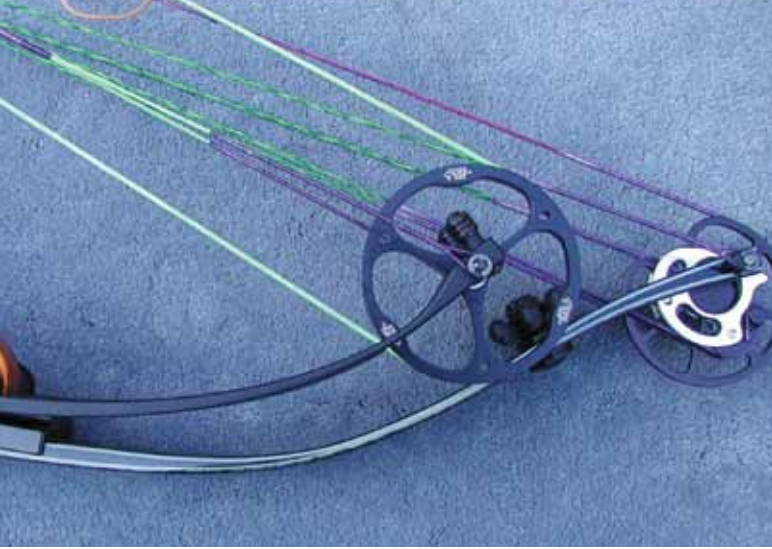
It's nice to sell the bows on your rack but let's face it; you don't stock many bows that give 32 inches or more. All those short 32 inch axle-to-axle compounds probably won't make a draw length of 32 inches so you'll have to sales pitch something longer. Our primary focus should be getting the customer properly outfitted so he/she can shoot accurately.

LONGER AXLE-TO-AXLE DISTANCE: There are several bow-design concepts that create more draw length. I'm sure, you're aware of most of them but for the newer dealers reading ArrowTrade let me outline them. First on the list of lengthening features is the longer axle-to-axle length. A bow that is 36 to 38 inches long has the potential to significantly increase draw length over the 32 inch axle-to-axle bow provided that they have the same brace height and same wheel diameter. An increase of 4 inches in axle-to-axle length increases draw length about one inch if all else is held constant.

CAM SIZE: A second design feature that increases draw length potential is cam diameter. The larger the cam diameter, and therefore circumference, the more bowstring that is required to wrap around it. This in turn means that the string must be drawn a longer distance in order to unwrap itself from the cam and get the bow to full draw. PSE uses a smaller cam system to generate shorter draw lengths on their X-Force Short Draw model. With the smaller cam this bow makes 24-27 inches of draw as compared to 26-30 inches on the standard X-Force cam.



The PSE X-Force is a good example of what can be done with a bow to achieve different draw lengths using different handle designs. The standard reflex handle (center) gives a brace height of 6 inches while the long draw handle at right is reflexed less to give an 8.5 inch brace height and draw lengths up to 33 inches. The X-Force Super Short (far left) uses a handle that shortens the bow from 33 inches axle-to-axle to 26-5/8 inches axle-to-axle. This allows this model to provide draw lengths as short as 26 inch.



with a brace height of 6 inches while the X-Force Long Draw has a more straight-line handle with a brace height of 8-1/2 inches thus allowing the LD model to produce draw lengths of 30 to 33 inches with the same limbs and cam.

LONG-DRAW GUIDE

So here's the guide for tall guys: If he's over 6 feet tall and wants to shoot with good model form he'll need a bow that is 36 inches long or longer, big cams and a brace height of 7.5 inches or more. If he insists on a shorter bow then he'll need hellish big wheels – make sure he knows that. Most of these guys want the advertised speed of the short bows not realizing that they may not get a draw length long enough to suit their needs. Many of them also don't realize that with their longer draw length they can get that speed with a longer axle-to-axle bow by storing more energy over a longer distance – and the bow will fit them. (ATA below refers to bow axle-to-axle length.)

GUIDE: 6' ARCHER => 30" ATA

People of heights over 6 feet 4 inches will need to combine several of the features mentioned above. A 38 inch axle-to-axle bow is a must in order to build a 33 to 34 inch draw length bow – chances are even better with a 40 to 43 inch bow.

The longer limbs of the Barnsdale bow give it a higher brace height and less string angle at the nock at full draw. The shorter 12 inch PSE limbs of course provide a lower brace height, more speed but a sharper string angle at full draw. It's easier to generate long draw lengths with the same size cam using longer limbs because it makes the bow longer axle-to-axle but the shorter bow is faster.

BRACE HEIGHT: One of the more obvious draw-lengthening features is brace height. If the handle riser has a deflex design (the handle grip section curves away from the archer) and, therefore, a higher brace height then, if all other factors are held constant, the bow has a longer draw length by the amount of deflex. Deflex risers have anywhere from 1/4 inch to 1 inch more draw length over a straight-line design and many times over 2 inches more than a reflex designed riser. Typical numbers to look for here are 9 to 9.5 inch deflex brace heights versus 6.5 to 7.5 inches for reflex risers.

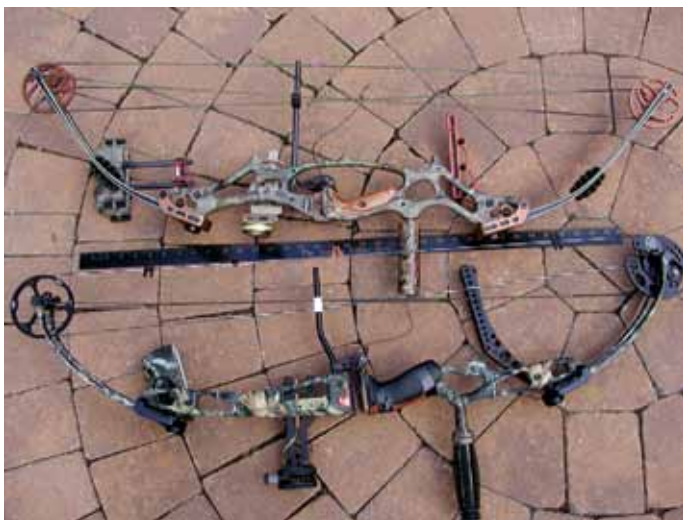
LONGER RISERS AND LIMBS: There are several other methods for making a bow longer axle-to-axle. First is the actual length of the riser. Longer risers will make the axle-to-axle length longer if all other features are held constant. A second method having the same effect utilizes longer limbs; having 14 inch limbs versus 12 inch limbs will make a bow 2 to 3 inches longer depending on the mounting angle between the limbs and the riser.

DEFLEX AND REFLEX RISERS: PSE uses a fourth method, as do several other bow manufacturers. That method incorporates handle risers with different amounts of reflex to alter the brace height. The base-model X-Force has a reflex handle

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My PSE Shark hunting bow is 38 inches axle/axle and has no trouble giving me the 31 inches of draw length I need. Neither did the Hoyt Protec I used last year. In fact, with the largest cam on the Hoyt 3000 limbs (41 inches axle/axle) the bow can give 34 inches of draw length for the really tall guys.

I know a good candidate for the long draw would be the Hoyt Protec I have hanging on my wall. With the longer 3000 limbs and the biggest Cam & 1/2 this bow will make 34 inches of draw length with an axle-to-axle length of 41 inches and brace height of 8.75 inches. My Mathews Apex is another good candidate at 42-1/2 inch axle-to-axle and an 8 inch brace height.

MEDIUM-DRAW GUIDE

This is easy! Most of the bows made today are for the average "Jack & Jill". That means most bows are made to fit guys and gals having draw lengths in the range of 27 to 30 inches. Adjustment ranges on cam systems that are made to fit multiple draw lengths often cover this 4-inch span since about 70 percent of archers fit it – just check any

bow manufacturer catalog.

GUIDE: 5' 9" ARCHER => 28" ATA

SHORT-DRAW GUIDE

This category includes youth and women as well as shorter men. Draw lengths under 27 inches are almost as difficult to fit as the long-draws because of product availability but the good news these days is that there are more short-draw bows available than in the past. And they are adjustable to fit that growing youth.

My friend Josh is about 5 feet 6 inches tall and a very good shot. You can use him as a good example of a 26 inch draw length. Properly postured with his draw arm inline with the arrow he needs a 26 inch draw length bow using the ATA Standard. That includes a D-loop, release aid and the standard removal grip on the riser.

GUIDE: 5'6" ARCHER => 26" ATA

This 26-inch draw length then will require some design considerations. To fit this draw length you will need a 32-inch axle-to-axle bow adjusted to the shortest draw setting. Some 33-inch long bows may adjust to 26 inches but you'll find that bows similar to the PSE X-Force Short Draw will put 26 inches in the middle of its 24 to 27 inch draw length adjustment range. However, the Bear Truth 2 in its standard 33 inch form uses modules to fit lengths from 24 to 30-inches.

GUIDE: 5' 2" YOUTH => 24" ATA

The short draw lengths will require design features like shorter handles, smaller cams and more reflex risers (lower brace height) or a combination of these features. So, for draw lengths under 27 inches you'll have to consider a bow that is not one of the standard models.

The design most likely to give the greater speed will utilize the reflexed handle. The lower brace height of this bow will translate into a longer power stroke for the shorter archer and that, as you know, can produce as much as 10 fps more speed per inch of draw stroke

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A typical design for making a versatile cam uses draw length modules to control how much buss cable wraps around the cam during the draw stroke. The smaller Ni Cam Module marked with the C,D,E,F lettering makes this PSE Shark model yield 26, 27, 28 and 29 inches. The larger module mounted on the cam makes lengths from 28 to 31 inches. Some other popular module systems use a different size module for each draw inch of draw length.



My friend Tony bought this Diamond youth for his growing daughter, Makenna. The cams are small on this 33 inch axle-to-axle bow to control the draw length. The bow draws to a moderate amount of peak weight and holds it there through the remainder of the draw stroke allowing the youth to draw to their proper full draw position whatever it is.

increase. The down side is the increase in string slap against the shooter's forearm. Since the low brace height bowstring starts closer to the shooter's bow arm and must finish there it can produce more arm contact.

SYSTEM ADJUSTABILITY FEATURES

Getting anyone properly fit with a bow depends on more than just its axle-to-axle length, it also depends on the draw length adjustability features of the bow. We have to do more than just get the draw length "close"; we have to get it correct within +/- 1/8 inch. A bow that is a half-inch short for a guy will leave him struggling with his draw-arm out of position; he'll be holding the bow with his arm muscles instead of transferring the hold into his back muscles. A half-inch too long will also put him out of proper position, a position he/she may not be able to reach when outfitted for cold weather and drawing on a deer from a treestand.

MODULES: I like the module system as a means of adjusting draw length on a bow. Just remove two or three screws, rotate or change the module and replace the screws. In most cases a bow press is not needed so it's really simple to get the bow properly fit to the shooter.

For a shop owner, the module system is a tremendous advantage because you don't have to stock a lot of bows. All you need is to have a supply of modules on hand to fit the range of draw lengths for that particular bow model. So, it's a win-win situation, you can make the bow fit the archer and you don't have to stock 50 bows to do it.

STRING ANCHOR POSTS: Many of the bow manufacturers are designing extra string-anchor posts into their cams. This second or third anchor post allows the user or dealer to alter the draw length of the bow by attaching one end of the bowstring onto a different anchor post. In many cases the two posts are labeled

with a zero (0) for standard and a minus (-) for the shorter draw post. If there are three posts they may be labeled with letters, A, B, and C for the longest, medium and shortest settings.

By moving the bowstring from the standard post to the short-draw post you are removing string from between the two wheels/cams and effectively making the string shorter. This rotates the cam into the draw stroke a small amount thus reducing the distance the cam needs to be drawn to reach full draw. The result is a slightly higher brace height and a 1/3 inch to 1/2 inch shorter draw. This is simple and very effective but does usually require a bow press of some sort.

If there are extra anchor posts on both sides of the cam you do not have to adjust both string ends at the same time. It is easier if you do because the nocking point will not be affected. If you adjust one side only then you will have to relocate the nocking point and peep to their proper height relative to the arrow rest. It's a good idea, however, to check the nocking point any time you adjust draw length no matter what method you use.

WHEEL/CAM SIZE CHANGES: Adding or deleting twists from the power or "buss" cable can alter compounds with a dedicated-draw-length cam. These adjustments are small but can be made using a bow press. Be careful to maintain the cam within its optimal rotation range indicated by markings on most cams.

If you have to rotate the cam out of its optimal range then its time to switch to a different cam size to match the needed draw length. This is why many dealers have a few extra cams available for customer trade-ins. Although, I do know some dealers who do not stock extras but, instead, order new ones on request; they feel that stocking cams ties up too much money.

D-LOOPS: You always have the d-loop to help you adjust draw length a small amount. I often have to

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lengthen my students' bows by this method. The primary focus of my shooting schools is to get archers standing with the proper posture and that requires that their bow be correctly adjusted to match their needs. If they need a 1/4 inch more draw length then the d-loop is the easiest way to get it because you have to change nothing else in the system...and its cheap! I always have a spool of BCY release rope with me for this purpose.

In radical cases where the bow is several inches too short for the archer, I've tied on d-loops that were 2 and 3 inches long. Yeah, we don't want to leave the bow this way but until we get the right module or the correct cam size this gets the guy in the correct posture so he can use his back muscles more and his arm muscles less. It's no different than cutting the toe-end out of a pair of sneakers that are too small for your feet – it doesn't look so good but it feels great.

RELEASE-HEAD LENGTH: Many bowhunters, as well as target shooters I know switch release aids as often as they change shirts. Most of these shooters don't realize it but they're changing the draw length of their bow/d-loop/release system because the release heads are all different lengths. That means that when they switch from a caliper release to a thumb model their drawing arm and hand are either a little further from the bow or a little closer.

More importantly, their full-draw-position has been affected and may be out of the optimum range for using back muscles. If their drawing arm is not rotated inline with and behind the arrow then they will have to hold and activate their release aid with arm muscles and, as mentioned before, this is a highly inconsistent method of shooting.

It's simple to deal with the differing release aid head lengths by compensating with the d-loop length. If the release head is long, shorten the d-loop, etc. The primary concern is for the entire bow/loop/release system to be of sufficient length to allow the archer to establish and maintain proper body alignment.

BOW GRIP SHAPE AND STYLE: Lots of bows have removable grips and, of course, archers remove them. When you see your customer has done this please remind them that they have effectively increased their bow's draw length. The amount of change is equal to the thickness of the removable grip at the bow-hand pressure point; this is usually about 1/4 to 1/2 inch. If the increased draw length puts their body in correct alignment then all is well. If not then the d-loop needs to be shortened, the module needs to be changed or some



Different release aids and different length release heads must be figured into matching bows to shooters of differing heights. Switching to the longer release head will dictate shortening the d-loop or the bow's draw length in order for the system to remain the same length. Adjusting the d-loop length is an easy and cheap way to change draw length.

other compensation has to be made to reestablish the draw length that matches the shooter.

BOWHUNTING

It's a given fact that most of you customers are bowhunters. As such they will want that really short and fast bow and it's always nice to sell them what they want. Some will be hunting from tree stands, some from horseback and still others from ground blinds. Regardless, they need a bow that, first, fits their draw length. And, that, as you know, often dictates a certain range of axle-to-axle lengths.

So, if what they want is not a good match for them and will prevent them from shooting effectively then ya' gotta' say something to them. You'll have to educate them a little in hopes of getting the appropriate match between their height and axle-to-axle length. If they decide to ignore your advice then so be it. But you did your part to make it right and archery will be better for it.

Good luck educating bowhunters!!! **Larry Wise**

EDITOR'S NOTE: Larry's books are available from Larry Wise Archery, Rural Route #3, Box 678, Mifflintown, PA 17059 for \$11.95 + \$1.50 S & H. Titles available are "Tuning Your Compound Bow", "Tuning and Silencing Your Bowhunting System", "Tuning and Shooting Your 3-D Bow" and "Bow and Arrow: A Complete Guide". Larry is also available to conduct one and two day CoreArchery Academies on shooting form. To contact him by email, use larrywise3x19@embarq-mail.com. The phone number for Larry Wise Archery is (717) 436-9168.

