Tune for Tens

http://texasarchery.org/resources/39-tuning

FOREWORD

An important part of archery is the equipment. The skill of the archer is also important but if the bow is not properly tuned, the archer's skill is obscured. Tuning can be achieved in a short period of time by following these steps carefully. The archer that puts the most time and effort into equipment will have the most success.

There are several steps to tuning a recurve bow. First set the brace height as specified by the manufacturer before setting the nock point. Changing the brace height will nearly always affect the proper nock point. Use the chart at the end of this document to record the brace height and always verify when reassembling your bow.

SECTION 1: Set the plunger to proper depth by removing the spring
NOTE: This step is the same for left hand (pull bowstring with left hand) and right hand (pull bowstring with right hand) archers:

1A: 

The PLUNGER has a SPRING controlling the horizontal movement of the arrow. When tuned properly, the PLUNGER will prevent the arrow from moving past center in case of a bad shot.

1B: 

Remove the SPRING from the PLUNGER.

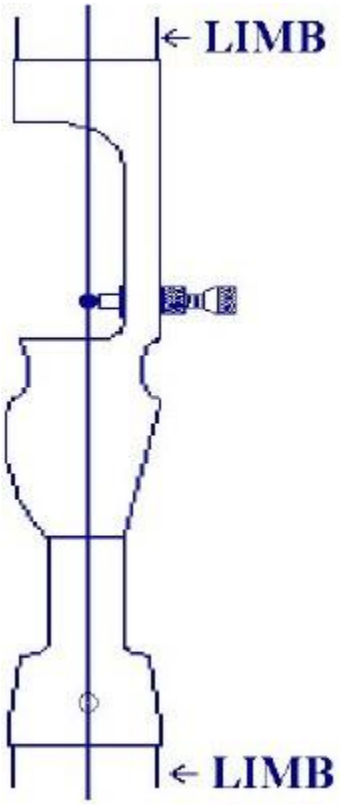
1C: 

Needed to make the plunger STIFF.
(replaces the spring in the plunger)

1D: 

Cut a wooden MATCH or piece of WIRE about 3/4" long and insert to make the PLUNGER stiff. The STIFF PLUNGER will help tune the arrow.

1E: Install Stiff Plunger

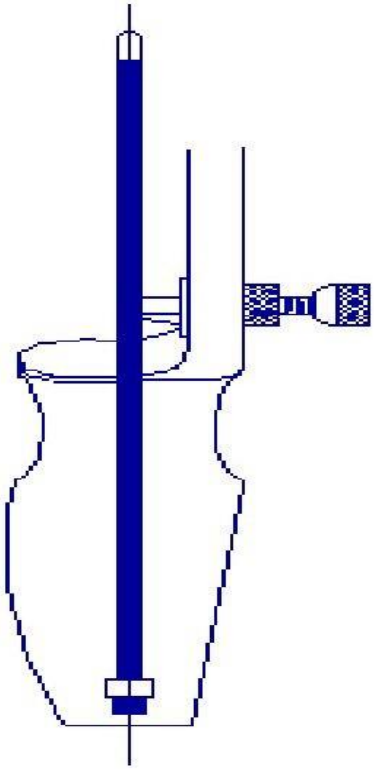


Remove the center stabilizer and the sight if necessary.

Place the bow in a stand or lean the tip of the bow forward against a wall to allow a clear view of the alignment of string and riser/limbs. Do not lean to a side that causes the limb(s) to distort.

The string should be centered as pictured.

1F: Adjust Stiff Plunger



Re-install the stabilizer and sight if removed in step 1E.

Adjust the stiff plunger so that the bare shaft is in-line with the center of the bow.

The string should be aligned with the arrow as pictured.

The bow is ready to shoot.

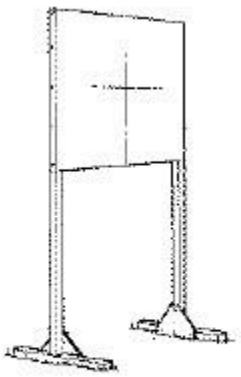
SECTION 2: Paper Tune Setup

2A: This step will:

(i) Determine if nock point is correct. (this is a correctable)
(ii) Determine if arrows are stiff or weak (this may be correctable)

WHY A BARE SHAFT? If shot at short distance through paper into a matt, a bare shaft 'may' reveal an improper tune since aerodynamics 'may' not straighten the arrows' flight. It will fly sideways through the paper creating a tell-tale pattern if the tune is bad.

Fletching will straighten the arrow's flight and will make this first stage of tuning more difficult.



The TUNING FRAME consists of a frame to hold a sheet/piece of paper at the proper height in front of the target matt. You will need at least one arrow with no fletching (aka bare shaft). It is better to have several bare shafts so that you can compare them and make sure they all behave the same.The paper can be tissue, newspaper, paper bag or butcher paper as long as it fits the frame and will tear cleanly as arrows pass through.

TUNING FRAME

BARE SHAFT

versus

ARROW

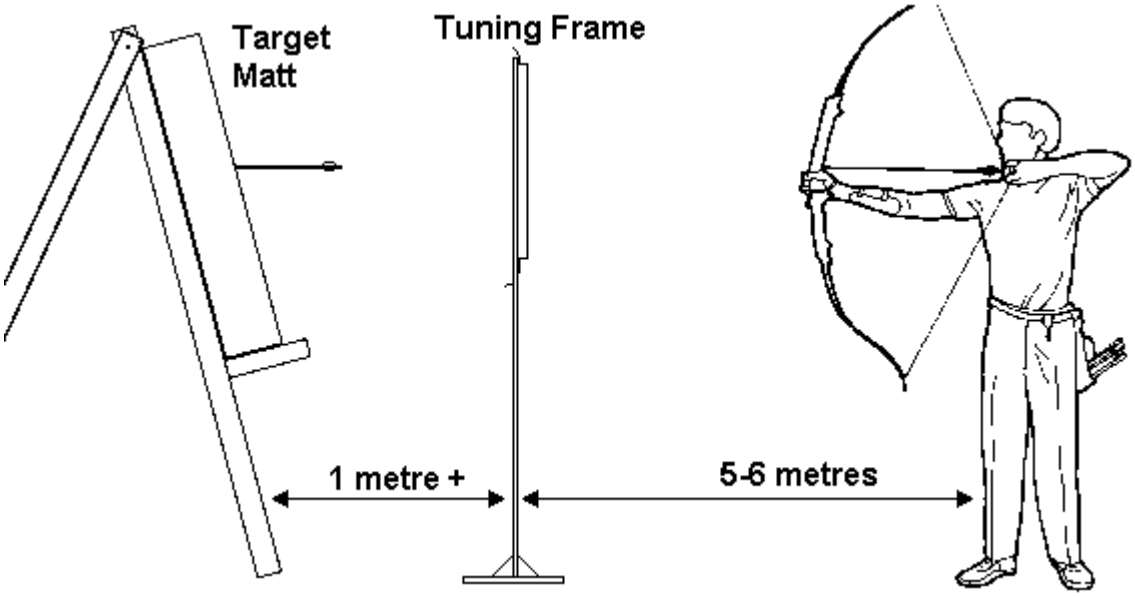
2B: Method

The nock point must be set so the bowstring pushes the arrow straight forward rather than up nor down.

Stand 5 to 6 meters from the tuning frame.

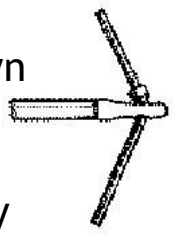
The target matt should be 1 to 2 meters behind the frame so the bare shaft will pass completely through the paper before it hits the target matt. Shoot the bare shaft though the paper about shoulder height to allow for a parallel flight. The shape of the tear in the paper will indicate the current tune. The tear may have both a vertical and a horizontal tear.

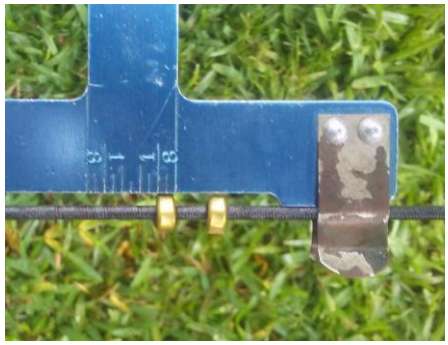
Adjust for the vertical tear first.



2C: Nock Point

The figure on the right is a starting point. Brass nock-sets can be moved up and down until the correct position is determined during the tuning process. More information on setting the nock point may be found in Section 3 on page 6.

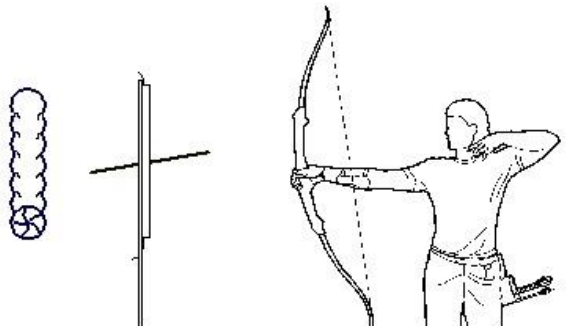




SECTION 3: Setting the Nock Point

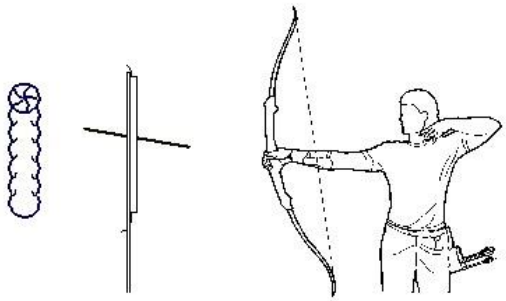
3A: Bare Shaft Tears Paper UP

TEAR is UP. The bare shaft goes through the paper with the point low and the tail high. The nock point is too high. Move the nock point lower down the bow string.



3B: Bare Shaft Tears Paper DOWN

TEAR is DOWN. The bare shaft goes through the paper with the point high and the tail low. The nock point is too low. Move the nock point higher up the bow string.



NOTE: It is common to experience a diagonal tear. Fix the nocking point first and the diagonal tear should mitigate to a horizontal tear. Verify your brace height, and then adjust the nock point until the tear is neither up nor down. Shoot as many bare shafts as necessary to be sure of the consistency of your results. Complete each step before beginning the next step.

SECTION 4: Horizontal Tear

An improper release will cause the shaft to act stiffer and create a larger tear. Take enough shots to ensure the release is not affecting results. See page 8 for Left-Hand archers.

4A: Right-Hand Archer

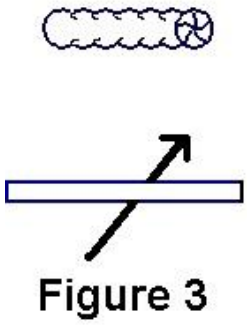


Figure 3

Figure 3 illustrates a left tear.

The point of the bare shaft enters to the right and the nock enters to the left. The shaft is too weak.

If the tear is 1 to 3 inches, the shaft can be stiffened by decreasing the point weight, decreasing bow strength, or shortening the arrows. If the tear is greater than 3 inches, the shaft is too weak. Select a stiffer shaft.

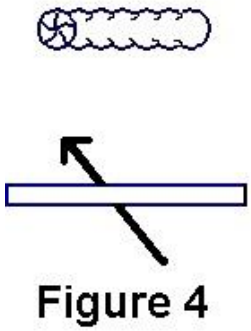
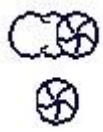


Figure 4

Figure 4 illustrates a right tear.

The point of the bare shaft enters to the left and the nock enters to the right. The shaft is too stiff.

If the tear is 1 to 3 inches, the shaft can be weakened by increasing the point weight, increasing bow strength or getting a longer arrow. If the tear is greater than 3 inches, the shaft is too stiff. Select a weaker shaft.



A horizontal tear less than 1 inch is acceptable. A single hole is ideal for recurve archers. Be careful trimming arrows. Even ¼ inch can make a difference.

4B: Left-Hand Archer

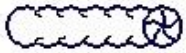


Figure 3 illustrates a left tear.

The point of the bare shaft enters to the right and the nock enters to the left. The shaft is too stiff.

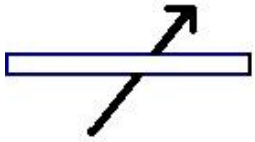


Figure 3

If the tear is 1 to 3 inches, the shaft can be weakened by increasing the point weight, increasing bow strength or getting a longer arrow. If the tear is greater than 3 inches, the shaft is too stiff. Select a weaker shaft.

Figure 4 shows a right tear.

The point of the bare shaft enters to the left and the nock enters to the right. The shaft is too weak.

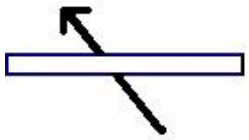
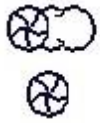


Figure 4

If the tear is 1 to 3 inches, the shaft can be stiffened by decreasing the point weight, decreasing bow strength or shortening the arrows. If the tear is greater than 3 inches, the shaft is too weak. Select a stiffer shaft.



A horizontal tear less than 1 inch is acceptable. A single hole is ideal for recurve archers. Be careful trimming arrows. Even ¼ inch can make a difference.

SECTION 5. Plunger Tuning - Spring Tension

5A. Right-hand Archer

First adjust your sight. The STIFF PLUNGER is in the center of the bow as per step **1F.**

Shoot fletched arrows from 18 meters. Shoot the best group possible in the center of the target. Adjust the sight until your grouping is centered on the target. Remove STIFF PLUNGER and install PLUNGER WITH SPRING with a medium tension setting.

Adjust the PLUNGER until the right edge of the tip of the arrow shaft is in line with the left side of the string. Do not use the right edge of the arrow point but rather the right edge at the end of the arrow shaft.

Shoot fletched arrows from 18 meters but DO NOT ADJUST THE SIGHT. Correct the flight of the arrow by adjusting the tension of the SPRING in the PLUNGER. Shoot the best group possible.

If the arrows group to the left of the center, weaken the SPRING (counter-clockwise). If the arrows are to the right of center, stiffen the SPRING (clockwise). Adjust the SPRING until the group is in the center of the target.

The group should be the same as the group you shot using the STIFF PLUNGER/CENTER SHOT METHOD.

5B: Left Hand Archer

First adjust your sight. The STIFF PLUNGER is in the center of the bow as per step **1F.**

Shoot fletched arrows from 18 meters. Shoot the best group possible in the center of the target. Adjust the sight until your grouping is centered on the target. Remove STIFF PLUNGER and install PLUNGER WITH SPRING with a medium tension setting.

Adjust the PLUNGER until the left edge of tip of the arrow shaft is in line with the right side of the string. Do not use the left edge of the point of the arrow but rather use the left edge of the END of the shaft.

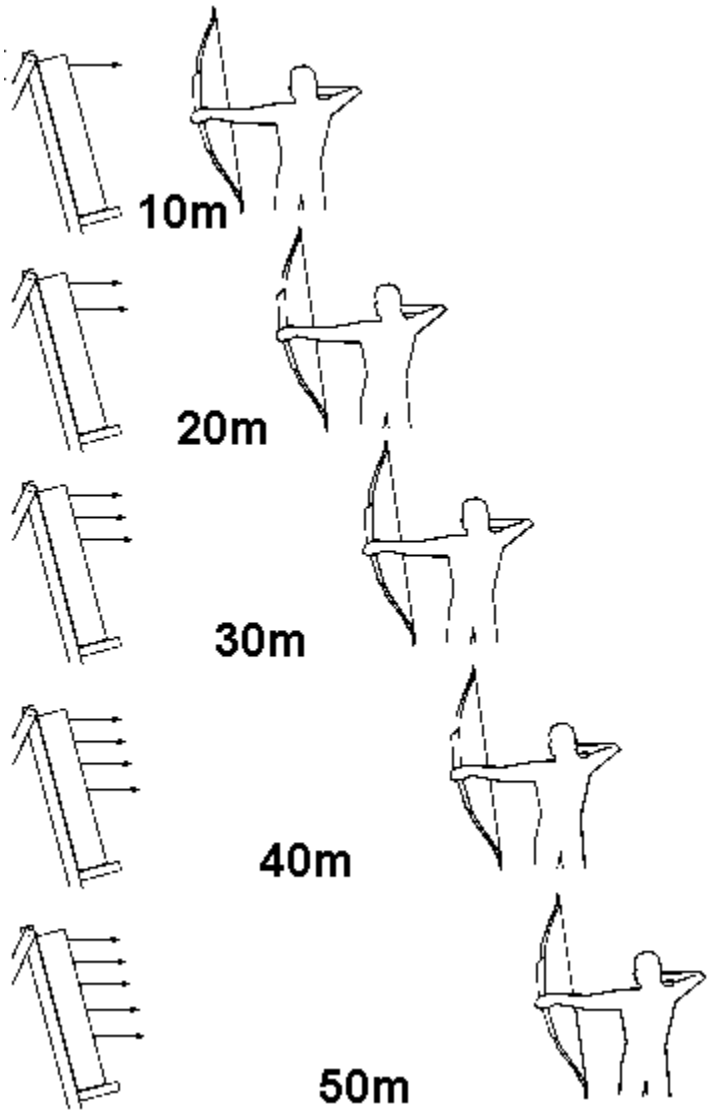
Shoot fletched arrows from 18 meters but DO NOT ADJUST THE SIGHT. Correct the flight of the arrow by adjusting the tension of the SPRING in the PLUNGER. Shoot the best group possible.

If the arrows group to the right of center, weaken the SPRING (counter-clockwise). If the arrows are to the left of center, stiffen the SPRING (clockwise). Adjust the SPRING until the group is in the center of the target.

This group should be the same as the group you shot using the STIFF PLUNGER/CENTER SHOT METHOD.

SECTION 6: The Beginning of Fine Tuning

6A: Drop Method – Repeat This Section if Necessary



Place a small target near the top of the target matt and shoot from 10 meters. Set the sight accordingly.

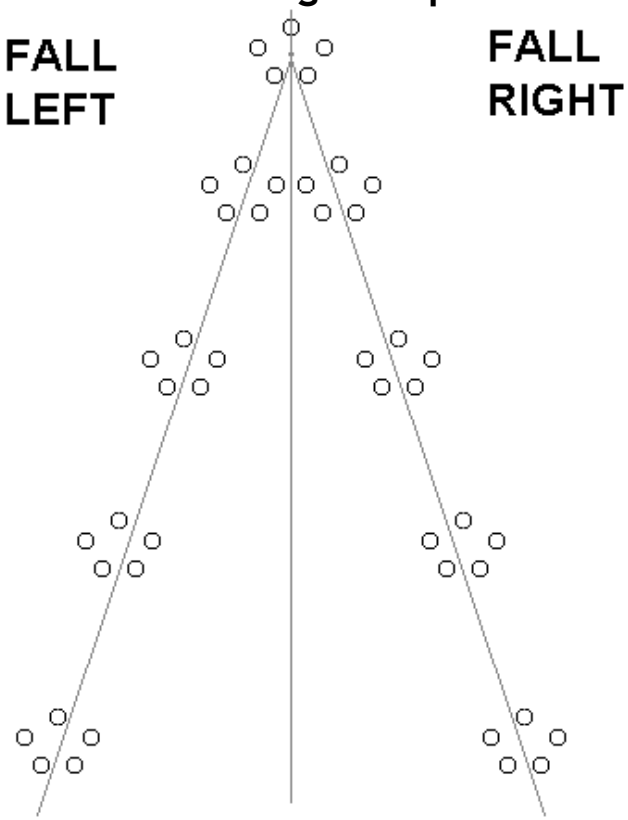
Shoot an arrow, then move back 5-10 meters but continue to shoot at the small target at the top of the target. Do not adjust the sight! The arrows should impact lower down the target as you move back.

Move back 5-10 meters at a time and as far back as possible without the arrows falling below the target matt. This is approximately 40 to 50 meters for most bows.

If the arrows drift to either right or left of center as you move back, more tuning is required.

If the arrows fall in a straight line, the tune is good.

6B. Pattern Analysis of The Falling Groups Method



FOR LEFT-HAND ARCHERS

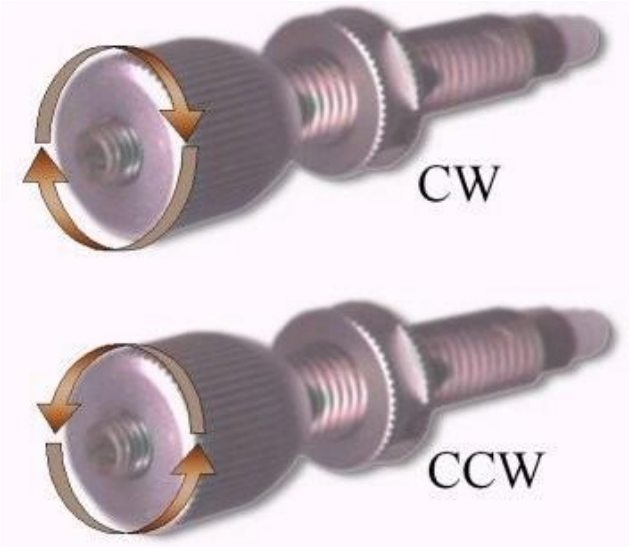
If the arrows fall to the left side of center, stiffen the SPRING (CW) until the arrows are in the center line.

If the arrows fall to the right side of center, weaken the SPRING (CCW) until the arrows are in the center line.

FOR RIGHT-HAND ARCHERS

If the arrows fall to the left side of center, weaken the SPRING (CCW) until the arrows are in the center line.

If the arrows fall to the right side of center, stiffen the SPRING (CW) until the arrows are in the center line.

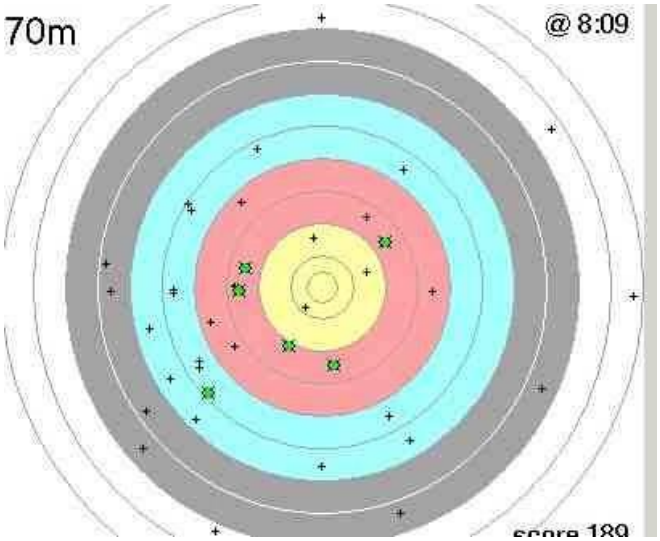


NOTE:
Approximately 1/4 turn (90 degrees) of the spring/plunger will move the arrows 4 inches at 40 meters.

SECTION 7: Tuning for Perfection

This is the beginning of "true" fine tuning. Fine tuning can be done during normal practice but requires consistency to be effective.

Choose a long distance: 60/70 meters for women, 70/90 meters for men. Take note of the plunger's setting. Shoot 6 ends of 6 arrows. Make a chart of the groups using either a drawing of the target or use an app from an App Store that visually plots the arrow's location.



Stiffen the plunger (CW) 1/2 turn, shoot another 6 ends of 6 arrows, make a new chart for this group and label it. Continue this process until the groups open up. Be sure to record the number of 1/2 turns on each chart.

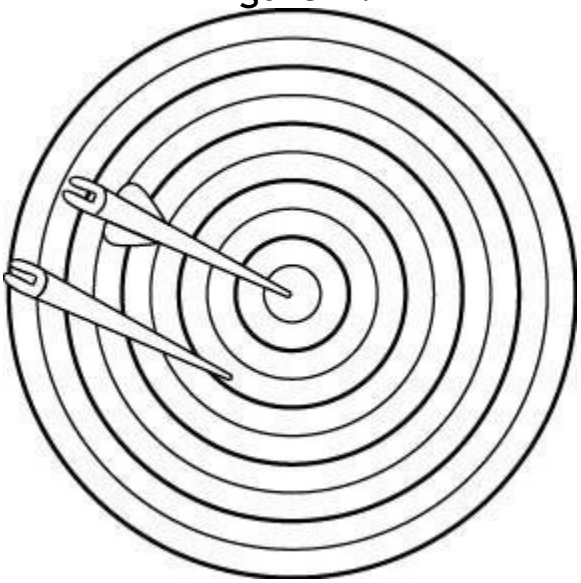
Reset the plunger to the setting at the start of this exercise. Weaken the plunger by 1/2 turn (CCW), shoot another 6 ends of 6 arrows, make a new chart for this group and label it. Continue this process until the groups start to open up. Be sure to record the number of 1/2 turns on each chart.

Review all the charts to find the tightest group and adjust the plunger to that groups' setting. This should be the best tune. If there is time and patience on your part, repeat the above exercise using 1/4 and 1/8 turns.

Excellence takes persistence!

SECTION 8: Making a Baseline Record

Figure 1:

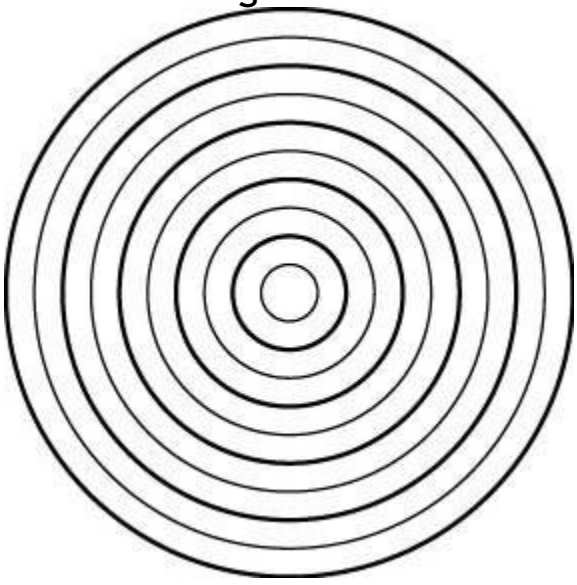


Go to 18 meters and shoot a group in the center of the target. Now shoot a bare shaft (or several) and note where it/they hit on the target in relation to the group.

For example, see the Figure 1 to the right. The fine tuning has found a better set-up. Do not be concerned if the bare shaft does not group with the fletched arrows.

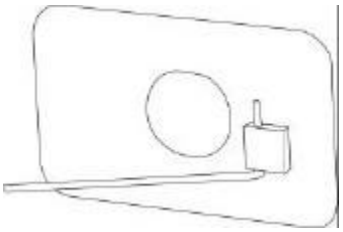
NOTE: It is important to record where the bare shaft hits in relation to the group. Record this in Figure 2 for later use.

Figure 2:



In an emergency where the bow needs to be re-tuned quickly, set the nock point, then adjust the plunger until the bare shaft hits relative to where the group is, as you recorded using figure 2.

SECTION 9: Indexing Nocks



Vane or fletching clearance issues can ruin an otherwise good tune and will give false feedback during the tuning process.

To determine if the arrow's vanes are touching the arrow rest or any part of the shelf during a shot, put some red lipstick on the support arm of the arrow rest. Shoot several arrows and if the vanes have red on them, they are making contact. Rotate the nock, shoot, rotate again, and continue until there isn't any lipstick on the vanes.

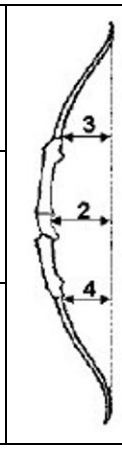
Orienting nocks in the middle of the valley between vanes may not be the best clearance for your arrows. You must find the midpoint away from the rest in both directions for maximum clearance. Turn the nock and shoot until the vane begins to rub. Make a mark on the shaft directly opposite the mold mark on the nock. This is where the rub starts for that particular vane.

Turn the nock in the opposite direction and repeat the process until the next vane begins to rub. Make another mark opposite the mold mark on the nock. These two marks indicate where the two vanes rub the bow. Turn the nock until the mold mark is directly in between these two marks.

This should be the point of maximum clearance. Index every arrow the same.

Record Important Information

DATE:	Outdoor	Indoor	Notes
Riser length			
Limb weight & length			
Upper tiller (#3)			
Brace height (#2)			
Lower tiller (#4)			
Length of string			
Number of strands			
Nock point			
Arrow brand & size			
Arrow length			
Point weight			
Type of nock			
Type of fletching			
Length of fletching			



Note from the author:
This method has been used for many years by some of the top archers. There are quicker methods but I believe this is the most complete. This method tunes and gives an idea of how the equipment works. Rick Stonebraker.