

*Thank you for your purchase.*

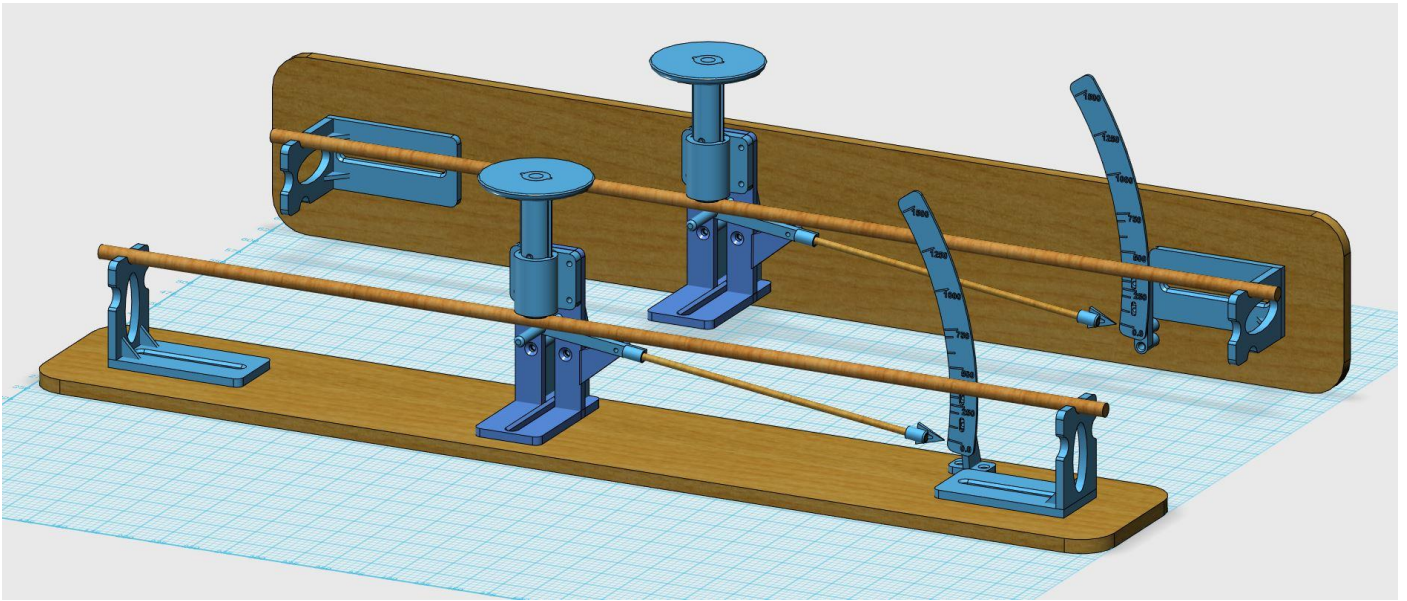
*Please download the instructions and charts from (case sensitive)  
<http://soft-sol.co.uk/inst.pdf>*

*If the pdf opens in your internet browser choose save as from the  
file menu to save pdf to your desktop.*

*I have tried to make the instructions as comprehensive and simple  
to follow as possible but if you are having any problems or have  
suggestions on improvements you can email me  
[Web-admin@bronte-archers.co.uk](mailto:Web-admin@bronte-archers.co.uk)*

## Software Solutions Arrow Spine Tester Guide.

*A flexible inexpensive adaptable spine tester kit for people with a budget.*



### Getting Started. In The Kit.

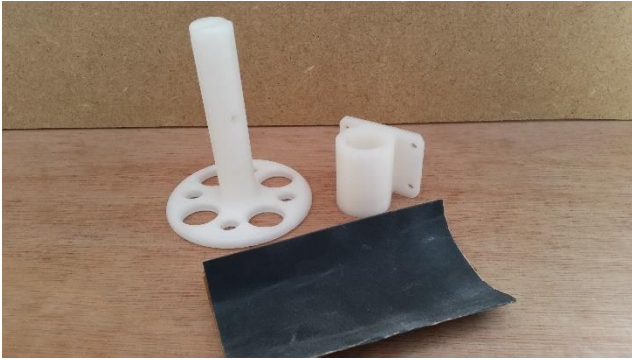


- 2 x End Stop arrow rests.
- 1 x Weight Container.
- 1 x Gauge.
- 1 x Main Plunger Stand.
- 1 x Plunger Guide.
- 1 x Plunger.
- 1 x Wall / Surface Gauge Mount.
- 1 x Bag of Bolts.
- 1 x Pivot Arm.
- 1 x Wood Pivot Arm Extension.
- 1 x Pivot Arm Pointer.
- 1 x Arrow Stand (for use with digital scales) (Scales not included).

#### Items Required

- Lead shot for weight.
- (1.94lb or 879.97grams Easton Scale) or (2lb or 907.185grams AMO Scale)
- (Available from diving suppliers amongst others)
- Some form of base or back board. (Plans included)

## Preparation:



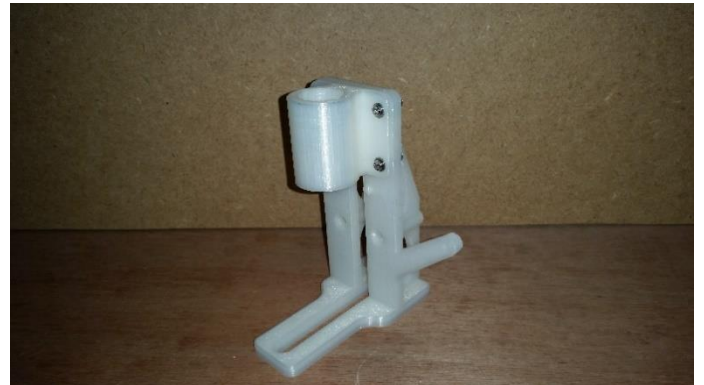
You may need to lightly sand the plunger shaft and runner for a smooth operation.

## Assembly:



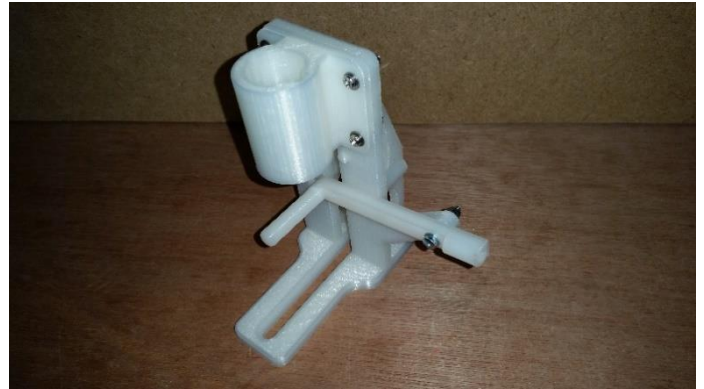
**Stage 1:** The Plunger stand and plunger runner assembly using the four bolts supplied.

**Do Not Over Tighten Bolts.** A nip up will do.



**Stage 2:** Pivot Arm assembly.

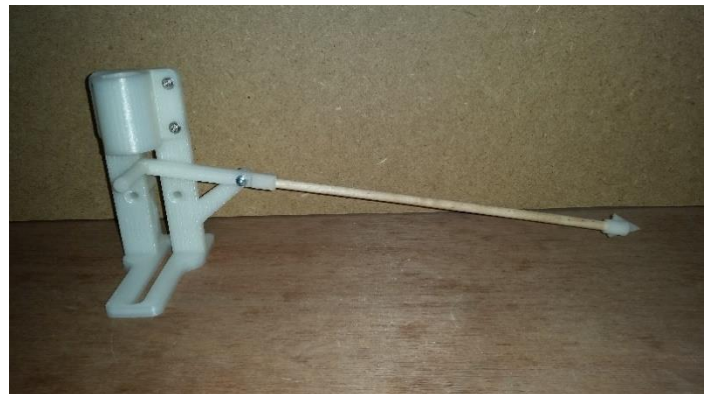
Important to place a washer between the Pivot Arm and the stand.  
Nip up bolt then loosen slightly to ensure free movement without wobble.



**Stage 3:** Arm assembly.  
You may need to lightly sand wood arm ends to fit snugly into pivot arm and pointer end.



Ensure that the wood arm is fully seated into pivot arm and pointer. You can glue this together, I recommend using an epoxy for this.



**Stage 4:** You can now insert the plunger and locking pin.



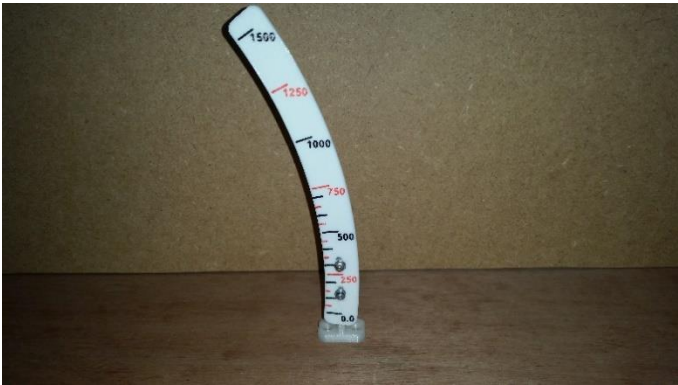
**Stage 5:** Choose which Gauge to use, AMO or Easton.





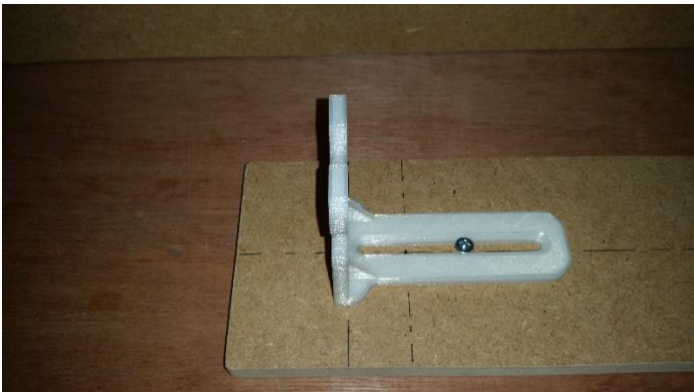
Stage 5: Choose which Gauge to use, AMO or Easton. Cut out the chosen scale and glue (low tack glue like Pritt stick) to back plate, once dry trim edges carefully.

Stage 6: Assemble Gauge.



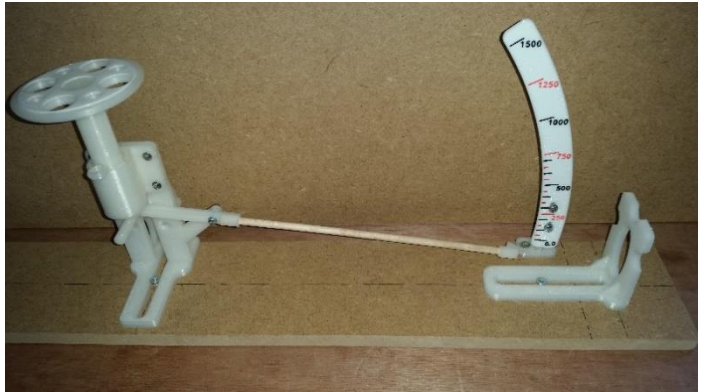
Assembled surface mount Gauge.

Parts are now assembled.



Example mounted Left End Stop Arrow Rest.  
**Do Not Over Tighten Screws** this will cause brakeage, just a nip up will do.

**Stage 7:** Mount the parts, Example of surface mounted.



**Stage 8:** Use a Carbon or straight shaft to zero scale.



Make sure plunger is locked while zeroing scale.



**Stage 9:** If you do not have an accurate scales to make your weight simply zero the scales with a carbon arrow of a known spine then add lead shot until the scale reads correctly for this arrow. (As carbon arrow spines are very accurate this method works well)





If you have access to digital scales, when you add lead shot make sure you include lid and plunger to get most accuracy.

Example of spine tester in use.



***You're now ready to start to match your arrows.***

Make sure base board or mount is on a hard flat surface that does not bend.

When checking an arrow make sure the pointer moves freely and is not obstructed in any way.

Make sure plunger has locking pin in place.

Place arrow or shaft on end rests and under centre of plunger.

Ensure the pointer is on zero, if not adjust.

Remove locking pin and lower plunger to shaft (No weight on at this stage).

Carefully add weight to top of plunger, making sure that the weight is central and the plunger moves freely.

You can raise and lower the weight a few time to make sure reading is constant. (If not constant something is binding).

***Thank you for choosing Software Solutions Arrow Spine Tester.***

## **Spine Explained & Useful Information.**

*AMO scale used in these examples.*

By: Justin Scott

### **What is spine?**

Spine is a measure of stiffness. How much backbone does that arrow have? That is correct-spine as in backbone, Long ago W. J. Rheingans and Forrest Nagler worked out a formula for measuring arrow stiffness. Most arrow makers use spine charts to sort out their shafts into various categories but the formula used to make that confusing chart is simple. 26 divided by bow poundage gives you the deflection in inches (usually a fraction of an inch) of a matched shaft.

### **For the AMO Scale.**

The arrow shaft is supported at two points 26 inches apart and a 2 pound weight is hung from the center. (A measurement of how much the shaft bends, or deflects, is taken.) Thus a 50 lb spine is  $26/50 = 0.520$  Or for 70 lb  $26/70 = 0.3714285$  (call it 0.371) You'll note that the higher the poundage the less the arrow deflects under its 2 pound load.

(Remember even though you measure with 26" gap the result is for a 28" arrow.)

### **What about draw length?**

The rests for measuring deflection are 26 inches apart but that doesn't mean they are for 26 inch arrows. Rheingans' and Nagler's formula became the AMO standard and provides a baseline to work from to choose the arrow shafts for our own set-ups. That baseline matches bow poundage to arrow stiffness for 28 inch draws.....in theory. At the time the spine formula was developed nearly all bows in America and England were selfbows. Bows made from a single piece of wood or two pieces spliced at the handle. Those bows were almost never centershot though many may have had a small arrow shelf. Let's wait a bit to conclude about draw length and discuss...

### **Bow design?**

For those unfamiliar with the term centershot or confused about it Centershot refers to where the arrow lines up in relationship to the center of the bow. As a practical matter this really means where the line of the string passes in relation to the arrowplate when the bow is in shooting position-the limbs can wander all over the place between the nocks and the nocks may lie on different sides of the bow's center (on some selfbows they DO). On most selfbows the arrow must be "shot around the bow" -The side of the bow holds the arrow tip out so pointing the bow at the target leaves the arrow pointing several degrees to the side (left for a right handed shooter) The fact that the arrow actually can be shot where the bow is pointed is the archers paradox-the correct arrow will bend just far enough that it takes off oscillating back and forth and eventually stabilizes flying in line to the target where the bow hand was pointing rather than where the arrow shaft seemed to be pointing. Obviously arrows for selfbows need to be more flexible than an arrow for a centershot bow that launches the arrow in line with the string, the bow's force and the target. Does this mean that the AMO charts are recommending spines too weak for your bow? Maybe.

### **Rule of thumb:**

1. Wide at the arrow pass selfbows usually need arrows 5-10lbs lighter in spine than the AMO spine charts indicate.
2. Bows with a cut in shelf that approaches centershot but doesn't go all the way to center usually match the spine charts.
3. Bows that are cut to or past center need stiffer arrows than the chart indicates. Sometimes a whole lot more. 5 lbs extra may suffice for a bow cut to center or just beyond but a bow cut deeply past center may need as much as 20 pounds of extra spine.

### **Back to drawlength.**

There is a rule of thumb that says for every inch of arrow shaft above 28 " one should add 5 lbs of spine and for every inch below 28inches one should subtract 5 pounds. While not perfect, it is a good working rule. Please understand that this is talking about selecting stiffer or more flexible shafts based upon your actual drawweight at your drawlength. If you have a bow marked 50lbs @28" and only draw 26 then your shaft selection should reflect the actual draw weight (probably 46lbs), the length of shaft you wish to shoot and the degree of centershot of the bow.



## **Point Weight**

Because inertia is the principle that causes shafts to flex upon release, point weight plays a critical role in spine requirements. Heavy points mean greater inertia and more flex -light ones less. The "standard" point weight is considered to be 125 grains. Considering that Nagler advocated 90 grain broadheads in some of his writings and many target arrows of his day were tipped with things such as bullet jackets It is debatable whether he had this weight in mind but 125s do work for us with our baseline spine measurements. There have been many rules of thumb proposed for adjusting spine ratings to differing point weights. The folks advising 5lbs more spine for each additional 15 grains, 20 grains or 30 grains of point weight are all correct as far as their experience is concerned. If shooter A has arrows that were adequately spined with 125s and they act weak with 140s then 15 grains did indeed push things into a 5lb heavier spine category. (We group shafts into categories such as 50-55 or 50-54 depending upon the supplier). On the other hand shooter B may swap points for some that are 20 grains heavier and still find his shafts fly perfectly. The unknown is whether shooter A. had arrows that were barely stiff enough and shooter B had some that were almost too stiff to begin with. The best advice is shoot and see but if you are trying to startup from scratch and have decided upon a specific broadhead weight my own rule of thumb is that each 25- 30 grains departure from the 125grain standard means 5 lbs of spine in common hunting weights. Heavier points need stiffer shafts (higher spine) lighter need lower spines.

Another issue occasionally mentioned is overall shaft weight-Some archers report a need for greater stiffness when shooting Ash (heavy) compared to Port Orford Cedar (moderately light). There is something to this but it isn't easy to quantify-some Ash shafts are fairly light and some cedars are fairly heavy. Even if you know the weight of the shafts you'll be getting, weight distributed along the full length of the arrow has a less dramatic effect than weight at the ends. To complicate it all, differing woods have different average modulus of elasticity ratings. If I may suggest...just ignore these differences in trying to make an initial shafting choice. The variables are small and there are already so many other variables in selecting arrow shafts you need not complicate your life with them. If you discover later that extra heavy shafts mean buying one spine category stiffer shafts is necessary you can do so.

## **Too stiff or too weak?**

There are many popular tuning methods. This isn't intended to be a tuning primer but for quick reference.... How does one tell if one has the right spine for the setup he/she is shooting? A right-handed archer shooting in the style most of us use grasps the bow in his left hand and draws the arrow with the right. The arrow passes along the left side of the bow. If the arrow is too stiff it will fail to flex around the bow sufficiently and may hit left of the spot it was aimed at. If it is too weak it will flex around the bow too much and tend to hit right of the target. If one is using paper tuning or tail watching methods an overly stiff arrow fliesnock right. A weak arrow fliesnock left.

As you think about the dynamics involved in this bending around the bow it becomes clear why bows with deeply cut shelves require extra spine. Please note that cutting past center isn't a design flaw.-It actually allows the most possible tuning options but it does change arrow behavior. A centershot bow that isn't cut deeply past center will keep the central axis of the arrow slightly to the left of center. That will probably need about 5 pounds of "extra" spine to tune well but will continue to shoot progressively stiffer arrows quite well.-We say that centershot bows are very 'forgiving' with good reason. If the bow is cut 3/16ths of an inch or more past center the central axis of 5/16ths and 11/32nds shafts will actually lie to the right of center and lots of stiffness is needed to cause that arrow to kick back into line. Otherwise the arrow starts out pointing a bit right and acts as if it were weak. Of course the archer also has the option of building the arrowplate out and thus change the alignment, dynamics and tune of the arrow. All of this was written for right-handers. -The sinisterly inclined suffer through life having to reverse all instructions.

## **Summation**

Correctly matching arrow stiffness to the bow is essential for best arrow flight and maximum enjoyment of your bow not to mention optimum penetration on game. Check length. Decide on desired point weight. Add or subtract poundage to the actual draw weight based upon degree of centershot, deviation from 28 inch standard length, and deviation from 125 grain standard points. Consider the inter-relationship of the variables. If your shafts seem too stiff you can add point weight. If they act as if they are too weak and your bow is cut past center you can build out the arrow plate with a bit of leather or moleskin. Starting with your arrows cut long allows you to play with other variables and still have a fine tuning adjustment available by

shortening in small increments. Nothing is more satisfying than perfect arrow flight to the center of your target. I hope this helps some to achieve that perfect flight.

**Disclaimer**

Actual results may vary with humidity and barometric pressure. Dedicated archer on test course. Your mileage may vary. Never drink and drive. No vegetarians were harmed in the making of this article. Always wear appropriate protection. Not valid with any other offer.

Justin Scott Canon City, Colorado

**Easton Scale Spine Chart (Longbow refers to American Longbow or Flatbow)  
Deflection Measured at 28" with 1.94lb or 879.97grams weight.**

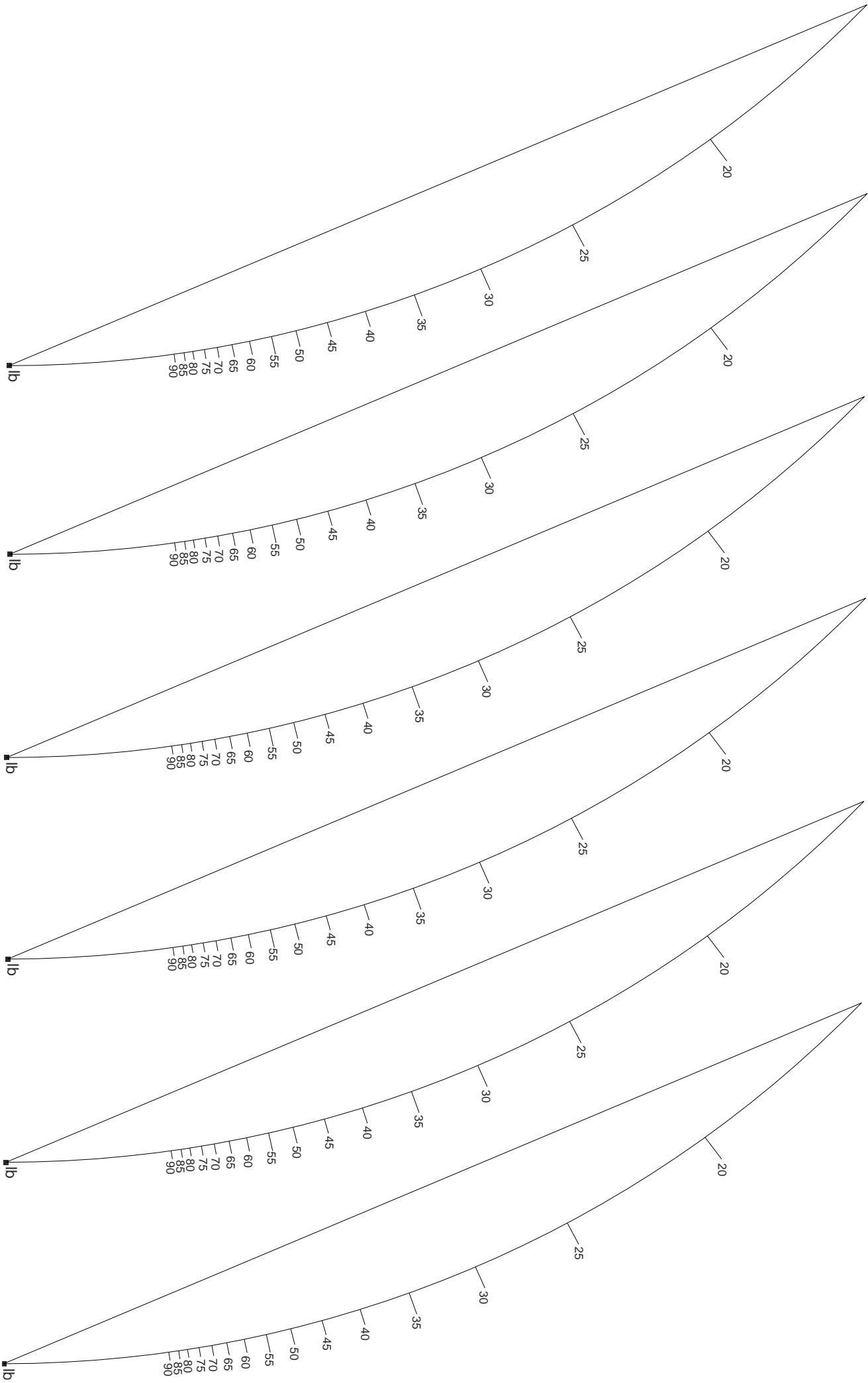
RECURVE FINGER RELEASE			ARROW LENGTH												LONGBOW FINGER RELEASE		
*PEAK BOW WEIGHT LBS															*PEAK BOW WEIGHT LBS		
*POINT WEIGHT			MEASURED FROM THROAT OF NOCK TO POINT TIP												*POINT WEIGHT		
200 Grains	150 Grains	100 Grains	23"	24"	25"	26"	27"	28"	29"	30"	31"	32"	33"	34"	100 Grains	150 Grains	200 Grains
<25	<25	<25	600	600	600	600	600	600	600	600	500	500	500	400	30-35	25-30	<25
<25	<25	25-30	600	600	600	600	600	600	600	500	500	500	500	400	35-40	30-35	25-30
<25	25-30	30-35	600	600	600	600	600	500	500	500	500	500	400	400	40-45	35-40	30-35
25-30	30-35	35-40	600	600	600	600	600	500	500	500	500	400	400	400	45-50	40-45	35-40
30-35	35-40	40-45	600	600	600	600	500	500	500	500	400	400	400	400	50-55	45-50	40-45
35-40	40-45	45-50	600	600	600	500	500	500	500	400	400	400	400	350	55-60	50-55	45-50
40-45	45-50	50-55	600	600	500	500	500	500	400	400	400	350	350	350	60-65	55-60	50-55
45-50	50-55	55-60	600	500	500	500	500	400	400	400	350	350	350	350	65-70	60-65	55-60
50-55	55-60	60-65	500	500	500	400	400	400	400	350	350	350	350	300	70-75	65-70	60-65
55-60	60-65	65-70	500	500	400	400	400	350	350	350	350	300	300	300	75-80	70-75	65-70
60-65	65-70	70-75	500	400	400	400	350	350	350	300	300	300	300	250	80-85	75-80	70-75
65-70	70-75	75-80	400	400	400	350	350	300	300	300	300	300	250	250	85-90	80-85	75-80
70-75	75-80	80-85	400	400	350	350	300	300	300	300	300	300	250	250	90-95	85-90	80-85
75-80	80-85	85-90	400	350	350	300	300	300	300	300	300	300	250	250	95-100	90-95	85-90

Please visit an authorized dealer for proper sizing or see our sizing chart on [BlackEagleArrows.com](http://BlackEagleArrows.com)

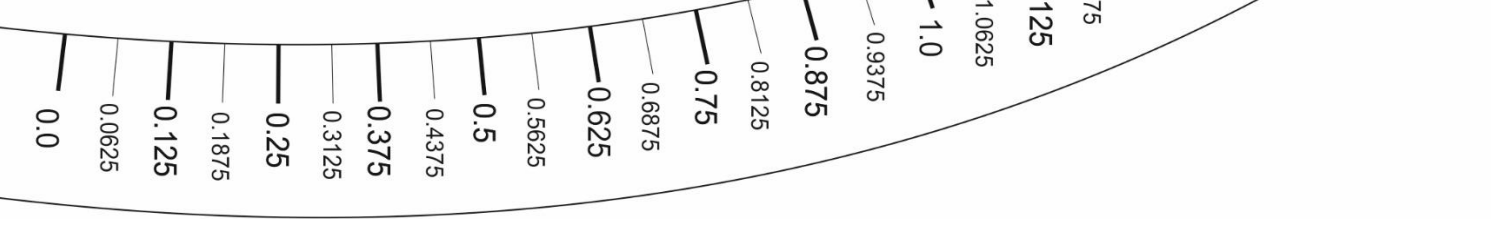
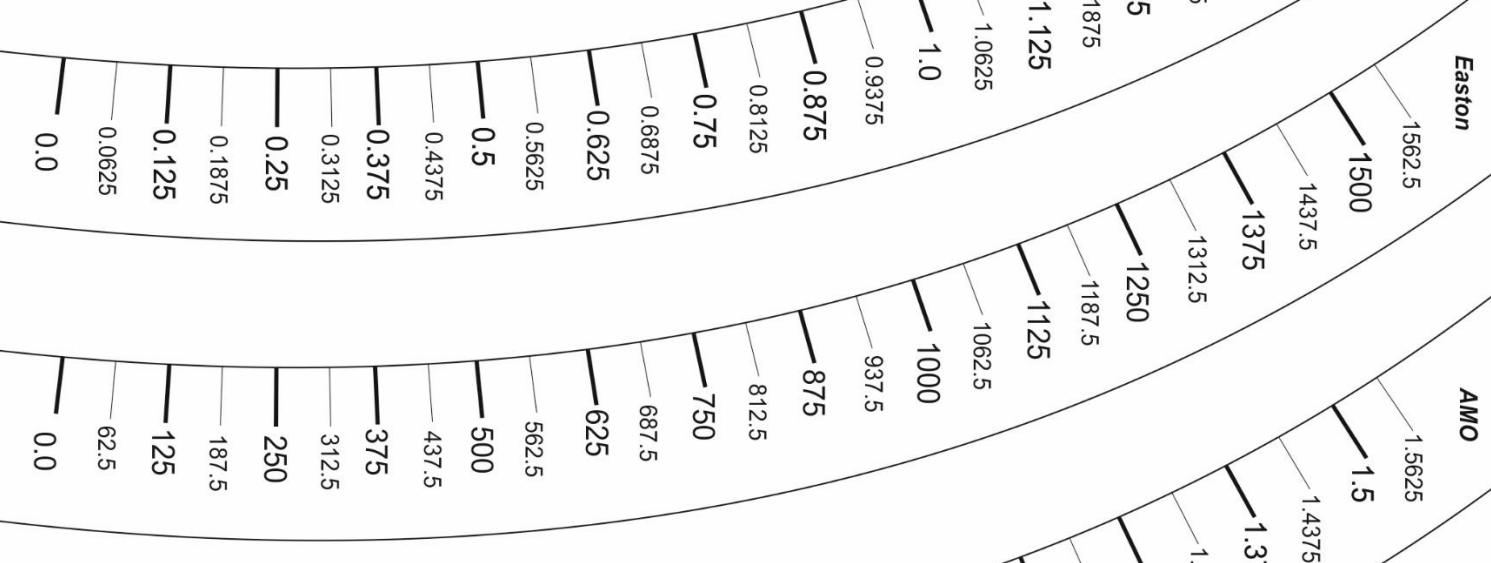
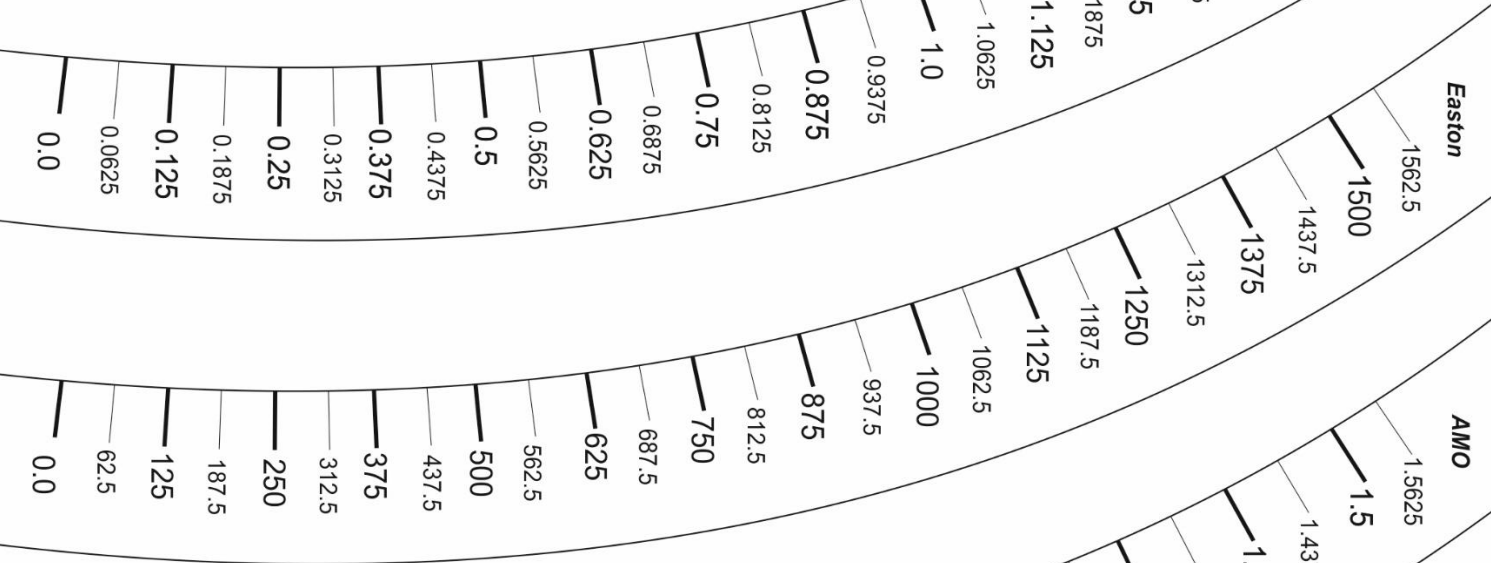
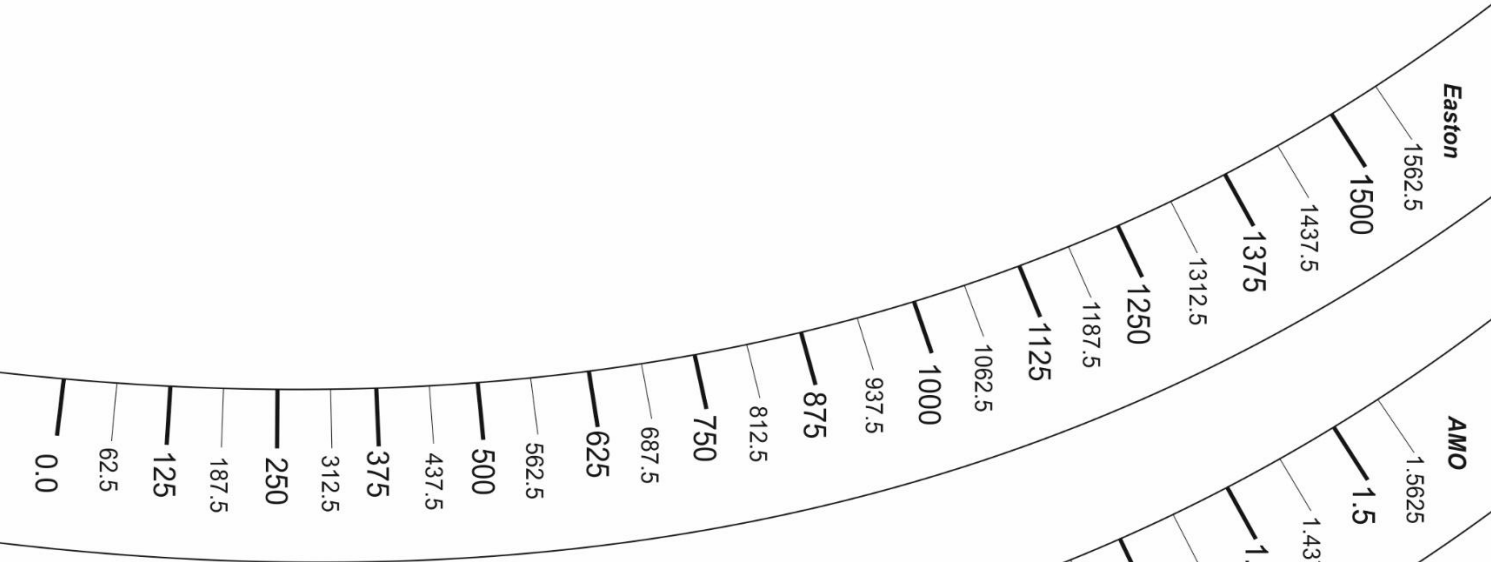
**Amo Scale Spine Chart (Used by UK Longbow users)  
Deflection Measured at 26" with 2lb or 907.185grams weight for 28" Arrow.  
Arrow Size Rule of thumb: Ever inch over 28 add 5lb, under minus 5lb.**

AMO SPINE CHART		
1.300 - 20#	.566 - 46#	.366 - 71#
1.248 - 21#	.555 - 47#	.361 - 72#
1.196 - 22#	.543 - 48#	.357 - 73#
1.144 - 23#	.532 - 49#	.352 - 74#
1.092 - 24#	.520 - 50#	.347 - 75#
1.040 - 25#	.511 - 51#	.343 - 76#
1.005 - 26#	.501 - 52#	.338 - 77#
.971 - 27#	.492 - 53#	.334 - 78#
.936 - 28#	.482 - 54#	.329 - 79#
.902 - 29#	.473 - 55#	.325 - 80#
.867 - 30#	.465 - 56#	.321 - 81#
.842 - 31#	.457 - 57#	.317 - 82#
.817 - 32#	.449 - 58#	.314 - 83#
.793 - 33#	.441 - 59#	.310 - 84#
.768 - 34#	.433 - 60#	.306 - 85#
.743 - 35#	.426 - 61#	.303 - 86#
.724 - 36#	.420 - 62#	.299 - 87#
.706 - 37#	.413 - 63#	.296 - 88#
.688 - 38#	.407 - 64#	.292 - 89#
.669 - 39#	.400 - 65#	.289 - 90#
.650 - 40#	.394 - 66#	.286 - 91#
.636 - 41#	.388 - 67#	.283 - 92#
.621 - 42#	.383 - 68#	.280 - 93#
.607 - 43#	.377 - 69#	.277 - 94#
.592 - 44#	.371 - 70#	.274 - 95#
.578 - 45#		

# Armo Scale In lbs







# Base or Back Board Design

