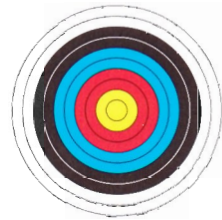


Kim,HyungTak
Archery

Kim,HyungTak
Archery





Coach Kim, Hyung Tak

Coach Kim archery training center

Coach committee of FITA

Director of Korean Archery Association

President of Korea coach association

President of Korea Club archery association.

1983-1986 : Korean national women's team coach.

1984 : Coach for Korean national women's team . L A.Olympicgame

1985 : Coach for Korean national women's team .Seoul World Championship

1986 : Coach for Korean woman's team .Seoul Asian games

1989-1997: Head coach for Taiwan national team and Sport University.

1990 : Head coach for Taiwan national team . Beijing Asian Games

1991 : Head coach for Taiwan national team .Poland World Championship

1992 : Head coach for Taiwan national team for Barcelona Olympic game

1993 : Head coach for Taiwan's national team Turkey World Championship

1994 : Head coach for Taiwan's national team .Hiroshima Asian Games.

2002: Captain for Korean national team Nimburg Junior World championship

2005:- Coach Kim archery training center.





김흥택





Coach Kim
Archery Tr



Hyung Tak Training Center



www.archeryschool.com



Coach Ki



n's family



A parade for coach Kim and Seo, Hyang soon who won a gold medal
in the Los Angeles Olympic Games in 1984



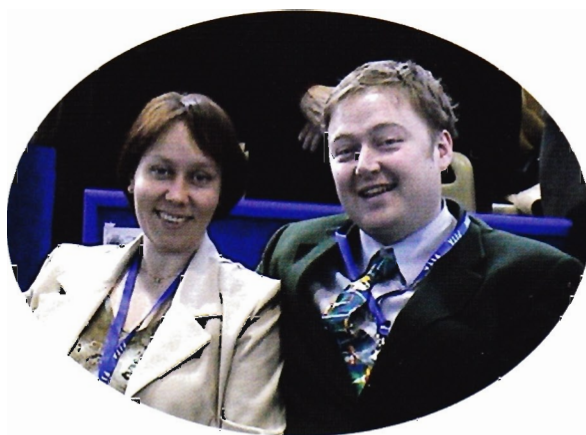


With Park, Sung Hyun and her coach Seo, Oh Seog



Dear Friends in Archery

I'm delighted to introduce this book from my friend in Archery, Coach Kim. Coach Kim is one of the most successful coaches in recent Archery history and has been an example for many to follow. He is always eager to learn and to improve his coaching techniques. His use of modern techniques and products such as Dartfish has helped a large number of archers around the world. He has been behind the success of many Olympians since the early days he went to Los Angeles in 1984 and obtained with his archers the first of many Korean medals. He has been successful with many other countries such as Chinese Taipei, Indonesia, Denmark, Switzerland and many others. He also is working with many teams using online coaching. He is never afraid to share knowledge, since through sharing you will improve your knowledge by analysing the feedback. What I like about Coach Kim's approach to coaching is making things simple. Archery should be simple since everyone has shot a 10 in his archery life. But shooting a 10 when it really matters makes it suddenly complex. That's where the challenge for modern coaching lies and that is keeping the technique and execution simple. You only have to see to the execution of the shot of many of the Korean Olympic Gold medallist to understand that is by keeping the shot simple and smooth that you reach the gold medal.



Having seen this book, I'm convinced that it will be an important tool for many coaches around the world and once more the sport will benefit from this tool.

I look forward to reading this exiting book and hopefully as a result shoot a little bit better. However in archery there are no miracle solutions and the only way to get to the gold medal is by practising for the gold medal.

Therefore, I wish all you the best of reading and then it is up to you, archers and coaches, to put it all into practice. The success of Coach Kim's students has proven that if you work hard and follow his instructions, the path to victory is there.

Happy reading

Tom Dielen

FITA Secretary General





Ken Bearman

Chairman – FITA Coaches Committee



When I was asked by Hyung-Tak Kim to help him with a book he was writing I jumped at the chance. I feel it a great honour to have helped Hyung-Tak Kim to get his thoughts on archery and coaching into a book form so that others around the world can share his knowledge and love of the sport.

I first met “Kim” 7 years ago and immediately we started talking it was obvious he had a vast wealth of knowledge and enthusiasm for the sport of archery, and from that day on we have been very good friends.

Working with him in his Archery Training Centre is an experience in itself, Kim never stops working from the time he arrives at the centre till the time he leaves. I can recall on one of my visits, we arrived at his training centre at 9:00 o’clock in the morning and worked right through to 2:00 o’clock the following morning and he was still as lively then as he was when he arrived. During the days I was there archers and coaches came and went, some stayed for 5 or 6 hours and others stayed longer, if there was anyone who needed help Kim was there to work his magic and put things right. When at Kim’s centre you never see a sad face, everyone is always smiling; I think they know they are getting some of the best coaching that is available and really appreciate it.

I have also worked with Kim in several countries giving seminars and practical workshops on shooting and coaching techniques. Everywhere we have been everyone enjoys his company and soaks up the knowledge they glean from him. He seems never to be able to get a “coffee break” archers and coaches alike come up to him and want to talk to him about some problem or situation they have, he never seems to mind though, he will help anyone, anytime when it comes to archery. I believe I can say without contradiction “Kim loves archery and everything involved with it.

I thank Kim from the bottom of my heart for spending the time to write this book, which when read, will give archers’ and coaches around the world an insight to some of the vast knowledge of this very good coach.





It is a pleasure and an honor for me to introduce this technical book to the archery community. There are several books available that talk about steps, parts or moments to be executed in the shot, learnt or teach in a certain way in order to become a champion and a successful archer. Each of these books explains the way that the author understands the “perfect shot” and of course the way to achieve it. This book is all this ... and something else. My friend and archery expert Coach Kim not only has a clear idea how to make the proper shot and achieve an efficient shooting technique, but also know the differences of how to explain it to the different people and cultures around the World. He knows how to adapt his wide knowledge about archery and the way to shoot a bow to each archer and coach. This is what makes this book different from others. He is giving us not only what to teach or do, but also the easiest and more efficient way to do it... and to adapt it to everybody in each level.

What I always admired and liked more in Coach Kim was his personal style in approaching people and student. He just communicates what he feels and believes it must be done with no complex terms or difficult exercises. For him shooting must be easy and simple... and he shows us how to do or teach like this. The reader will find this style in this book: Simple, direct and clear.

I remember the first time I met Coach Kim. As coach and archer I was expecting to get from him the “many secrets” of the Koreans archers and coaches. Coach Kim showed me very soon that there was no secret at all... just a good basic shooting form. *“If the archer does the basic shot close to perfection... repeating it many times, making it stable in each shot and circumstances that will come and always in the same way... the level will go up to the Top... becoming a top level archer”* Kim said. I never forgot this and used it in my carrier as coach since then. Make it simple, make it consistent and make it strong... and your level will go up.

I hope you will get from this book all what I got from Coach Kim. After reading it you might feel that you have not learnt a lot of new “stuff”, that you have not discovered anything “secret” or “especial”... but all his knowledge together and when practiced, make a huge difference on how you can see the “perfect shot”.

I really hope you will enjoy this book as I enjoyed each minute I spend with my friend and archery expert Coach Kim. It was a real pleasure meeting him and I would like to thank him for all what he did for Archery and is still doing day after day in his fantastic archery center in Korea. In this archery paradise (Kim Archery Center) he is helping archers all around the world to become better persons and top archers. Fantastic!!!!

I do not want to take more of your time, as the important is just to come.
Enjoy the reading, enjoy the knowledge shared here and enjoy Archery!

Juan Carlos Holgado
Olympic Gold Medal – Team Barcelona 92
Archery expert
FITA Event Director



This story goes back to 1978; I was in the second year of high school when Hyung-Tak Kim became my coach. I was not able to aspire to greater prominence as an archer until that time, and did not expect the big change in my life which happened one year later.

Hyung-Tak Kim taught us archery with sharp observation and unique leadership. In 1979, I broke the world record for 50 meters (322) in the National Sports Competition which was one of the major sports events in Korea. After that, I became a member of national archery team and won many medals in various international archery championships for 7 years. In particular, I won two gold medals and one silver medal in the World Archery Championships in 1979, 1981, 1983. I also participated in the Los Angeles Olympic Games in 1984 under the coaching guidance of Hyung-Tak Kim.

When I was young, I used to see Hyung-Tak Kim studying hard and always preparing for the future. He made us bring conviction to our shooting, and encouraged us to make the most of the opportunities, and to shoot cheerfully. It had a favorable and lasting influence upon my life.

I started studying English in 2000 in order to become an international judge. Personally, I am honored to help Hyung-Tak Kim in the preparation of this book.

Whenever Hyung-Tak Kim wants to do something, he certainly achieves it. And the success he has with archers and coaches is a testament to his abilities.

This book explains many methods of shooting and coaching with an abundance of pictures and drawings to help everyone through the whole spectrum of archery.

If you choose this book, I am sure you will find it of great interest and value.



Young-Sook Park (Sally)

FITA International Archery judge



All friends who love archery,

I started archery quite by chance when the modern day archery was first introduced to Korea. When my arrow hit the centre of the target for the first time, I was delighted. I could not forget the pleasure it gave me, so I went the archery field every day. Archery became the whole of my life from that time on, and it will also be my future.

After being an archer for many years I became a coach, and have been teaching and coaching archery since 1971. This tells me that I have been an archery coach for 40 years and still enjoying it and I intend continuing coaching for many years to come. I run an archery training centre in Korea where many archers and coaches come from around the world to improve their technique and coaching skills. Also, I travel to many countries around the world giving seminars, lectures, and practical workshops for archers and coaches of all grades. As a member of the FITA Coaches Committee I do my best to help others enjoy the sport of archery and to widen the window that looks out onto new horizons.

In this book I have written down my coaching methods which I have followed over many years, and I pray that archers who read this book will find something that will help them improve their skills and enhance their enjoyment when taking part in archery. I hope this book will be a good companion, and help every archer and coach achieve all their goals.

In particular, I appreciate the help Ken Bearman and Young-Sook Park (Sally) gave so willingly to help me produce this book, and I pray that all archers will have good fortune and enjoy their archery experiences as much as I have enjoyed mine.

Kim, Hyung Tak

Coach committee of FITA
Coach Kim archery training center
Archery expert







Table of Contents

Stance

- The width of the stance 2
- The direction of stance 3
- The angle of the feet when assuming the stance 5
- The centre of the body when assuming the stance 6

Bow grip

- Personalizing the bow grip 9
- The direction of force and hand position on the bow grip 11
- The height of the bow grip 13
- The position of the bow hand fingers 14
- The use of a bow sling 15

Hooking (placing the fingers on the string) 18

- The position of fingers, the first joint when hooking 19
- The position where the string is placed on the finger tab 21
- The distribution of the force on the fingers which are hooked onto the string 22
- The position of the fingers which are not hooked on the string 23
- The joints of the back of the hand (Metacarpo-phalangeal joint) 25
- The Joints of the wrist 26
- The use of the finger spacer on the tab 27
- The use of the anchor plate 28

Set up 32

- The position of bow arm and drawing arm during the set-up procedure 33
- The forward rotation of the bow arm 35
- The centre of the body 36
- The correct posture of the chest and buttocks as seen from behind during set-up 37
- The position of the head and the body when setting up 38
- The position of the bow arm shoulder when setting up 39





Drawing the bow

- The direction of drawing the bow 41
- The speed of drawing the bow 43
- Drawing balance 43
- Keeping the bow vertical when drawing a bow 44
- The position of the bow arm when drawing a bow 44
- Breathing 45

The anchor 46

- The position of the hand when anchoring 47
- The position of a string when anchoring 49
- The movement of the head when anchoring 51

Aiming 52

- The method of using the sight pin 53
- Alignment of the string 55
- The time of seeing the string 56
- The position of the string 57
- When the string is aligned beside the sight pin 58

Full draw

- The correct posture of the head and body when at full draw 60
- The height of the drawing elbow when at full draw 61
- The position of the bow shoulder when at full draw 63
- The angles of full draw as seen from above 64
- The direction of the waist at full draw 66
- The right posture of the body, at full draw 67
- The inclining of the bow at full draw 69
- The position of the scapula at full draw 70





The method of using a clicker

• When to introduce the use of a clicker	71
• Preparation training for using a clicker	72
• The using a clicker and extending for the beginner	73
• The selection of the arrow length	74
• Checking the arrow length for the growing young archer	75
• The first step to using a clicker (To draw a bow watching the arrow point)	76
• The second step of using a clicker	79

Extending

• The direction of the pushing arm and drawing arm when extending	80
• The balance of extending	81
• The time of extending	82
• The location of the scapulas	83
• The necessity of “the feeling” training of extending	84
• The method of training “the feeling” of extending	85

Release

• The form of the fingers at the time of release	87
• The form of the elbow at the time of release	91
• The direction of release	92
• The distance of hand travel during the release	93
• The speed of release	94

Follow through

95

• The direction of follow through	96
• The free movement of the bow	97





The progressive training method for the beginner

Step 1 - Training with the empty hands 9 9

Step 2 - Drawing a rubber band 10 2

Step3 - Drawing the bow 10 5

- The use of a bow sling 10 5
- The use of the stabilizer on the practicing bow 10 6
- Grip 10 7
- The posture of the body 10 8
- Practicing hooking the string fingers for the beginner 10 9
- The height of setup 11 1
- Drawing 11 2
- Anchor 11 3
- The use of the kisser button for anchoring 11 5
- The effect the bow length has on the anchor position 11 6
- Full draw 11 7

Step4 - Preparation practice of the release..... 11 8

- Practicing the release feeling for the fingers 11 9
- The length of travel of the release 12 0
- The direction training of the release 12 1

Step5 - The exercise for the “follow through” 12 2





The analysis of the posture and method of the modification

The points to consider when extending

• The ring finger slipping off the string	125
• The ring finger is bent inward at the time of extending	127
• The arrow nock is lifted up by the middle finger	129
• The anchoring hand is moved back when extending	131
• The arrow point creeps toward the target when aiming	133
• The elbow moves down at the time of extending	135
• The bow shoulder is raised up	137
• Rotating the pushing arm	138
• The change of the bow grip	139
• When extending, the change of the location of the string on the chest	140
• If the string is pulled away from the chest when extending	141
• Leaning the bow left or right	142
• When a bow is inclined to the left	143
• When a bow is inclined to the right	144
• If the bow moves back toward the body when extending	145
• When extending, the bow moves downward	147
• The change of the centre line of the body	148
• The position change of the string alignment when extending	150
• The change of the string alignment when extending	152
• The imbalance of the extending power	153
• The inconstancy of the extending time	154
• The fingers of the bow hand or the drawing hand move when extending	156

Problems that happens at the time of the release

• The elbow moves down at the time of release	159
• The fingers moving forward at the time of release	160
• The wrist of the drawing arm is bent	163
• The hand is opened at the time of release	163
• The archer closes the eyes when releasing	163
• The waist turns at the time of release	164





Problems that occur during the follow through period

- The direction of the free movement of the bow, and the way the archer holds the bow 165
- The bow jumps to the inside 166
- The bow moves downward 167
- The bow jumps to the outside 167
- The training method of keeping a relaxed bow hand 168
- After shooting, the bow arm drops or is moved right or left 169
- The centre line of the body moves toward the heels when extending 170
- The body is moved toward the target when shooting 171
- The consistency of the location of the bow after shooting 172

The relation of the posture to position of the arrow landing in the target (a right-handed archer)

- The arrow hits to the right on the target 174
- The arrow hits to the left on the target 175
- The arrow hits high on the target 176
- The arrow hits low on the target 176

Tuning the bow and using the equipment

- Tuning the bow 177
- The arrow flight 178
- The rotation of the arrow 179
- The flight direction of the arrow 179
- The bow weight options for the beginner 181
- Checking the arrows 182
- The spring strength of the cushion plunger 183
- The thickness of the string 184
- The centre of balance of the arrow (FOC) 185
- The location of the sight pin 186
- The equipment control after tuning 187
- The confirmation of the location of the sight pin 187





Aligning and tuning the recurve bow

• Tuning the Recurve Bow	190
• Purchasing a Bow and ancillary attachments	190
• Limb alignment	192
• Preliminary setting the bow tiller and bracing height	193
• Setting the height and angle of the arrow rest	194
• Initial setting of the pressure button	195
• Setting the arrow rest arm	195
• Aligning up the sight bar	196
• Aligning up the sight	196
• Initial setting of the nocking point	198
• Serving and nocking point	199
• Initial setting the bracing height	200
• Initial setting the tiller	200
• Setting the draw length check (clicker)	201
• Some ideas for selecting a stabiliser system	201
• Selecting a stabilisation set-up that will suit the individual archer..	202
• Nocking point set-up	207
• Arrow flight paper tuning test	208
• Bare shaft planing test	210
• Short distance fine tuning	214
• Fletching selection	219
• Long distance grouping	221
• Dynamic arrow selection	224
• Getting to know your sight	226

Training to be confident in the wind

The situations to consider in windy conditions

• The positional change of the arrows hitting the target	228
• The change of the arrow flight	228
• When the archers clothes flutter during windy conditions	229
• The change of the centre of the body	229
• The direction of the bow arm	229
• Changing the extending time	230





● Changing the balance of extending	230
● The reduction of the physical stamina	230
● The complication of the decision about the aiming off	230
● Uneasiness feeling about the wind	231
● Changing the team tactics during a team match	231

Measuring the archer's ability to adapt the wind

● The technique of aiming off from the centre of the target	232
● Measuring the archer's ability to judge the direction and strength of the wind	233
● The observing changes of the extending time	233
● Evaluating the psychology of the archer	233

A method of training to help shooting in the wind

● An exercise of repeatedly drawing the bow for a given set	235
● The drawing of a bow and extending at full draw in excess of the time for a normal shot	235
● Training for the various abilities to aim off	236
● Training a sense of unity and direction of extending when "aiming off"	236
● The aiming off and follow through	237
● The adaptation of changing the extending time	237
● Maintaining the balance of extending	238
● The cultivating the ability to judge the aiming off location for different wind strengths and conditions	238
● The observation and information gathering about wind conditions of a sports ground before taking part in a competition ..	238
● What to practice during an "open" practice time	239





Stance

The stance is the foundation of the shot on which the complete form of the archer is based. However, often when beginners start shooting they do not seem to take enough care about their stance. Generally, it seems that they adopt their comfortable posture or copying/following others' stance. Stance is very important for the beginner as an inconsistent angle of posture will cause various anomalies within the state of the stance, which will introduce many weak points from such inconsistencies. Therefore, beginner should practice to produce a good stance consistently and accurately.





The width of the stance

The width of stance is dependent on archer's physique. The best way to determine the width of the stance is to have the feet the same as the width of archer's shoulders as shown in **figure 1**.

When an archer is drawing the bow, the two feet support the weight of the upper body. The weight should be distributed equally onto both feet, and the archer should maintain the vertical centre line of the body. With the width of the stance being proportioned to the archer's physique it is easier to maintain the balance of the body during extending and releasing. His stance shows the feet placed shoulder width apart with the hips and shoulders directly above the feet and are all in line with the target. If the archer's stance is very narrow it can easily introduce a lean of the upper body, this would become evident with an angle from the waist (leaning back away from the target) when extending, causing the centre line of the body to move.

With a narrow stance it is also difficult to maintain the balance of the body in windy conditions.

It is also noticeable that when shooting many arrows, or shooting continually for a long time, the archer will get tired very quickly.

When the stance is very wide, tension is applied to the lower part of the body and this creates insufficient flexibility on the whole of the body. Rotund or overweight archers' often have a stance that is a little bit too wide.



Figure 1





The direction of stance

A square stance is the best as shown in **figure 2**. This is the posture which people acquire naturally throughout the daily life, the body and both feet are naturally parallel most of the time. Standing this way people are able to keep a fixed posture easily and naturally. Not only are archer's shoulders, waist, hips and feet paralleled forward the target as shown in **figure 3** but so is the direction of the flying arrow.



Figure 2

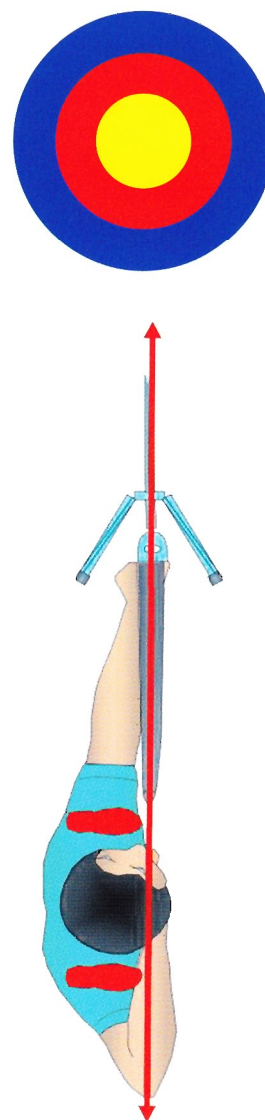


Figure 3



If beginners adopt the open stance or close stance, it is difficult for them to learn the skill of producing a correct and constant direction of the upper body time after time. When using the open stance, the direction of the waist should be in a straight line from the shooting position to the target. However, beginners often forget the position or direction of their waist very easily. The position of the shoulders is affected by the direction of waist. If the waist is slanted to a similar angle as the feet, the shoulders' line would also be biased in the same as the direction of the waist. If the position of the shoulders is not accurate, the archer cannot make a correct body line at full draw. If the waist and the upper body are turned an excessive amount for an open stance, the archer comes to feel tension in the upper body. And, the buttocks tend to stick out in order to maintain the centre line of the body. If the archer does not pay attention to their body's centre line, it is easily moved out of line when extending. And, the rigid muscles relax that hold the waist in place and waist gets to twist when shooting, as shown in figure 4. If the waist turns, the bow shoulder moves back, and consequently the bow arm will collapse inwards. If the bow arm collapses inwards when shooting, the bow does not jump forward from the bow hand, but the direction of the bow movement gets biased toward the front of the body.

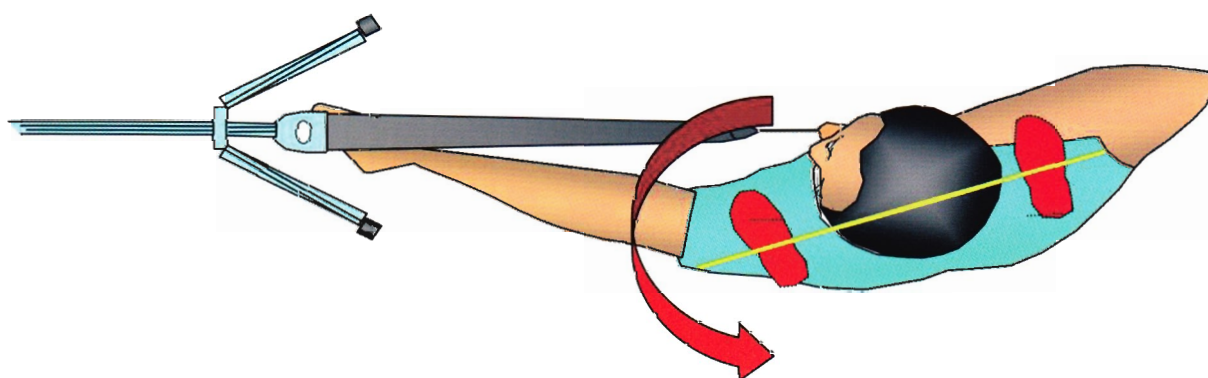


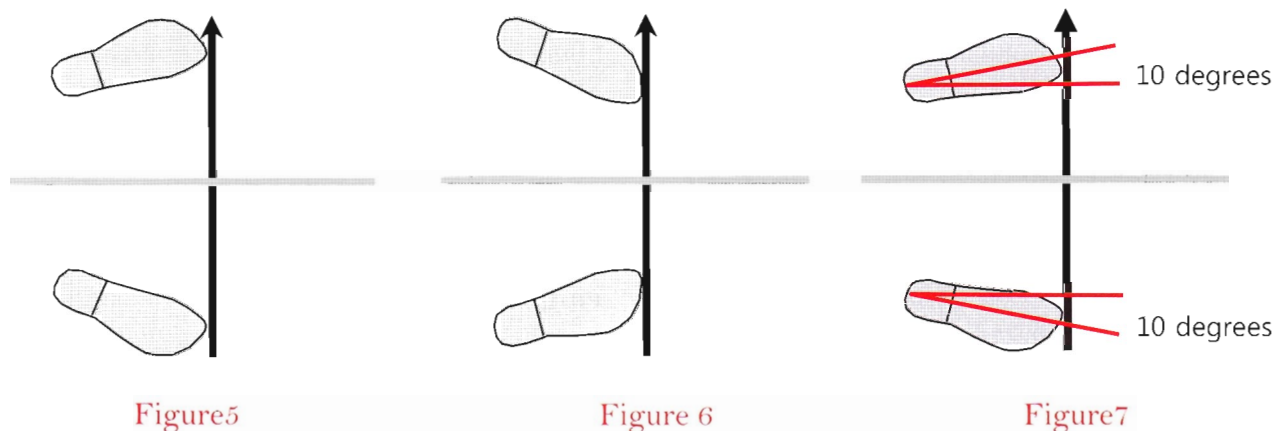
Figure 4





The angle of the feet when assuming the stance

The shape of the stance is very important to maintain the centre of the body. When the toes point outwards too much as shown in [figure 5](#) the pelvis becomes open. Therefore, the centre of the body gets to move back toward the heels and the chest rises. If the toes point too far inwards as shown in [figure 6](#), the centre of the body gets to move to the front.



If the angles of the two feet are different, the direction of the pelvis gets to be different. Hence, the archer feels the fatigue in the lower body very quickly and the weight distribution on the two feet becomes unequal.

If the angle of the feet is turned outwards or inwards too much, the centre of the body moves if the time for extending is too long, or in windy conditions. It is better to have the angle of the feet slightly open, at approximately 10 degrees as shown in [figure 7](#).

According to the structure of their body, archers should try varying the angle of their feet, but only change the angle a small amount, keep doing this until the most stable position is found. Keep in mind that the differing feet angle will move the centre of the body forward or backward depending on the angle chosen.

The centre of the body when assuming the stance

When assuming the stance, the centre line of the body must be placed along the centre of gravity line which should be above the centre point between the two feet. There are many archers who have the centre line of their body lean to the right foot or left foot, in many of these cases they are not aware they are leaning as they probably have been leaning for some time and it has become a natural part of their stance. One of the most important things is that if the centre of the body is leaned to the right foot or left foot, it will cause a change to the angle of the waist. This change to the angle of the waist can have an influence with the centre line of the whole body.

Viewing from the side of the body the centre line of a body should pass through front of the ankles and through the kneecaps as shown in figure 8. If the centre line of the body is behind the body as shown in figure 9, the hips are set forward in order to maintain the centre of gravity of the body.

If the centre line is in front of the body as shown in figure 10, the body moves to the front when extending. That is why the archer must ensure the centre of the body is set correctly.

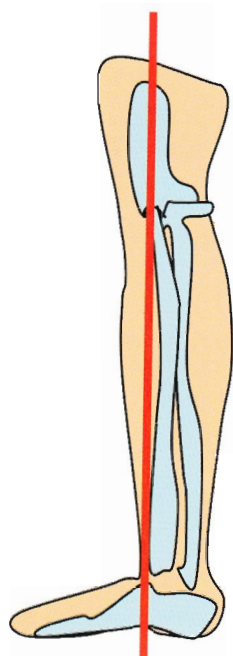


Figure 8



Figure 9



Figure 10



The centre of the stance should be fixed in the accurate position at the time of the stance setup. The position of the fixed stance must be maintained through the pre-draw and while the bow is being drawn as shown in **figure 11**. As you can see in **figures 12**, the centre of the body moves continuously at the time of extending and the keeps moving right through to the release, this is because the archer did not set the centre of the body correctly when assuming the stance.

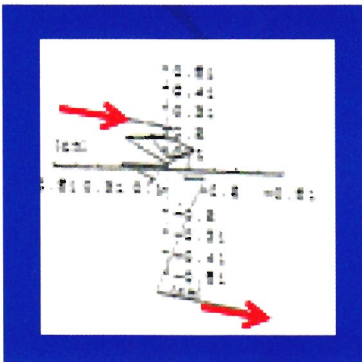


Figure11

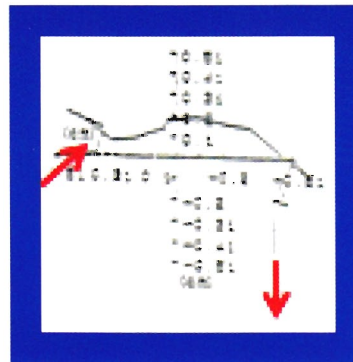
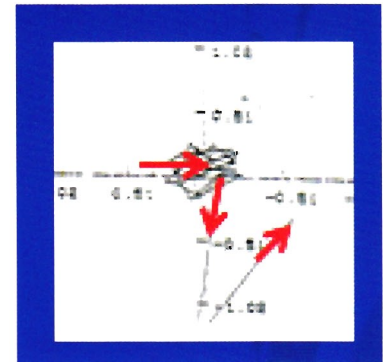
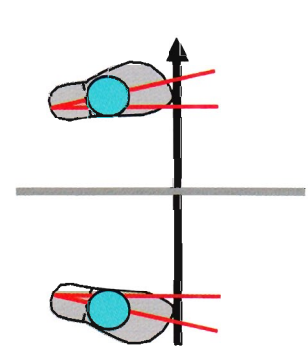
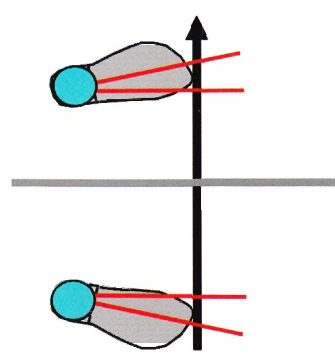
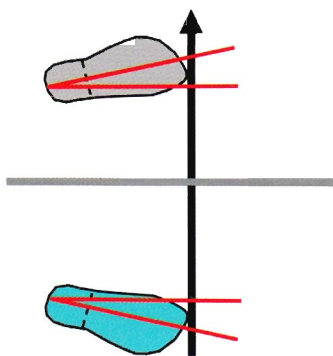


Figure12



Good



If the centre of the body is moved as shown in **figure 13**, the aiming position and direction has to be changed, which means the body has to be moved to get alignment with the target. However, the archer mainly changes the angle at the full draw position unwittingly to keep aiming at the centre of the target. Consequently, a change will occur to the direction of extending.

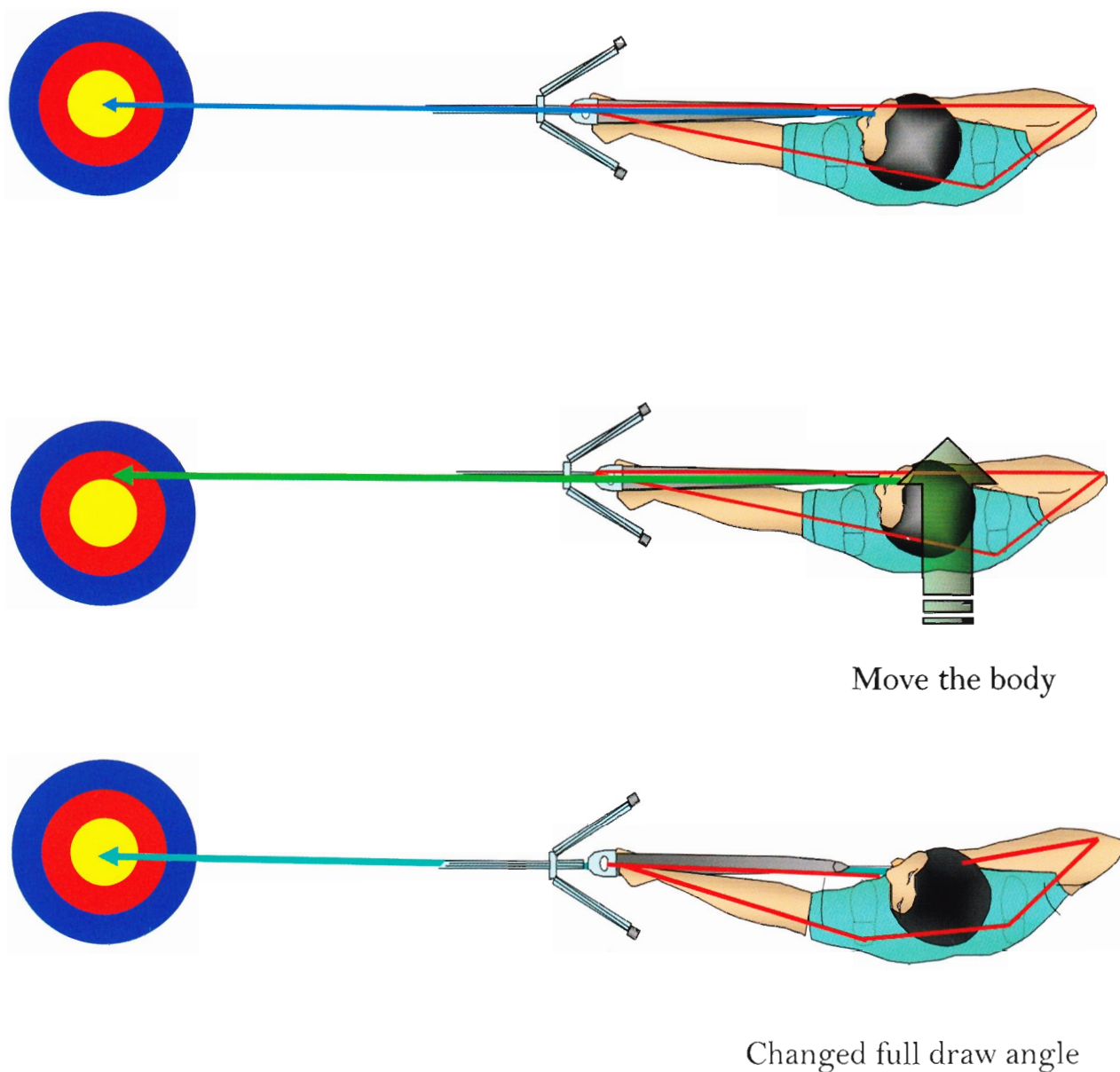


Figure13

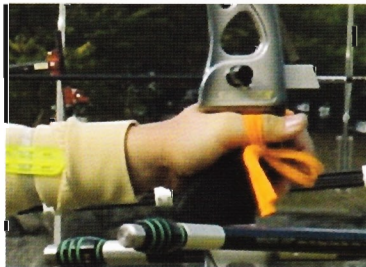


Bow grip

Personalizing the bow grip

The bow grip is a very important part of the archery equipment yet most archers use the grips which have supplied by the bow manufactures. The shape of the bow grip differs from bow manufacturer to bow manufacturer, also the archer's hand is not a standard size so this will also differ from other archers.

Therefore, it is essential that a bow grip is made according to the shape and size of the archer's own hand when it is in a natural position on the bow grip. This can be done by adding some epoxy moulding material (grip maker) to the bow grip then shaping it to fit the archer's hand.



Park S.H



Park K.M



Yoon M.J



Lim D.H



Jung J.H



Kim B.R



After sticking a quantity of “grip maker” on to the bow grip it can be moulded into a rough shape and then left until it is dry and ready to be finally shaped, as shown in **figure 14**. When ready for shaping, the archer can use the exact hand position on the bow grip and modify the added “grip maker” with a knife or the other tools until it suits and fits the archers hand.

For a right-handed archer, the left side of the grip has to be made a little higher than the right and the position of the grip which fits deeply into the hand between the thumb and forefinger has to have the round shape maintained as shown in **figure 15**. By doing this the hand will be comfortable on the grip and the archer can push the centre point of the grip accurately as shown in **figure 16**.

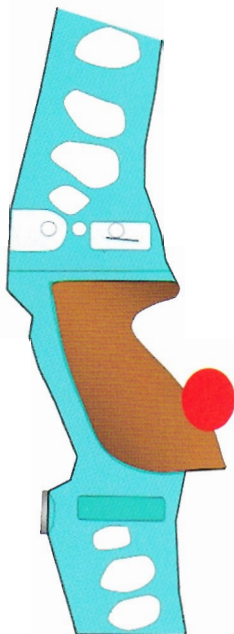


Figure 14

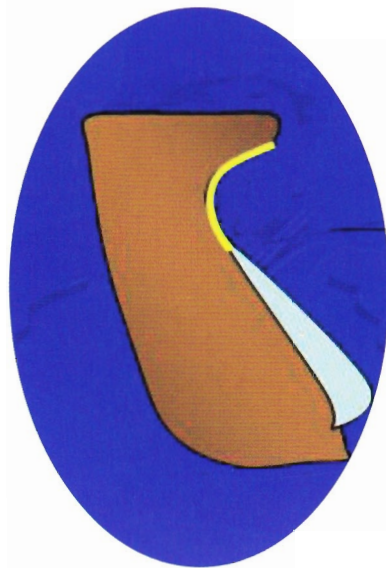


Figure 15

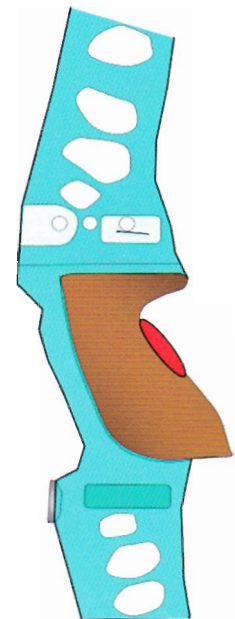
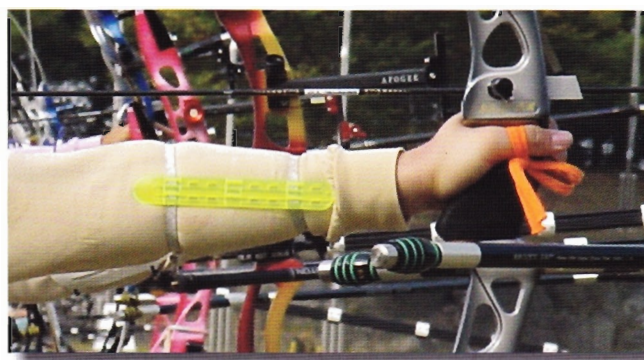


Figure 16





The direction of force and hand position on the bow grip

The direction of force of the hand should be placed between the thumb and forefinger and this central part should be placed in the centre of the bow grip as shown in figure 17.

If the central line of the hand and bow grip is not the same, the bow hand slides left on the grip at the time of extending. This would be most evident when it is raining or the palm of the bow hand is perspiring. This would also be noticeable when extending, the power direction of the grip has to be to the centre of the target, but the direction of the force may be off the centre of the target because the bow hand slides on the bow grip. Also, when the bow hand slides on the bow grip, the space between bow arm and the bow string becomes wider and the angle of direction at full draw will change. As shown in figure 18, the direction of the hand pressure on the bow grip is good, that is to say there is a straight line from the centre of the thumb and forefinger to the arrow and the drawing elbow. It is better to have the lower part of center of the thumb and the forefinger placed on the lower part of the pivot point of the bow grip as shown in figure 19.

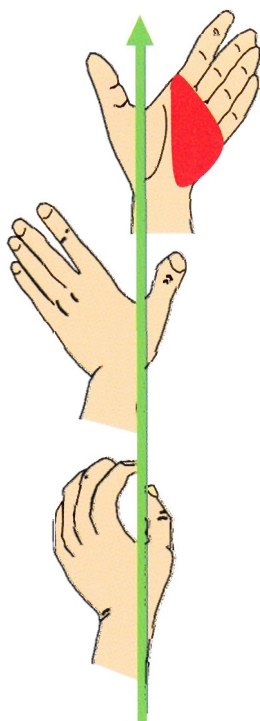


Figure 17

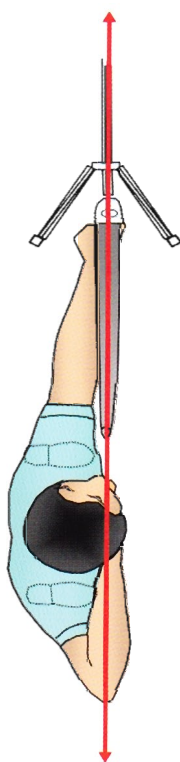


Figure 18

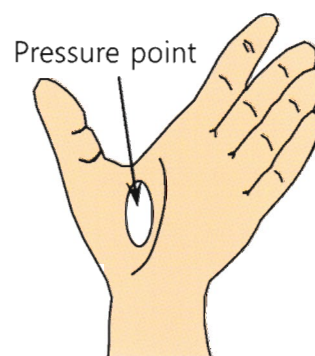


Figure 19



However, if the archer pushes the bow grip using a high grip, the pivot point of the bow grip gets to be pushed which could make the bow hand slide up the bow grip and making the area between the thumb and forefinger of the hand very sore. Many years ago when clickers were not so widely used, a lot of archers used the high grip. Now clickers are very widely used archers have to extend whilst at full draw to activate the clicker. So it is better to push a little bit lower than the pivot point on the bow grip because the bow hand should push the bow grip in a forward direction whilst keeping the force comfortable.

The most important thing is that when archers add “grip maker” to their own bow grip, they should cut or rub it down until the position and contours of their own hand fits perfectly. If the pisiform (small bone in the wrist) is put on the bow grip, it is not correct. The pisiform must be placed on the outside of the bow grip as shown in [figure 20](#).

If the pisiform is put on the bow grip, the force of the pushing hand gets to push with this part of the hand, so the centre of the bow grip and the arrow are not in the same line. As the result, when the archer shoots, a change will occur to the direction of the arrow's flight and the bow will not jump forward from the archer's hand accurately, nor will it be in line with the target. In addition, the pushing arm cannot be fully rotated and the bow shoulder cannot be fixed correctly and tends to move back during the time of extending and shooting. This is prevalent with beginners who do not use a bow sling as shown in [figure 21](#), the archer tends to hold the bow with the bow hand; consequently the pisiform gets to be placed on the bow grip. When the beginner uses a weak bow, and if they use a bow sling, and can push without holding the bow grip, an accurate hand position on the bow grip can be introduced from the first time.

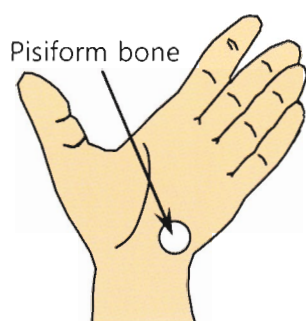


Figure 20

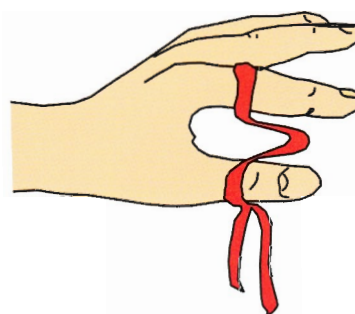


Figure 21





The height of the bow grip

The height of the bow grip can differ depending on the archer's hand. The archer who has wide or large hands will have a different pressure point height on the bow grip than the archer who has slim or small hands. The archer should not control the up or down height of the pressure point on the bow grip up by changing the angle of their hand. When making their own personalized bow grip archers have to make it to suit their own hands, and the location of their hand should be made by correctly modifying the height of the bow grip as shown in figure 22.



Figure 22



The position of the bow hand fingers

When the bow hand is on the bow grip, the position of the fingers should be natural and relaxed and possibly slightly curled as shown in [figure 23](#).

When shooting, force has to be felt on the centre of the bow grip, whilst keeping the all bow hand fingers relaxed. If force or tension is felt on the fingers, the palm tends to tense up as well. When this happens the archer cannot push on the centre point of the bow grip, and at the same time force/pressure is felt in the bow arm. As you can see in [figure 24](#), the outside part of the bow hand palm should not touch the bow grip.

When the bow hand is on the bow grip there should be an inclination of approximately 35 to 45 degrees with the direction of the palm facing toward the ground as shown in [figure 25](#).

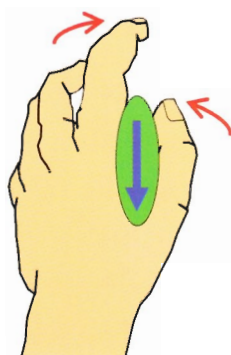


Figure 23



Figure 24

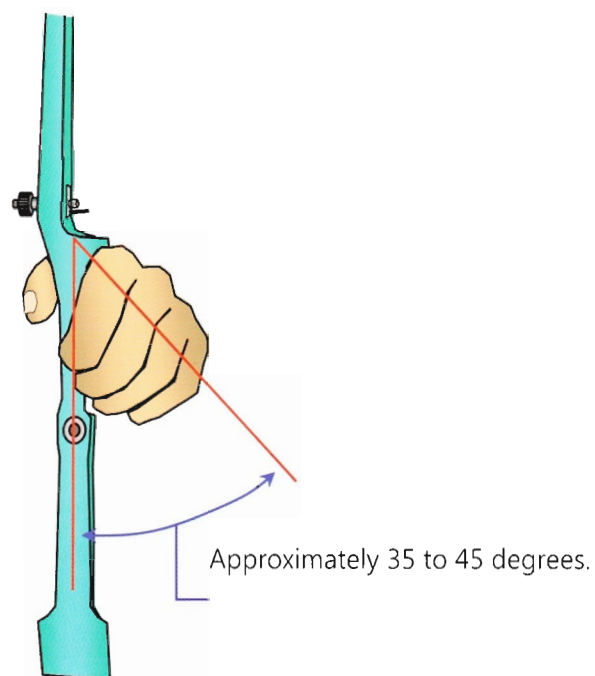


Figure 25



The use of a bow sling

The archer uses the bow sling in order to prevent the bow from falling to the ground when the bow moves forward out of the hand just after the moment of the release. Quite often the beginner does not use a bow sling when using a weak bow. However, if the archer does not use a bow sling, the personal and correct shape of the bow grip cannot be made. The reason is, most of the beginners who learn archery have a tendency to grasp the bow with the fingers, as shown in [figure 26](#), and some beginners even do this when they are using a bow sling. When the bow is held with fingers, the archer cannot get a good hand position on the bow grip. This also jeopardizes the accuracy of the position, and shape, of the pushing hand, as shown in [figure 27](#), also the archer cannot turn the bow arm correctly for true alignment. If the beginner uses a bow sling, they are able to push the bow grip without grasping the bow. If the bow sling is not introduced into the early lessons the archer will develop a habit of holding the bow with fingers because they are anxious that the bow will fall to the ground when shooting. To make matters worse, if the bow is held with the fingers at the time of the release, the bow is moved sideways by the archer, and it is not being allowed to follow its own movement in a forward motion. There are three kinds of the bow sling that archers seem to favour as shown in the diagram, but it is the best to use the bow sling that fits on the thumb and the forefinger as shown in [figure 28](#). In this case, whilst the bow is moving forward in the bow hand just after the release no change will occur in the direction of the bow hand or the bow and the bow gets to move forward in the direction of the target at the time of the follow through. If the archer uses a wrist type sling which is too long, when the bow is moving forward in the hand during the follow through, the bow is biased to the left of the target and the bow grip moves an excessive amount between the fingers and the sling. Consequently, the archer can develop the habit of holding the bow with the bow fingers. If the archer places the finger sling between the thumb and the middle finger the palm on the bow hand gets to be turned in toward the bow grip at the time of shooting. In this case the archer can develop the habit of holding the bow with the bow fingers, because the bow sling being used this way has to be a little longer and the bow can then slip down the between the fingers and the bow sling, as shown in [figure 29](#)



Figure 26



Figure 27

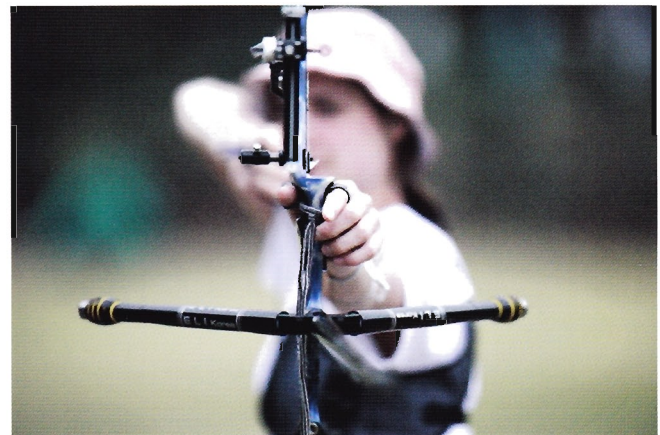
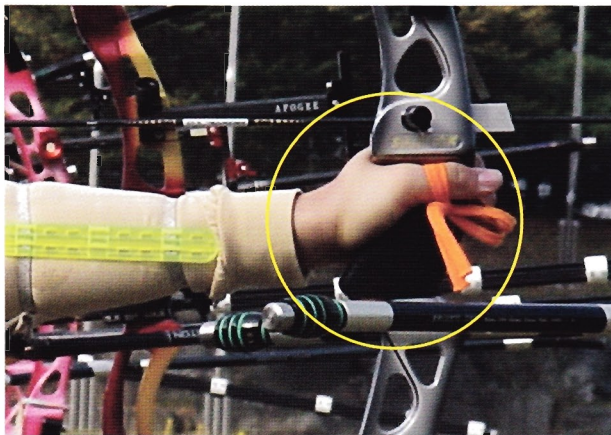
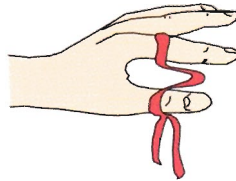
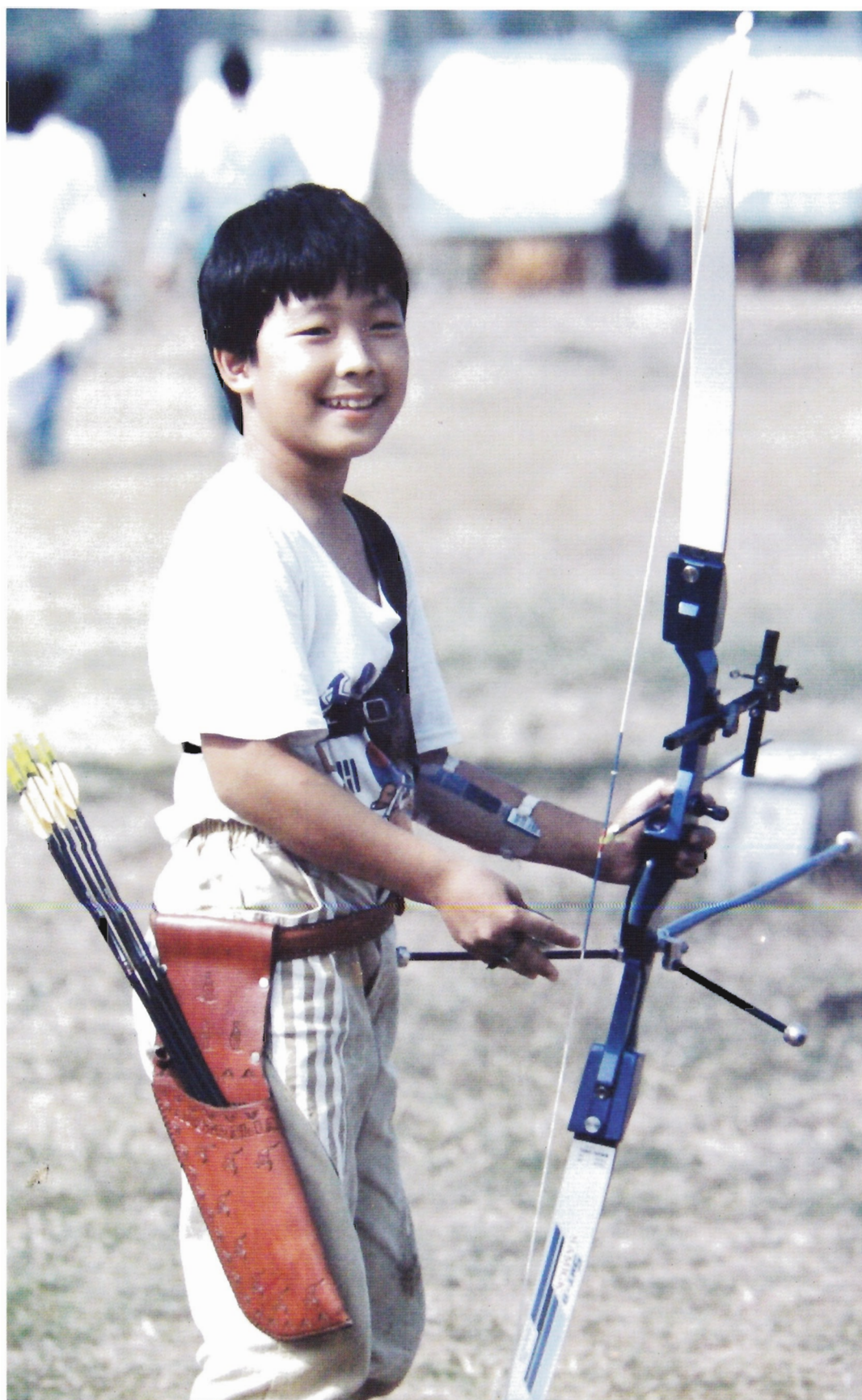


Figure 28



Figure 29





Hooking (placing the fingers on the string)

The location where the string is placed on the three fingers is very important. Many beginning archers do not go through the preparation exercise for hooking when they attend their early archery lessons, but it is very important for the archer to hook the string in the correct position on their fingers. When placing the fingers on the string, the shape of the wrist joint, and the division of the force on the fingers at the time of the hooking is very important. If the archer does not hook the fingers accurately, the sharing of the power on the fingers changes as the archer comes to full draw, and during the time of extending. Subsequently, according to the placement of the string on the hooked fingers, a change occurs to the direction of flight of the arrow at the time of the release, and the position of the hit on the target will be inconsistent. Consequently, when learning archery at the first time, the beginner should observe and make the location of hooking correctly. If the beginner is given exercises in the method of hooking in advance of shooting a bow it will produce good finger placement, and finger control, at full draw and during the release.





The position of fingers, the first joint when hooking

With the hand open, as shown in [figure 30](#), you will see that the joints on the first and third fingers are in line, but the joints of the second finger are out of line due to the differing lengths of the fingers. The amount of this differential will depend on the size and shape of the hand.

However, when the fingers are bent the second finger bends a little more than the first and third fingers which allow the joints to become virtually in line. The joint location of the bent fingers as shown in [figure 31](#) is very close to being similar. Therefore, even though the length of the three fingers is quite different, there is no problem at the time of the hooking.

As shown in [figure 32](#), the string should be hooked on the first joint of all three fingers when hooking. If the string is hooked on the second joint as shown in [figure 33](#), the time taken for the fingers to slip from the string at the time of the release is quite long. This causes a problem as the speed of the release tends to be slow which often causes mistakes within the release.

If the string is hooked on the cushion of the finger as shown in [figure 34](#), during the release the string moves sideways round the fingers and the flight of the arrow becomes erratic. It would be better to have the string hooked in the first joint as shown in [figure 35](#). If the string is not hooked correctly on the ring finger, the string slips from this finger at the time of extending as shown in [figure 36](#). With this problem, the archer becomes aware of it mentally and tends to press the string with the ring finger in an effort not to let it slip off the string. If the archer presses the string, the force of all three fingers also tends to curl inward when releasing and the movement of the string causes inconsistent arrow flight. Hence, in the case of the right-handed archer, the arrow gets to fly to the left of the target.

This problem becomes more evident when it is raining as the fingers slip much more during wet weather, this could cause the archer further problems as it is likely that they will feel uneasy about it psychologically.

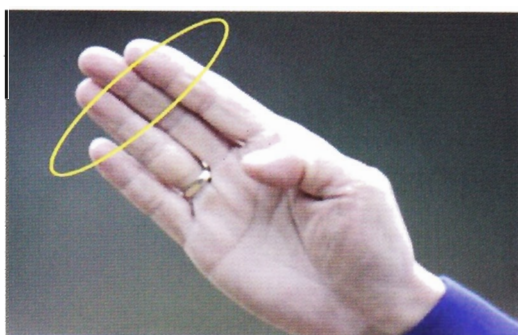


Figure 30

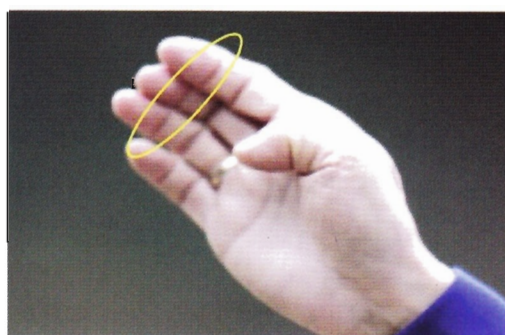


Figure 31

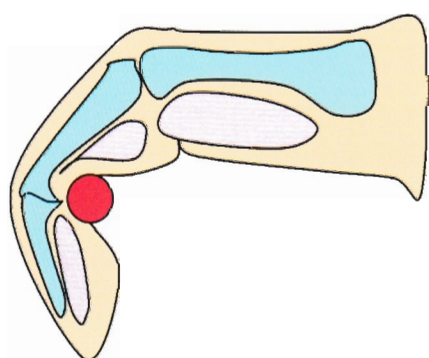


Figure 32

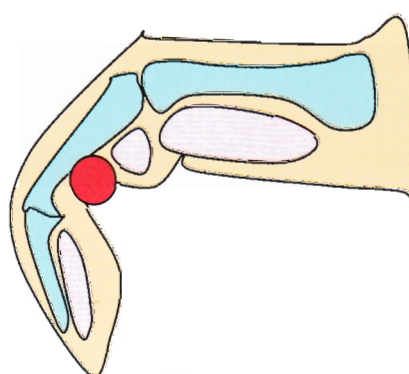


Figure 33

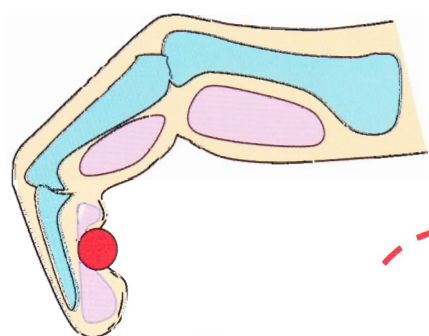


Figure 34

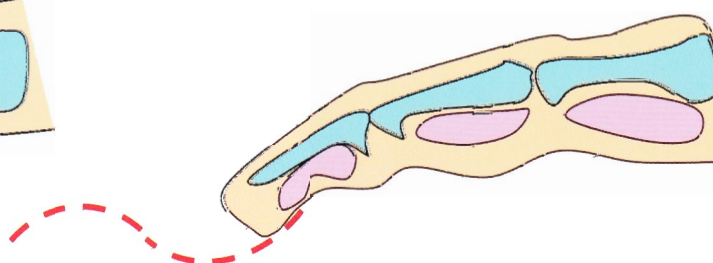


Figure 35



Figure 36



The position where the string is placed on the finger tab

Most beginners, when learning archery for the first time, use a finger tab which other archers have used before. Quite often this “borrowed” tab is either larger or smaller than the beginners own hand and consequently does not fit correctly, as shown in [figure 37](#). In such a case, the location where the string is hooked on the finger tab might not be correct. Therefore, when the beginner starts archery and shoots for the first time, the correct and proper fitting finger tab must be used, as shown in [figure 38](#). With a correctly fitting finger tab, the archer can hook the string in the correct position on the finger tab. If the string is placed at the inside of the finger tab as shown in [figure 39](#), it is possible to have an inconsistent arrow flight because the nock of the arrow touches the finger tab at the time of release. And, if the string is positioned too far along the fingers as shown in [figure 40](#), the fingers tend to be slip off the string at the time of the extending. To help the beginner find the correct position for placing the fingers on the string, a line can be drawn on the finger tab where the string should be placed. This will also help the beginner to replicate the correct position time after time.



Figure 37



Figure 38

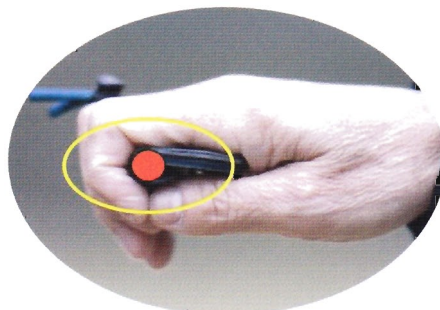


Figure 39



Figure 40

The distribution of the force on the fingers which are hooked onto the string

It is not easy for the archers to properly distribute the force on the three fingers which are hooked onto the string. Also, it is not good, and very difficult, for archers to divide the power on the three fingers by themselves. Depending on the position of the drawing elbow at full draw, the power sustained will be different for each of the three fingers which are hooked onto the string. If the archer's drawing elbow is low, the main force moves to the forefinger as shown in **figure 41**, and if the archer's drawing draw elbow is too high, the main force will move to the ring finger. With the archer's drawing elbow at the correct height the action of extending will become more natural, as shown in **figure 42**, and the force will be distributed correctly enabling the release to be executed naturally. When hooking the three fingers on the string, it is better to let the power distribute on the three fingers naturally. The distribution of the natural power will be divided automatically accordingly to the height of the drawing elbow and the length of the archer's fingers.



Figure 41



Figure 42



The position of the fingers which are not hooked on the string

The archer hooks the string with the first three fingers of the hand and does not use the little finger, or thumb, at this time. However, the little finger and thumb which are not used are as important as the three fingers which are used. The most important thing at this time is that the little finger and thumb should remain totally relaxed.

If force is felt on either the little finger or thumb, tension will be applied to the three hooking fingers which will be evident during the release, when this happens the archer cannot release smoothly. The thumb should be relaxed and bent slightly inward as shown in [figure 43](#).

As you can see in [figure 44](#), the thumb is lifted up and is fixed under the chin to provide an anchor for the string hand. Use of the thumb in this way is not advisable as it will cause inconsistencies in the anchoring position. For a consistent anchor the hand should be fixed under the chin and using the upper part of the forefinger to make contact with the chin, as shown in [figure 45](#). At this time the little finger, as shown in [figure 46](#), should be relaxed and slightly bent. If the archer bends the little finger too much and has it under tension, tension enters the fingers which are hooked on the string, and this will cause too much tension being used at the time of release.

The first joint of the little finger should be bent lightly, as shown in [figure 47](#), and the direction of the little finger should be natural and relaxed. All muscles and nerves of the five fingers have some influence over each other. Therefore if tension enters one finger, the other fingers also have a tendency to tense up.

If the fingers that are not used to hook the string are naturally relaxed, the other fingers, that are hooking the string, tend to relax quickly and more naturally when the finger muscles (flexors) are relaxed. As a result, the archer can execute a natural and smooth release.

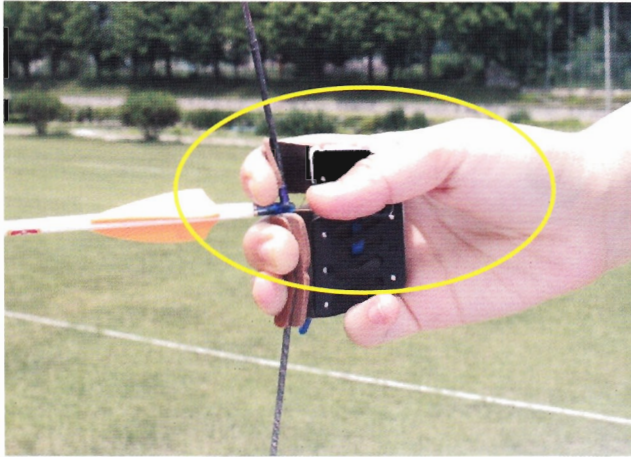


Figure 43



Figure 44



Figure 45

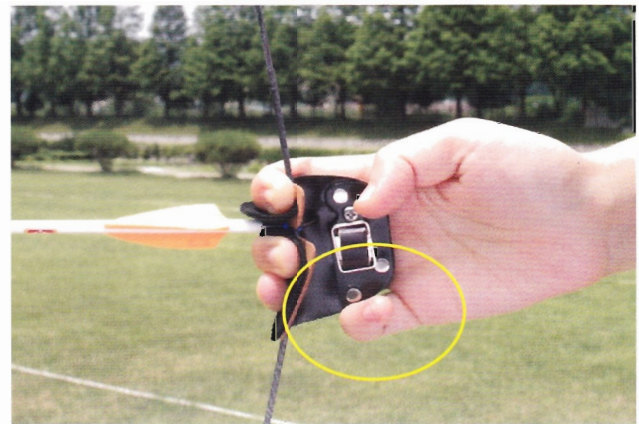


Figure 46



Figure 47



The joints of the back of the hand (Metacarpo-phalangeal joint)

Archers should make sure that the knuckles of the back of the drawing hand are flat and not sticking out at the time of hooking as shown in [figure 48](#). If the knuckles on the back of the hand are sticking out, the archer tends to use the fingers to get the last small movement of the arrow to activate the clicker. If the knuckles on the back of the hand are sticking out, tension is applied to the fingers, and for a right handed archer, the string moves to the left of the fingers at the time of release (and vice versa for a left handed archer). This reduces the speed of the release which becomes slow and subsequently the archer produces a forward release. The reason the knuckles of the back of the hand stick out is that the string is not hooked on the first joint of the fingers at the time of hooking, but is hooked on the cushion of the fingers. Furthermore, when extending, tension is applied to the end of the fingers because the archer worries that the fingers may slip off the string. Consequently, the knuckles on the back of the hand (Metacarpo-phalangeal joint) become tense and stick out. If the archer hooks the string on the first joint of the fingers accurately and naturally, the knuckles do not stick out and the archer can have the back of the hand quite flat, as shown in [figure 49](#). We know that the knuckles on the back of the hand straighten up if the archer hooks a heavy object with the three fingers and holds their arm straight down by their side, with the arm relaxed it also straightens up, as shown in [figure 50](#). This can be used as an exercise to show beginners what the hand should be like when shooting a bow.



Figure 48

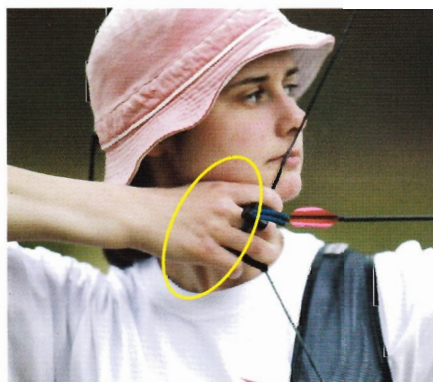


Figure 49

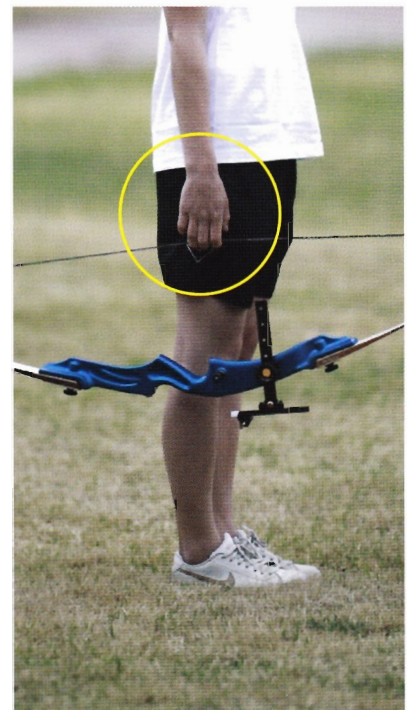


Figure 50

The Joints of the wrist

The joints of the wrist should be in a straight line with the fingers which are hooked on the string as shown in [figure 51](#). If the joints of the wrist are bent, the power with which the bow is drawn does not transmit to the elbow of the drawing arm when at full draw. And then, the three fingers which are hooked on the string do not release from the string at the same time. When the drawing elbow is not brought into line with the shooting plane the bent drawing arm is opened at the moment of release, as shown in [figure 52](#), and the archer makes the release while pressing on the string with fingers. When the fingers are hooked onto the string the wrist should not be bent. That is why the three fingers have to be hooked onto the string correctly. In particular, if the little finger is curled too much, the archer gets to press the string with the third finger. Therefore, tension enters the wrist and the joint of the wrist tends to be bent. If the string is hooked in the joint of the third finger accurately, the joint of the wrist gets to be in a straight line. You can see the poor shape of the wrist in [figure 53](#) when the third finger has not been correctly hooked onto the string, and you can also see the difference in the angle of the wrist in the second picture where the third finger has been hooked on the string correctly.



Figure 51

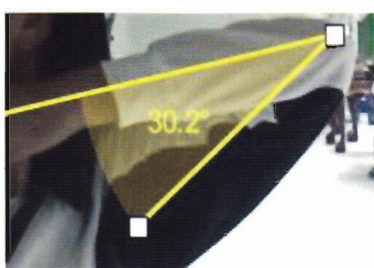


Figure 52

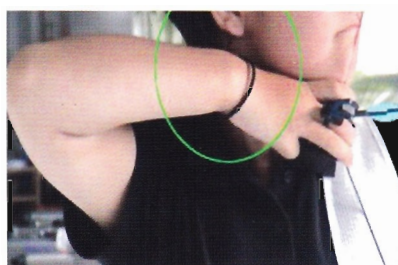


Figure 53



After change



The use of the finger spacer on the tab

The finger spacer is placed between the first and second fingers as shown in figure 54. The purpose of the finger spacer is to prevent the fingers from being pressed together by the angle of the string, which could induce the fingers to squeeze the nock of the arrow when reaching the full draw position. And, when shooting, the fingers should not touch the nock as this will induce an unwanted change to the flight of the arrow. If the finger spacer is too big or too thick, for the archer's hand, excessive pressure is applied to the forefinger which gets bent downwards toward the nock of the arrow. With this pressure on the fingers tension is applied to the forefinger and the archer's hand will feel unnatural, so if a finger spacer is used it is very important to use one that is comfortable and the proper size to fit the archer's own hand.



Figure 54



The use of the anchor plate

When archers cannot get a positive location for their hand under the chin at the time of anchoring, or when a lot of vertical positional changes occur to the location of the anchor, an anchor plate often is used, as shown in figure 55. Generally, it is better and more natural that the top of the forefinger is fixed under the chin to form the anchor as shown in figure 56, and not to use an anchor plate.



Figure 55



Figure 56

If an anchor plate is used, it should be fixed to the tab and placed where it cannot interfere with the relaxation of the thumb; it should be placed above the thumb as shown in figure 57. If the anchor plate is placed under the thumb, as shown in figure 58 the archer gets to press down on it with the thumb and the release would not be relaxed and smooth.

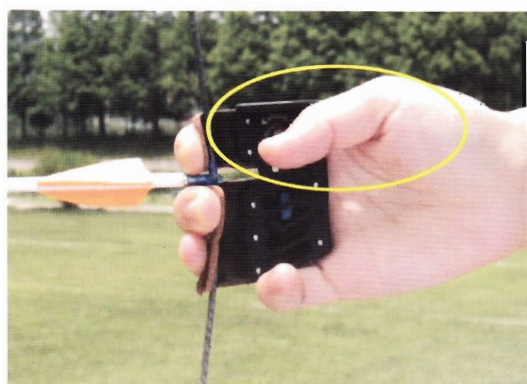


Figure 57



Figure 58



When an anchor plate is being used it should be very narrow and placed inside the tab and slightly lower than the forefinger as shown in **figure 59**, this is because when the anchor plate is located under the chin at the time of the anchor, the top of the forefinger is also able to be located along the chin giving the archer a stable anchor. If the anchor plate is placed above the forefinger as shown in **figure 60**, when the anchor plate is located under the chin the forefinger would be too low and would not be in contact with the chin. It means that when the anchor plate is placed under the chin the archer must rely on the tab to give some stability to the drawing hand whilst aiming, extending, and releasing.



Figure 59



Figure 60

Also, when the plate is on the inside of the finger tab, normally, it becomes too wide to use correctly as the drawing hand cannot be positioned on the chin because of this wide plate, as shown in **figure 61**. Consequently, the archer should use a finger tab of the proper size, or make the plate smaller to suit the contour of their neck and chin, as shown in **figure 62**. More importantly, if the plate on the inside of the finger tab is too big or the anchor plate is too high, the archer cannot raise the drawing elbow up to the correct height, nor can they maintain a good angle of the drawing elbow, as shown in **figure 63**. This would result in tension entering the drawing fingers jeopardising the quality of the extending period and the performance of the release.

The drawing hand must be located correctly on the chin for the archer to perform the extending period efficiently, which would also help to produce a stable and relaxed release.

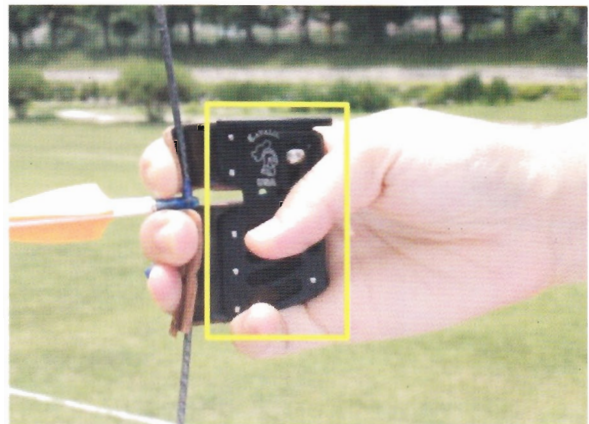
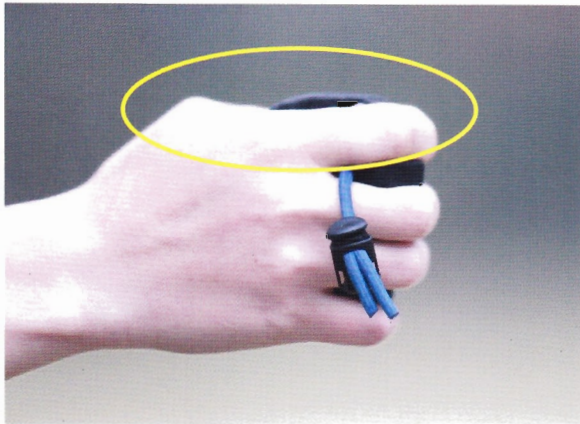


Figure 61

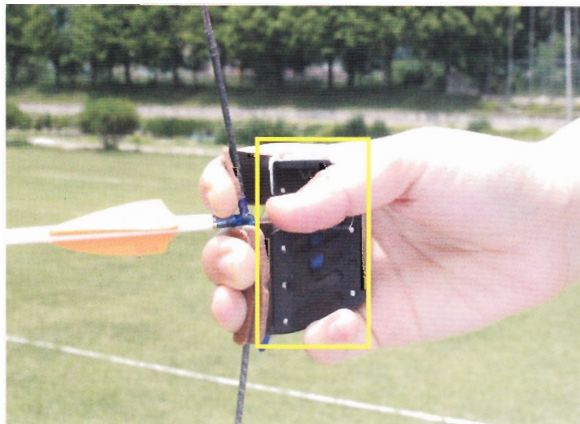


Figure 62



Figure 63



1984, L.A Olympic Game





Set up

An archer should ensure that during the set-up period they make the preliminary angles of the body accurately to enable the posture to be correct at full draw. When the archer's body is under tension at full draw it is not easy to change, or correct, the posture or any angle of a body that has been set-up incorrectly. This is because the muscles which are already under tension need to be relaxed again to correct or make a new angle. During the time of set-up both arms should be partially relaxed and the position of the body, or head, should be not changed. Also, problems will occur if the set-up is done too quickly. If the speed of set up is too fast, the bow arm becomes rigid and it is difficult to get a good rhythm when drawing the bow. Set-up is very important for the beginner because it determines the correct angles of the body, prior to and, when the body is at full draw. Many beginners use a bow that is too heavy for them to pull correctly and efficiently when they first start shooting. In many such cases, the speed of set up and drawing is performed too fast and the archer tends to use the wrong parts of their bodies. The beginner should become proficient in performing the stage of set-up accurately with a rubber band, before they progress to using a bow.





The position of bow arm and drawing arm during the set-up procedure

Both arms should be raised gently during the time of the set-up, and the archer should not draw the bow before getting the body to the correct angle or position. The archer has to raise and settle both hands higher than the position. The bow is raised until the sight pin is placed at 12 o'clock on the target around the blue or black scoring area as shown in [figure 64](#), and the drawing hand should be raised and positioned at a level between mouth and eyes, as shown in [figure 65](#).

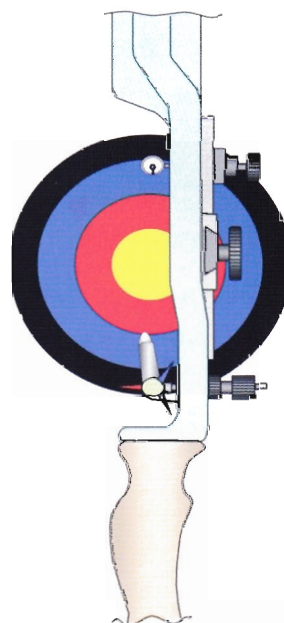


Figure 64





The forward rotation of the bow arm

The bow arm must be rotated slightly forward at the time of the set-up (clockwise from the archer's view – if a right handed archer). The reason for slightly rotating the bow arm is to allow the triceps and deltoid muscles to become slightly energised then archer can fix the bow shoulder correctly before coming to full draw, as shown in [figure 68](#) and [figure 69](#).

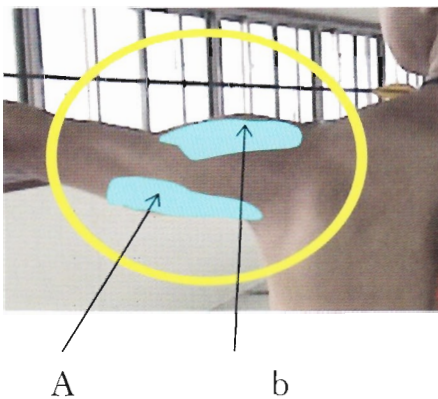


Figure 68

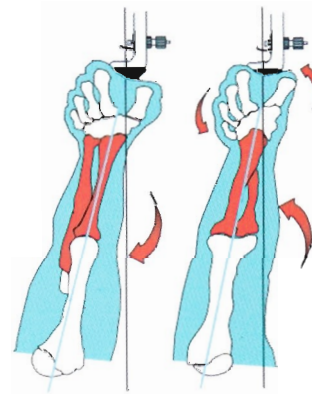


Figure 69

Subsequently, when extending and shooting, it prevents the bow shoulder from rising up or moving back. It is better to rotate the bow arm naturally and gently when raising the bow and only minimal tension should enter the bow arm muscles. It is usually quite hard for beginners to rotate the bow arm when raising the bow. As you can see in [figure 70](#) it is better to exercise/practice rotating the bow arm with the bow hand held static on a wall or similar. If the bow arm and shoulder remain relaxed the archer can rotate the bow arm easily. When rotating the bow arm correctly the radius and ulna bones get to be parallel, as shown in [figure 69](#).



Figure 70

The centre of the body

Many archers tend to move the centre of their body at the time of extending as shown in **figure 71**. Consequently, inconsistencies occur to the grouping of the arrows in the target, as such the strike pattern would tend to be from side to side.

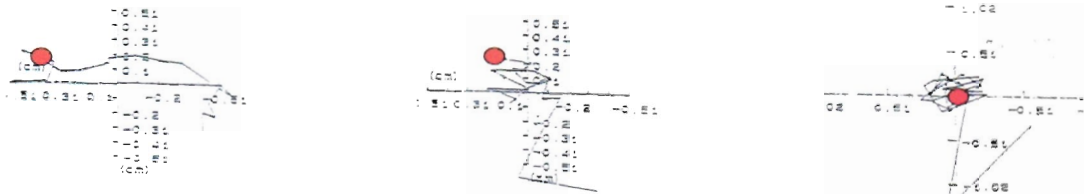


Figure 71

However, there are many cases where archers are not aware that the centre line of their body has been moving because it has become a natural thing to them since acquiring this habit. The reason the centre line of the body is moved is that it is not set in the correct position at the time of the set-up. In particular, the centre of the body moves much more on the strong windy day, and at the time of a prolonged extending period. When preparing to shoot the bow, the centre line of the body is placed toward the heels of the feet, as shown in **figure 72** the centre of the body then moves forward to the centre of the feet at the time of the set-up. As you can see in **figure 73** the force of the body's front part and the heel front of the ankles

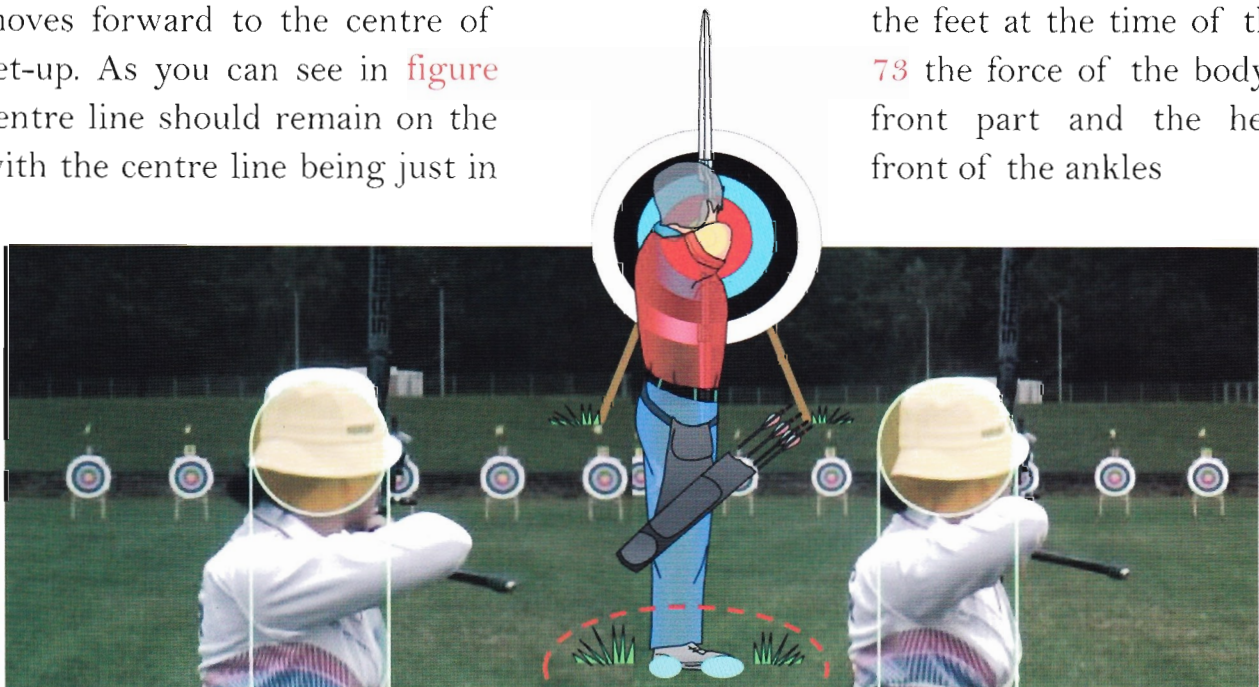


Figure 72

Figure 73



The correct posture of the chest and buttocks as seen from behind during set-up

There is a posture situation that many lady archers seem to do, and that is, when they come to the pre-draw position they tend to lift the chest, and when they get to full draw they often tend to stick out their buttocks as well, as shown in **figure 74**. The reason for this situation is that usually, the bow is too strong to shoot and the archer breathes with the chest, which gets raised during the time of set-up. Men tend to breathe using the abdomen but women breathe mainly using the chest, so this kind condition is very common. Before entering the setting up period, the amount of natural breathing will help to maintain the centre of the body in a well balanced state. During the set-up stage the breathing pattern is transferred to the abdomen, and the centring of the body has to be continuously maintained at the lower abdomen area. When setting up, the chest should remain passive and be in the same condition as it was before commencing the setting up period, only arms should move when lifting the bow up to the pre-draw position. At this stage it is very important not burdening the archer with a bow that is too strong for them to pull. If the bow is too strong for the archer to shoot, the chest is lifted up in order to draw the bow by force. It is better for the beginner to practice drawing with a rubber band until they are proficient in producing the correct posture. For the archer who has developed the habit of breathing in, then breathing out approximately 50% of the air before setting up, the chest gets to move down as shown in **figure 75**. When setting up in this situation, the chest does not get raised up. After correcting the problem of the archer raising the chest, the archer can use the normal breathing method.



Figure 74



Figure 75

The position of the head and the body when setting up

As you can see in **figure 76** the head and the body should be placed on the vertical centre line of the body at the time of set-up.

If the position of the head or the body is bent or leaning during the setting up period, the bow shoulder raises up, the waist is bent and the drawing elbow is moved down at the time of full draw.

Therefore, the location of the head and the body are very important when setting up. When setting up only the arms should move, the head or body should not move.

The correct position of the head is directly over the centre line of the body, and the centre line of the body should be perfectly vertical.



Figure 76



The position of the bow arm shoulder when setting up

The bow shoulder must be positioned accurately and correctly at the time of set-up.

As shown in figure 77 the archer pushes the bow arm shoulder toward the target and at the same time turns bow shoulder inside slightly whilst setting up. However, if the archer rotates the bow shoulder it too much at this time the bow shoulder tends to rise up, as shown in figure 78

To stop the bow shoulder from rising up, the archer has to turn the bow arm inwards slightly and only up to a point where the bow shoulder does not rise up. The structure of the shoulder joint is the ball and socket type as shown in figure 79. If this joint is not fixed in the correct position, according to the structure of the joint, an unwanted positional change of the shoulder can occur very easily when extending and shooting. If bow arm shoulder moves upward too much or too frequently, the muscles of the shoulder will get tired quickly and it is possible that an injury can occur.



Figure77

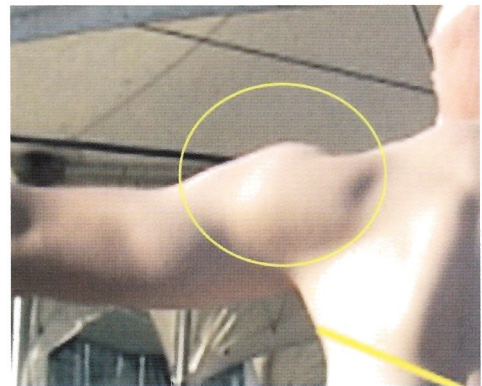


Figure 78

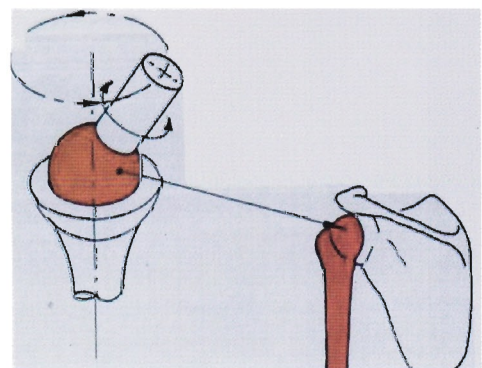
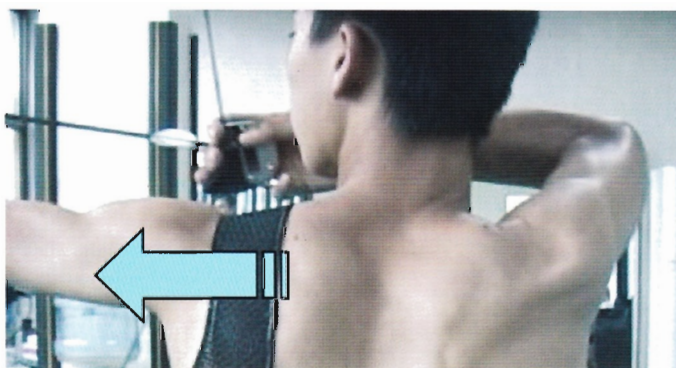


Figure 79





Drawing the bow

The direction of drawing the bow

As you can see in [figure 80](#), the archer draws the bow from the centre of the grip to the right side of the mouth. If the archer draws the string to the centre of the face or too far to the inside of the face as shown in [figure 81](#), the chest can interfere with the drawing path of the string and it will be difficult to have an accurate and true line at full draw.



Figure 80



Figure 81

If the drawing hand is placed too deeply under the chin during the action of drawing the string to the anchoring position, as shown in [figure 82](#), the archer tends to move the chin quite a lot causing inconsistencies to occur in the draw length. Therefore, as shown in [figure 83](#), the drawing hand should be placed slightly under the chin which will allow the archer to continue the draw in a straight line.

If the archer has the drawing hand too far under the chin, the chin gets to move forward for anchoring as shown in figure 84 this causes many inconsistencies to occur in the draw length.



Figure 82



Figure 83

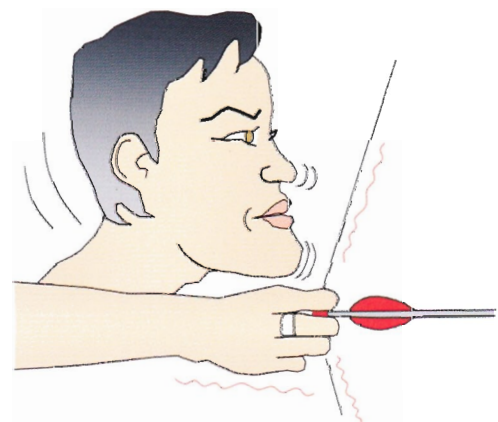


Figure 84



The speed of drawing the bow

When drawing the bow, the speed of the drawing should be constant and controlled all the time. If the archer draws the string too suddenly, the muscles of the whole body become rigid. It is difficult to return a tense muscle back to being relaxed again after drawing the bow. These tense muscles could jeopardise good extending and the release would not happen naturally or smoothly. The archer should draw the bow slowly with the good rhythm and the same speed has to be maintained when anchoring.

Drawing balance

When drawing the bow, a 50% balance has to be maintained between the drawing arm and the pushing arm. The balance of the both arms should be maintained from centre of the body, the spring like pressure from drawing the bow, should be between the bow hand on the bow to the elbow of the drawing arm. The pushing arm and the bow shoulder should maintain the force directly toward the target and the drawing arm must be drawn following a straight line and using the drawing elbow.

When drawing the bow, the correct balance is essential to help to maintain the accurate balance at the time of extending.





Keeping the bow vertical when drawing a bow

When drawing the bow it should be kept vertical and not lean either to the right or left as it is difficult to return a leaning bow back to the vertical after reaching the full draw position. If the archer cants the bow at the time of set-up, the chances are that it will still be canted at full draw as the body continues canting the bow through the drawing procedure. The body and the bow should not be canted during any part of the sequence from set-up to full draw.



The position of the bow arm when drawing a bow

Many archers draw the bow using only the drawing arm and forget about pushing the bow arm toward the target. When this happens, the force on the bow arm moves it back and into the shoulder which gets raised up or is moved back toward the spine. When drawing the bow, the archer has to maintain the power of the shoulder and the hand on the bow grip because the bow shoulder should not be moved back. If the bow shoulder is allowed to move back 'during the draw', inconsistencies occur to the body line-up, causing problems with the archers timing when trying to draw to the correct arrow length. Also, if the bow shoulder has moved up and back when drawing the bow the archer cannot extend correctly and will not have good balance. Therefore, many mistakes will happen causing many problems.





Breathing

During the relaxation period the archer should breathe naturally, relaxed and subconsciously. Before setting up, the archer's natural breathing routine should intake the air to approximately 50% of the lung capacity. At the time of setting up the archer should breathe air in to the lung capacity of approximately 65%-75% as shown in figure 85. As you can see in figure 86, while drawing the bow, the archer should breathe out about 15%-25% of the air when coming to the anchoring position, and begin extending without breathing, then completely exhale after releasing the arrow. When the archer does not breathe during the extending, the airway should not be closed and the air should be released through the airway naturally. After completing the shot the archer should return to breathing naturally, and subconsciously. This breathing should be the most natural to the archer similar to the time before drawing the bow i.e. the intake of the air should be approximately 50% of lung capacity.

The coach does not need to teach the method of breathing in the early stages of the beginners training as most beginners breathe the correct way quite naturally. It is better to observe each beginner and to rectify any cases where the wrong breathing method is being used. And, if the archer breathes in too much air during the setup period, the chest expands and tends to lift up. The breathing depends on the action of the setup and the drawing speed, and the pathway to producing a correct setup and drawing speed is to breathe correctly.

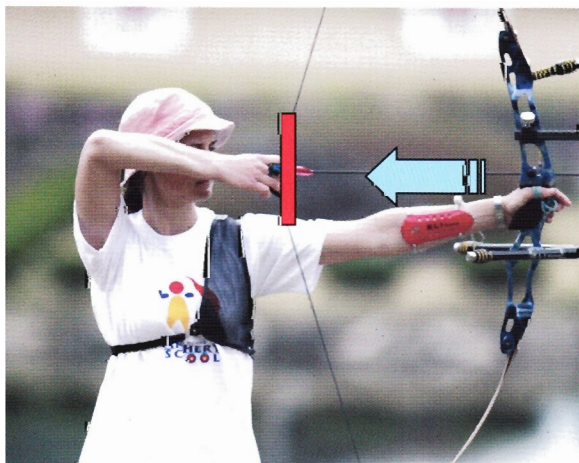


Figure 85

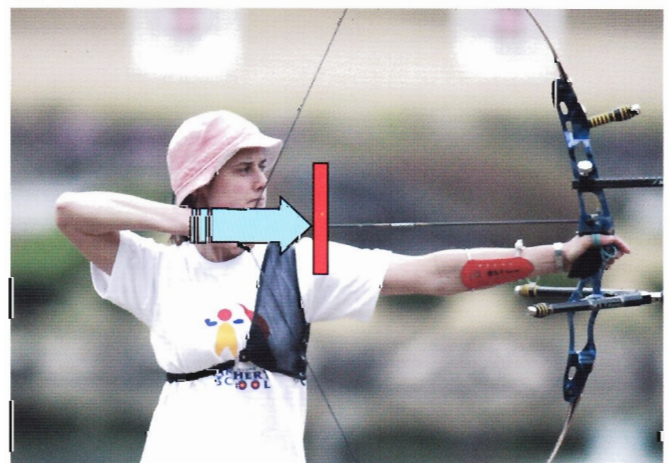


Figure 86

The anchor

The art of anchoring is the most important of all the basic skills. The reason for this is the anchor is the central position of the pushing and pulling points when in the full draw position. The anchor should be fixed to the chin strongly and in the same position each time in order to maintain a good extending balance. In addition, it prevents the releasing fingers from slipping forward at the time of the release. The shape of the archer's chin is very important, the hand should be placed directly onto the chin, but if the chin is sharp or pointed the archer can use an anchor plate fitted to the tab to secure a stable anchor.

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The position of the hand when anchoring

It is better and more natural when the top of the forefinger is fixed under the chin to form the anchor as shown in [figure 87](#).

Many archers fix their thumbs under the chin to form a reference point as shown in [figure 88](#). However, if this is done the location where the hand is placed under the chin tends to be inconsistent causing anchoring location problems.

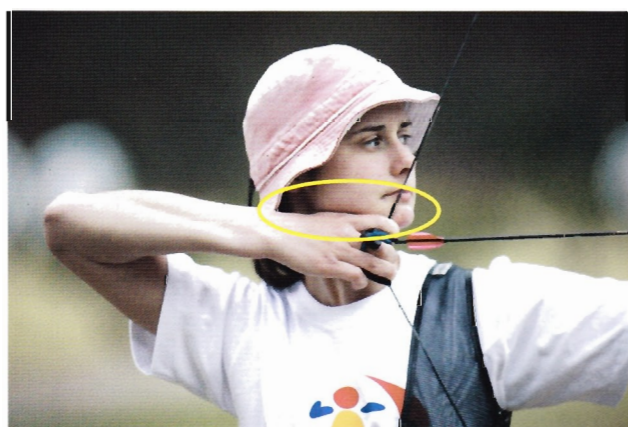


Figure 87

These variations to the anchor position causes problems with the arrow hit pattern in the target, usually producing high and low arrows depending on the change of the up and down location of the thumb.

When using the thumb this way it becomes tense and rigid when anchoring, and this tension migrates to the hand and the wrist, which can hinder the correct positioning the drawing elbow.

The thumb should be placed on the inside of the hand at the time of anchor. As you can see in [figure 88](#), if the thumb presses down the upper part of the finger tab or the anchor plate, the tension enters the whole hand; consequently, the archer cannot produce a relaxed and smooth release of the string.

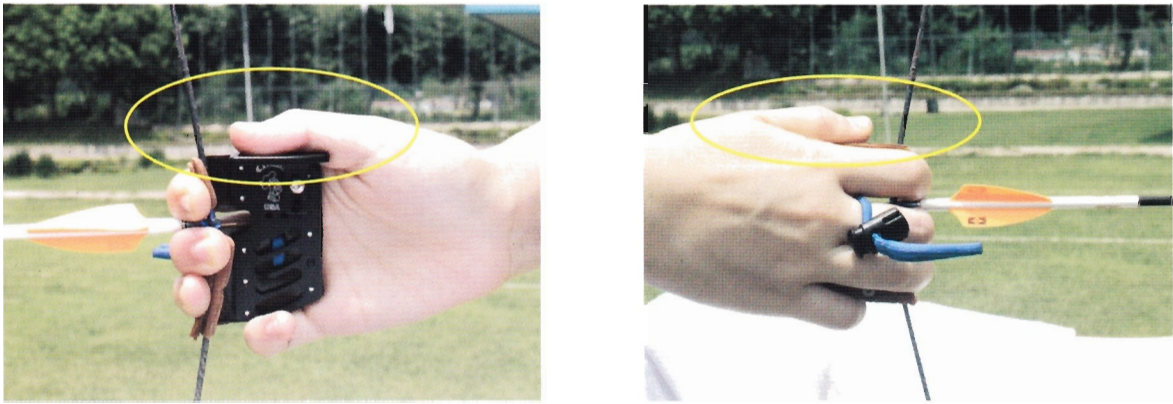


Figure 88

The little finger may be bent slightly but should remain in a relaxed condition as shown in [figure 89](#). If the little finger is not relaxed but bent inward and under tension, some tension will be applied to the third finger and the archer gets to shoot pressing the string with this third finger. Maintaining a relaxed thumb and the little finger will help to produce a good smooth release.

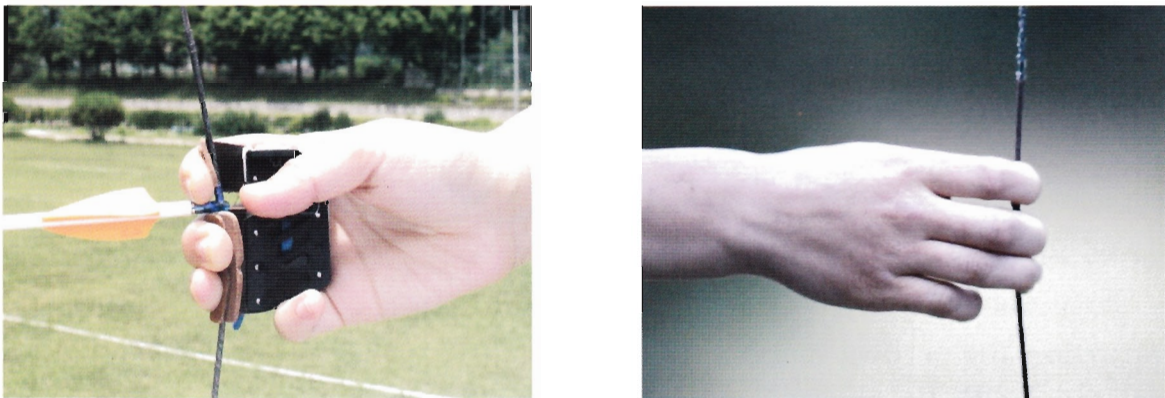


Figure 89





The position of a string when anchoring

As shown in **figure 90**, the two archers are locating the string a little off centre and slightly to the outside of the mouth at the time of anchor.

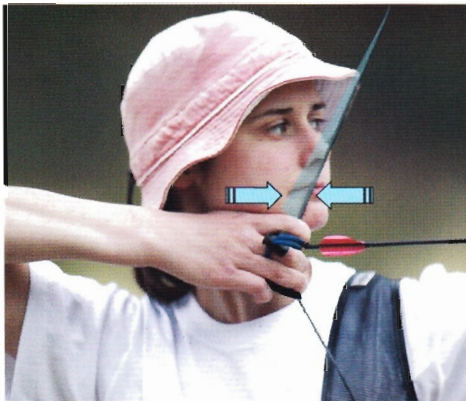


Figure 90

At this time, the string has to be placed on the centre of the nose.

This explanation is for a right handed archer as shown in **figure 91**, if the archer is left handed the reverse would be true. As shown in **figure 91**, if the string is located to the right of centre on the nose, the string will be seen on the right of the riser. Therefore, the arrows will hit on the left side on the target as the sight pin is located too far to the left. On the other hand, if the string is placed to the left of centre on the nose, as shown in **figure 92**, the string will be seen on the left of the riser. For this situation the arrows will hit on the right side on the target as the sight pin is located too far to the right. For both scenarios above it would be very difficult to confirm the location of the string with the riser because when aiming, the position of the string is placed on too far left or right of the riser.

It is very important that the string should touch the nose at the time of anchor as shown in **figure 94**. If the string does not touch the nose, the archer does not know the exact position of the head which could be slightly back and with the face lifted up or slightly forward putting the face down. With this situation the archer would have arrows hitting high and low on the target.

As shown in **figure 93**, if the string is not touching the nose because the head is slightly back and lifted up, the back of the neck becomes rigid and too much tension is applied to the muscles of the neck and the shoulder. This could cause the archer to develop a repetitive strain injury (RSI).

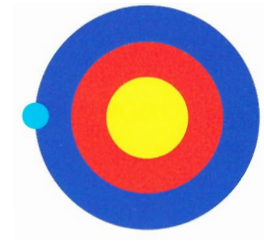
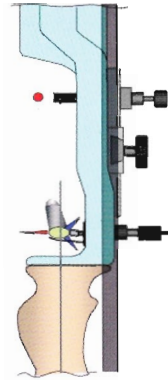
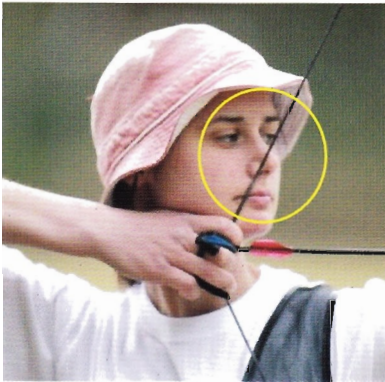


Figure 91

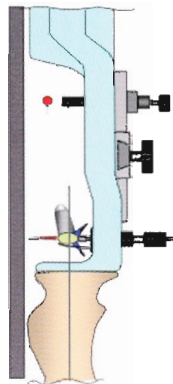


Figure 92

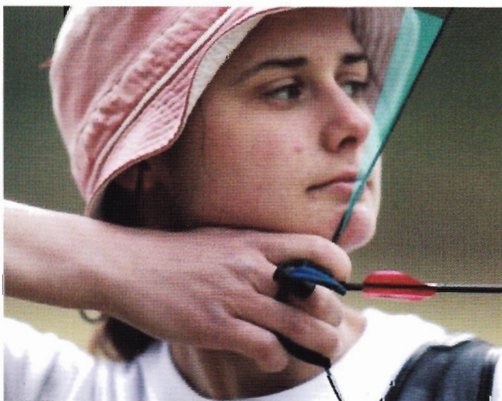


Figure 93

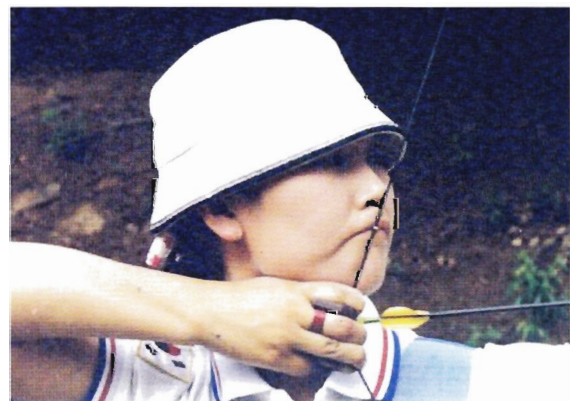


Figure 94

It is better to place the string a little to the outside of the mouth during the action of anchoring as shown in [figure 94](#). If the string is located this way the drawing elbow can be moved back more and it will help to achieve a good draw force line at full draw and produce a good stable release.



The movement of the head when anchoring

When anchoring, as shown in **figure 95**, the chin or head should not move forward to meet the string. If the head and the chin move forward at the time of anchoring, the draw length produced gets to be shorter by the same amount the head was moved forward. If the draw length differs when using a draw length check (clicker) the extending time also differs, this would jeopardise the timing and accuracy of the shot.

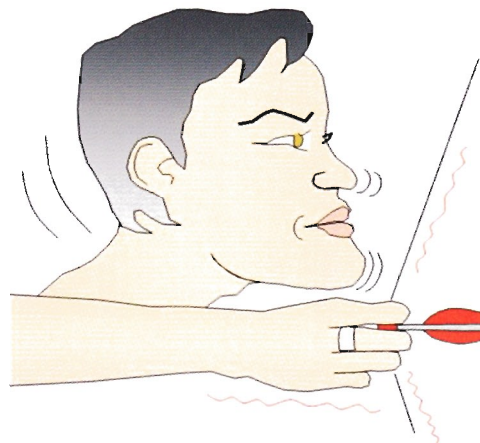


Figure 95

If the head is raised when the chin is moved forward to the string the drawing hand can be left too low, and away from the chin, when drawing the bow, as shown in **figure 96**. In this situation the archer has to be very careful because the head and chin will move at the time of anchoring. The head should not move at the time of anchor, the archer should move only the drawing hand into the anchoring position.



Figure 96

Aiming

When beginners start shooting a bow for the first time, they should have the correct knowledge and a good habit of aiming. If they develop the wrong habit, they often tend to release before getting the sight on the centre of the target. Also, in the early stages of using a bow the beginning archer often feels uneasy about the aiming.

At the time of setup, the archer aligns the sight at approximately the blue / black area at 12 o'clock on the target as shown in [figure 97](#). And then after full draw, when the archer starts aiming, the sight pin settles on the centre of the target as shown in [figure 98](#).

It is not a good habit to let the sight drift away from the gold when anchoring, as shown in [figure 99](#), and then trying to move it to the correct position on the centre of the target when at full draw.

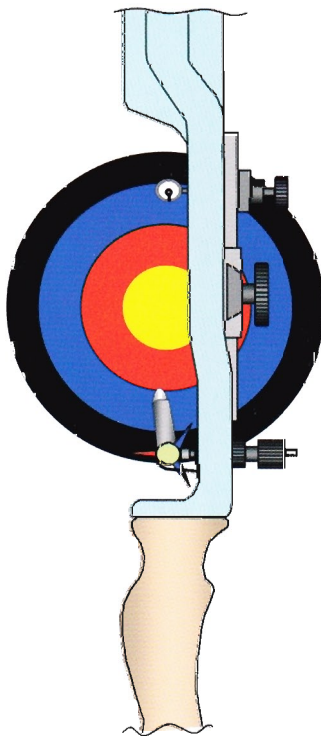


Figure 97

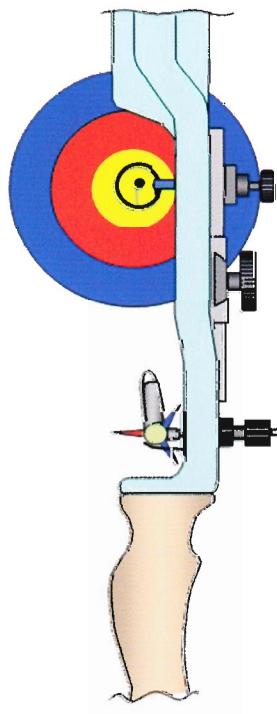


Figure 98

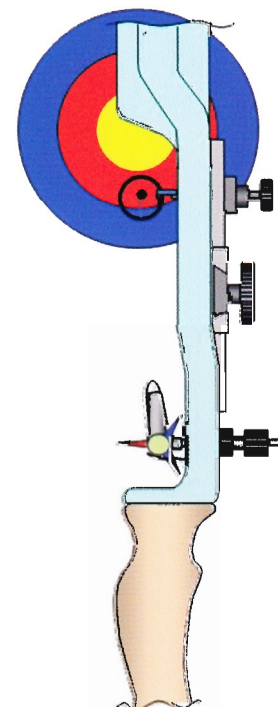


Figure 99

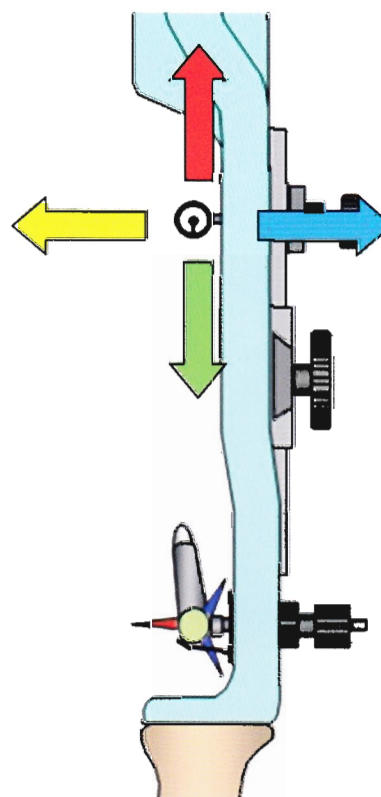


The method of using the sight pin

If the arrows are not hitting the centre of the target the archer should move the sight pin in order to get the maximum point of impact central on the target. As you can see in **figure 100**, the sight pin is moved toward the direction of where the arrows are landing in the target. For example, if the arrows hit left on the target, the sight pin is moved to the left and if the arrows are hitting high, the archer must move the sight pin up. And likewise if the arrows hit right on the target, the sight pin is moved to the right and if the arrows are hitting low, the archer must move the sight pin down.



Figure 100





Archers who participate in competition should mark the location of the sight block of every shooting distance correctly on the vertical track of the sight as shown in **figure 101**. It is not good to write it on paper or to memorize it. If the paper on which the archer has written the location of the sight block is mislaid, the archer could be embarrassed due to not having any pre-calculated sight marks when changing distances. As shown in **figure 102**, the archer should look at the sight track and block very carefully when moving it, and confirm the range of the movement and that it has been set to the right mark.

There are some archers who move the sight block without watching it or confirming the range, this can cause many errors. There are many cases where the archers move the sight block or pin turning the lever/dial of the sight pin by feel only. It is very important for the archer to know the accurate position of the sight block, and sight pin, of each shooting distance. If a sudden change occurs to the regular and normal position of the sight, the archer should check that their equipment is still in good order or check that their posture has not deteriorated. Therefore, it is very necessary for the archer to know the correct location of the sight pin at all times. And, any change to the equipment or posture can/will require a positional change to the sight pin. When this happens the archer must mark this new location of the sight block and pin as well.



Figure 101

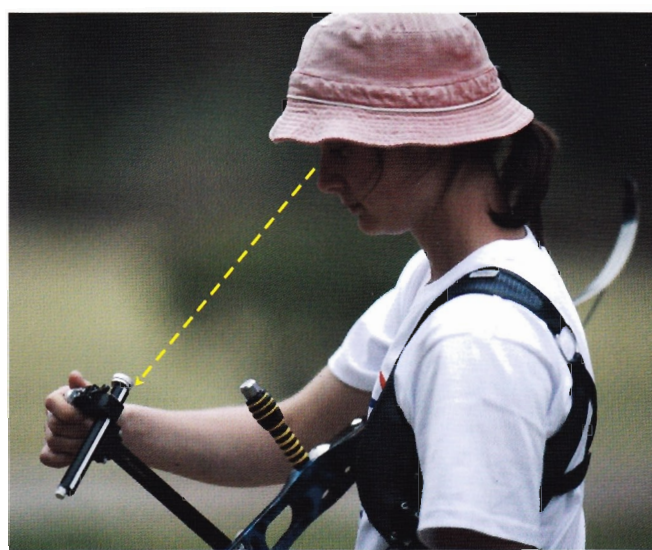


Figure 102





Alignment of the string

When aiming, the centre of the **target**, the **sight pin**, the **string**, and **eyes** should all be on the same alignment at the same time as shown in **figure 103**. If any one of these four items is not the same alignment with the other three, the arrows will hit either to the left or right side of the target. The most important thing among these four items is the position of the string. The strike pattern of the arrows will spread across the target, left and right, depending on the location of the string in the line-up of the **target**, **sight pin**, **string**, and **eyes**. After anchoring, the archer sees the string with the sight pin, the position, and relationship of these two items should remain the same at all times, especially when extending. The archer should be careful not to change the position of the string either to the left or right in relation to the sight pin. As shown in **figure 104**, if the position of the string is placed to line up with the left side of the riser, the arrows will hit on the right of the target. On the other hand, if the position of the string is placed to line up with the right side of the riser, the arrows will hit on the left side of the target. The reason why the location of the string can change in relation to the riser/sight pin is that the position of the face is probably tilted to the left or right, which will also have an adverse effect when extending prior to the release.

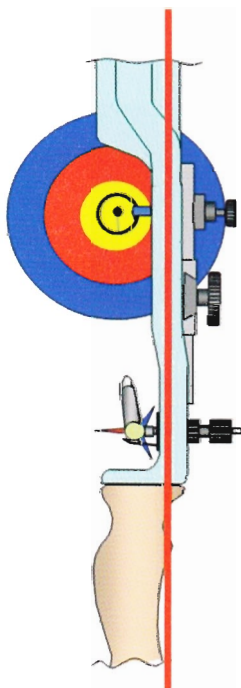


Figure 103

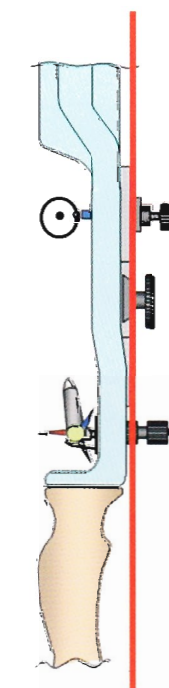
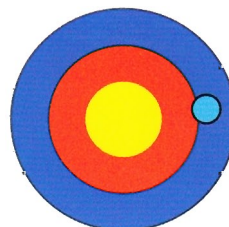
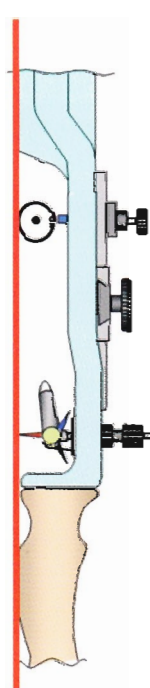


Figure 104

The time of seeing the string

The archer sees the string at the beginning of the aiming procedure, which is directly after anchoring as shown in figure 105. The focus of eyes is directed to the sight pin at this time and the string is seen to be slightly blurred. After beginning the aiming procedure, the archer should see the string continuously during the time of extending. It is helpful for a beginner to keep seeing the string, from anchoring to the extending, to help develop the skill of obtaining the correct head position and the direction of extending. If this skill is mastered completely, the archer can concentrate on the sight pin without actually noticing the string. But, the position of the string should be confirmed occasionally because the location of the string may be changed without actually knowing it. For some archers, seeing the sight pin and the string at the same time may not be comfortable, or the archer may not even be able to see them at the same time. The archer will see the string more clearly when using a string that is a different colour to that of the bow riser.

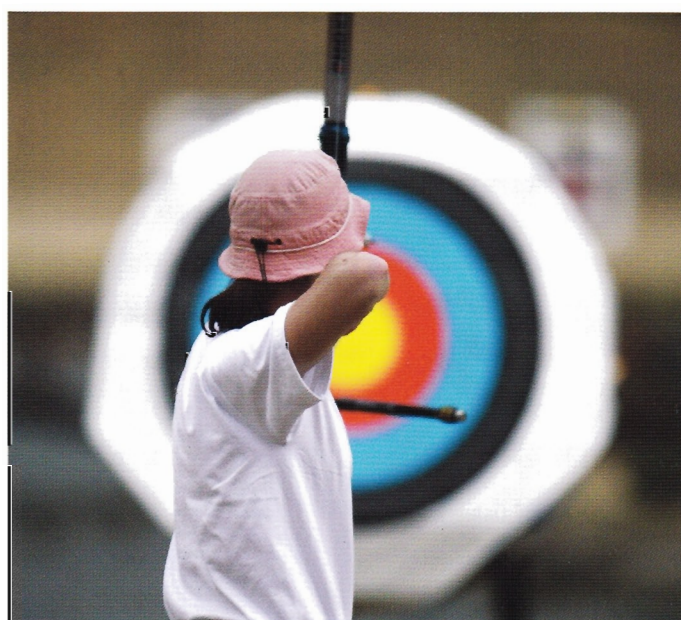
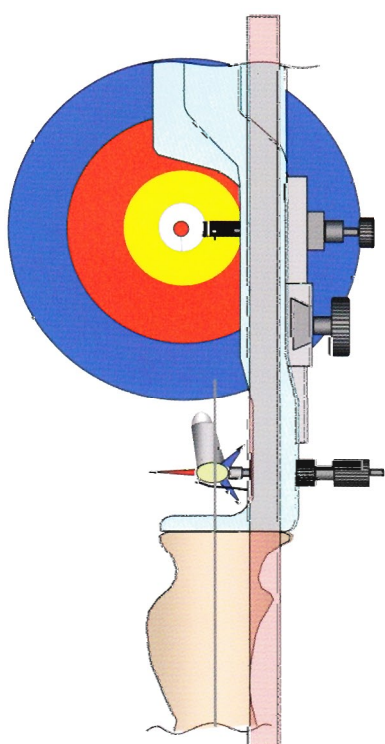


Figure 105



The position of the string

When aiming, the location where the string is aligned to should be a permanent identifiable place on the riser. This is advisable as the archer can see the fixed position of where to align the string all the time because the location of the bow riser with the line up of the body does not change. The position of the string should be aligned either on the centre, inside line or outside line of the bow riser as shown in figure 106.

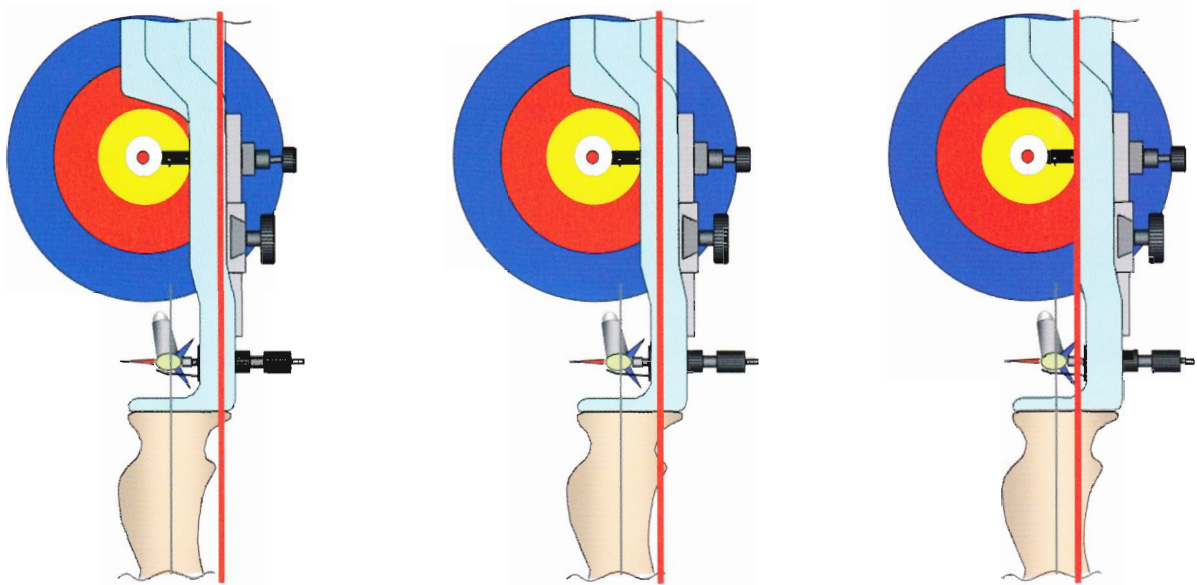


Figure 106

It is better to choose the position of the string that is most comfortable for the archer which could depend on the head position and the angle of the posture. As shown in figure 107, if the position of the string is aligned too far left on the bow riser, the arrows will hit on the right side of the target. So, if the archer moves the sight pin too far to the right to compensate for this arrow impact on the right, the archer cannot see the sight pin because of it hiding behind the bow riser. And, if the archer tries to compensate for this error by increasing the pressure of the spring in the pressure button, with the intension of moving the arrow impact and sight to the left, the arrow flight will be jeopardised and erratic arrow grouping will possibly occur. And, if the string is aligned to the extreme outside right of the bow riser as shown in figure 108, too much tension is applied to the muscles of the neck and the shoulders.

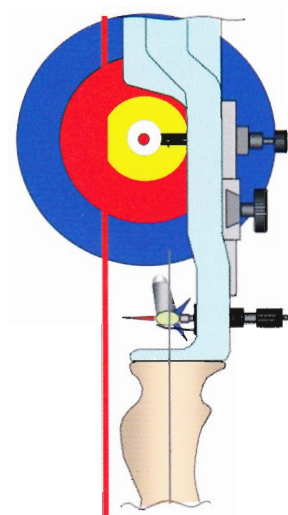


Figure 107

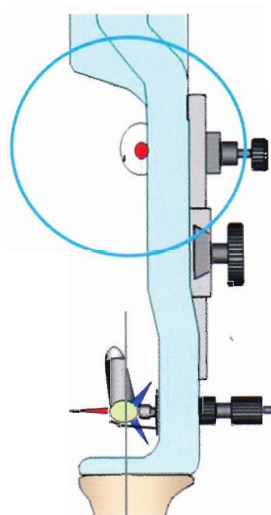


Figure 108

When the string is aligned beside the sight pin

Some archers align the string with the sight ring; this may be aligned either to the right or left of the ring as shown in [figure 109](#). This method has an advantage as the archer can see the position of the string very easily as the eye can see the **string**, **sight pin** and **target** without turning the eyes as would be done if aligning the string with the riser. However, the visual alignment of the string on the sight pin should be placed on the exact location of the sight ring, whether it is on the left or right of the sight ring, every time.

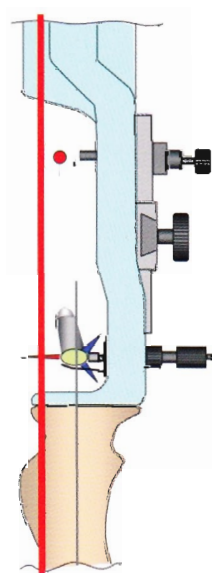
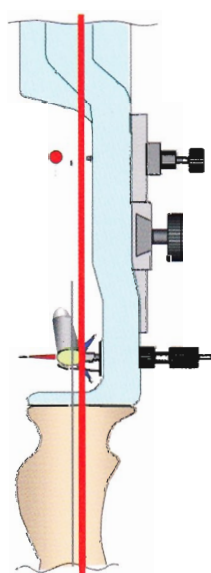


Figure 109



If the archer chooses to align the string with the sight pin during aiming they have to be aware that if there is any change to the windage setting of the sight the string alignment will also change by the same amount in relation to the riser as shown in **figure 110**. If the bow is not set-up correctly or, on a very windy day, the sight may be moved left or right for very shooting distance. In such a case, the position of the string also gets changed every shooting distance by the same amount as the movement applied to the location of the sight pin. Also, when wind blows with regular intensity, the sight pin would be moved left or right to accommodate where the arrows were hitting the target. In this case, the sight pin and the string are moved together, so comparing a windy day, to a non windy day the position of the string will differ, which will cause the angle of the face, the feeling of extending and the angle of full draw to be different.

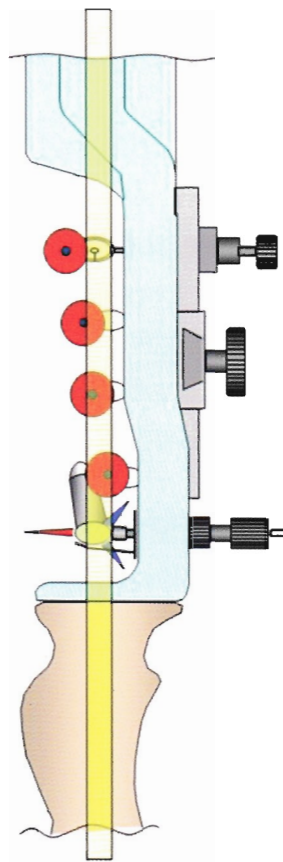


Figure 110

Full Draw

The archer should have the correct posture at full draw in order to maintain the accurate extending period and a good shooting balance, if the posture is not correct many errors could occur due to some incorrect body angles at full draw. Having a good, and correct, body posture at full draw is most important if the archer wishes to shoot high scores. The beginner should not use a bow that is too strong for them to manage or to be able to control at full draw. The beginner archer should never practice with a weak bow then change to a stronger bow for competition; they should always practice with the bow they will shoot in competition. If the archer uses a bow that is stronger than the bow they use for practice, the correct posture at full draw will not be achieved and tiredness will enter the muscles very quickly.

The correct posture of the head and body when at full draw

As shown in figure 111, the location of the head should be placed on the vertical centre line of the body when at full draw. If the archer of leans the centre of the body back away from the target or forward toward the target than the centre, as shown in figure 112, too much tension gets to be applied to the muscles around the neck, it is then difficult to maintain an accurate balance at the time of extending and shooting. For good posture, the whole of the body should stand straight upright and the centre of the body should be divided evenly over both feet.



Figure 111

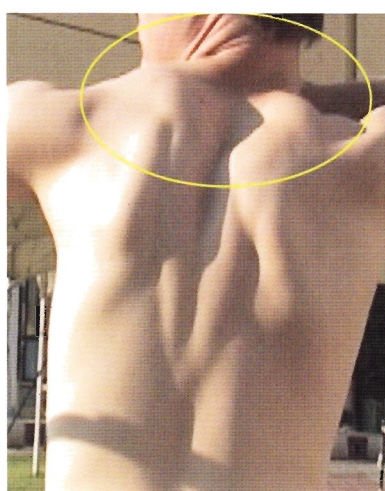


Figure 112





The height of the drawing elbow when at full draw

As shown [figure 113](#), if a line could be drawn along the arrow and extend out past the drawing elbow, at full draw the drawing elbow would be above that imaginary line. It is likely that some archers may have their drawing elbows above this line, this height can vary depending on the condition of the archer's physique. The archer should endeavour to have the height of the drawing elbow approximately 3 to 6 degrees above the arrow line as shown in [figure 114](#).

If the archer's shoulders are very flexibility they may attempt to lift the elbow up too high, but try to keep this angle to no more than the 6 degrees. If the drawing elbow is placed too high, the third finger of the anchoring hand cannot be hooked onto the string accurately, so when extending, the string gets to slip from the fingers, as shown in [figure 115](#), causing the archer some anxiety.

If this happens tension enters the fingers and the third finger gets to press on the string. Consequently, the forward direction of the string is impeded at the time of release and the direction of the arrow flight is corrupted. Moreover, the scapular gets to move away from the spine as shown in [figure 116](#).

When the drawing elbow is low, the force of the elbow moves down at the time of extending. And, when releasing, too much tension is applied to the fingers. So, as shown in [figure 117](#), the hand tends to lift up, the drawing elbow lowers and becomes open at the time of release jeopardising the chance of producing a good follow through.

One of the most important things is that the archer should produce a good and correct posture and an upright body in order to produce a good position of the drawing elbow. Also, the archer has to produce an accurate location of the shoulders to prevent the bow shoulder from rising up when under tension at full draw



Figure 113



Figure 114



Figure 115



Figure 116

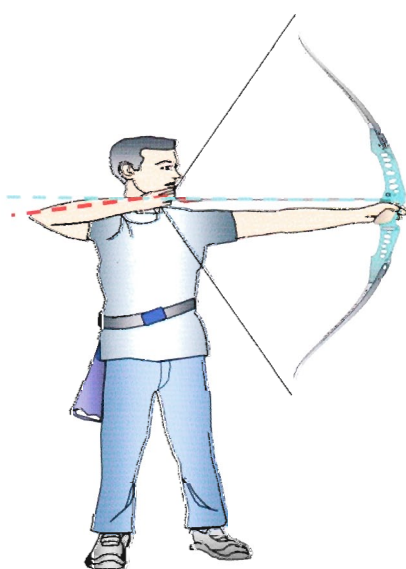


Figure 117



The position of the bow shoulder when at full draw

At the time of full draw, the height of the shoulders may be different depending on archer's physical characteristics. The archer should know about the correct height of their own shoulders before, and during, full draw. As shown in figure 118, the method which can help the archer know the correct height and location of their shoulder is; with the body relaxed and without a bow, raise both arms to a position as if drawing a bow. The archer should make a straight line from above the imaginary arrow rest to the nocking point, which means the between the forefinger and the middle finger when drawing. And then a check can be made of the correct height of the bow shoulder which is dependent on the archer's physique.

When the archer has a long neck or a short chin, the shoulder should be below the arrow line as shown in figure 119. On the other hand, if the archer has a short neck or a long chin as shown in figure 120, the shoulder is could be on the upper part than the arrow line. If the height of the bow shoulder is raised more than the standard height for the archer's physique, the drawing elbow gets to be lowered automatically. And, the extending force line is not maintained correctly because the bow arm and drawing arm are deviating from a straight line.



Figure 118



Figure 119

Figure 120

The angles of full draw as seen from above

When at full draw, the archer should have a straight line from the bow hand which is pushing the bow, the bow shoulder, and the drawing shoulder as shown in [figure 121](#). Looking down from above the location of the drawing elbow and arrow should be in a straight line at the time of full draw. In such a position, the pushing arm, drawing arm, and shoulder form the three sides of a triangle. If the pushing shoulder and drawing shoulder cannot be made to form a straight line at this time, the angles of the upper body will take on the shape of a tetragon or a pentagon, as shown in [figure 122](#).

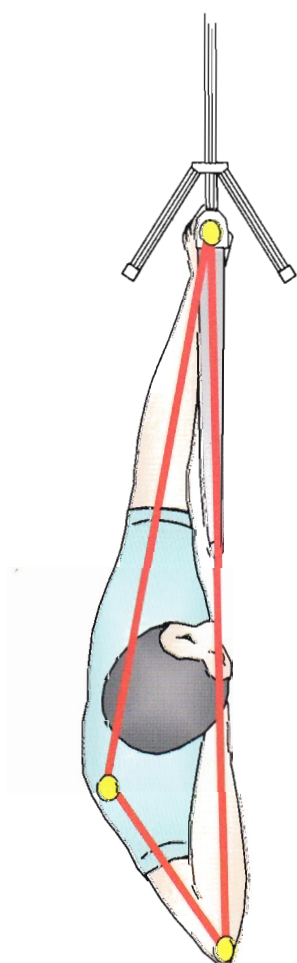


Figure 121

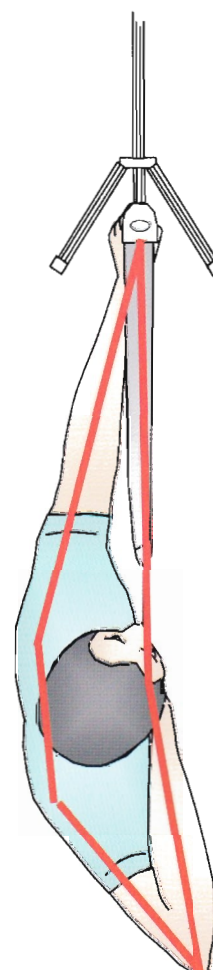
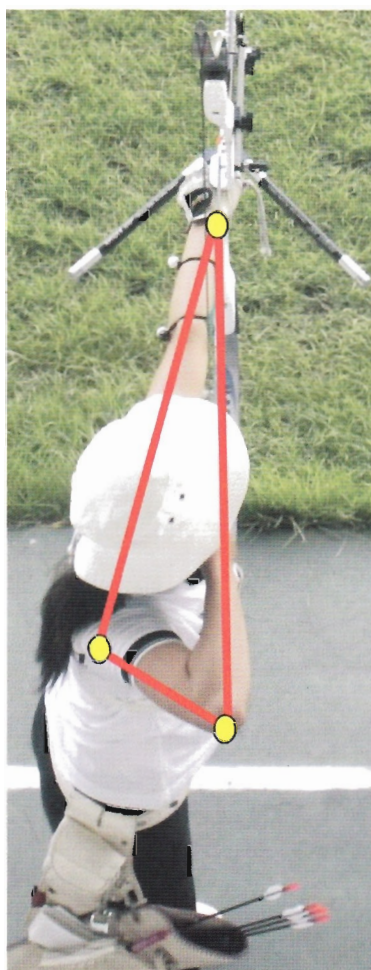


Figure 122



If the upper body takes up a stance where there are too many angles, although the archer may try to correct this, many changes will happen to the angles at full draw which will introduce errors during the extending, release and follow through periods. When starting the setup procedure it is very important to get the upper body and especially the location of the pushing arm to make the correct triangle as shown in **figure 123**. When at setup, it is essential that the bow arm and shoulders take up the correct and accurate position, and when anchoring the scapulas should be correctly positioned, as shown in **figure 124**, the scapular of the drawing arm should be lower than the scapular of the bow arm. As shown in **figure 125**, when putting an arrow across both scapulas, the line of the arrow should point a little to the inside of the draw force line. If the position of the pushing shoulder is not accurate, the line of the scapular will point away from the direction of the draw force line as shown in **figure 126**.



Figure 123



Figure 124



Figure 125

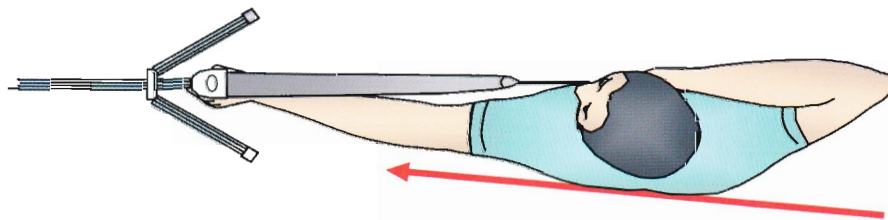
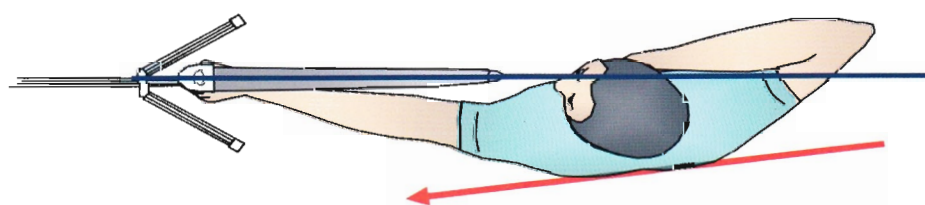
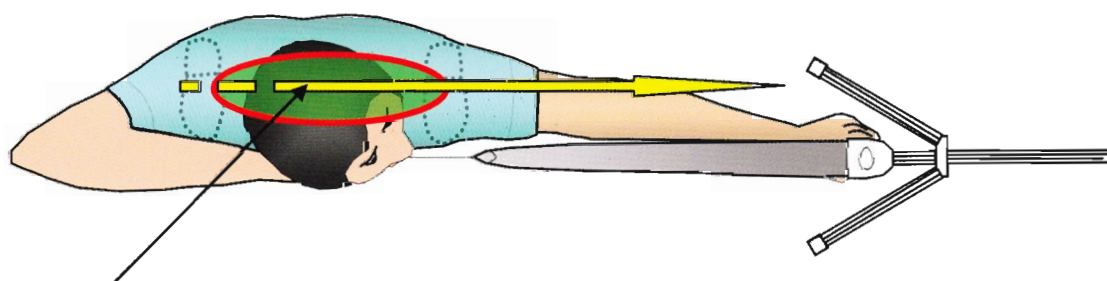


Figure 126

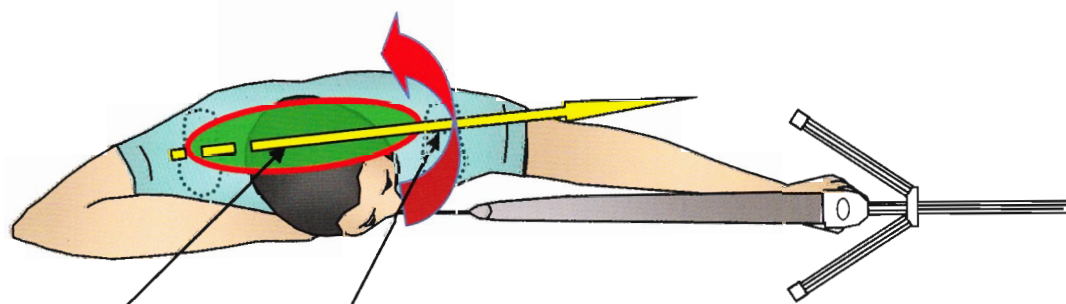


The direction of the waist at full draw

The direction of the waist and hips should be parallel with the stance at the time of full draw as shown in [figure 127](#). As you can see in [figure 128](#), when the waist is opened toward the target, the position of the shoulders become out of line as they get turned in the same direction and to a similar angle that the waist is turned. When using the open stance, it is not easy to maintain it or produce it accurately shot after shot, because the archer has to keep the shoulders parallel to the arrow line whilst turning the waist and hips to an undefined angle. If the waist is turned to the open position at the time of shooting as shown in [figure 129](#), the bow shoulder and waist are often swung together, and the shooting balance will collapse. The beginner should develop the habit of having the feet, waist and shoulders parallel with the arrow line. When using the square stance an experienced archer can reproduce and maintain the same posture all the time.



Hips [Figure 127](#)



[Figure 128](#) [Figure 129](#)



The right posture of the body, at full draw

When at full draw, the location of the body should be vertical or be leant a little to the front. Before drawing the bow, as shown in [figure 130](#), the centre of the body is often canted toward the heels which are quite natural, but whilst drawing the bow as shown in [figure 131](#), the centre of the body should be moved toward the centre of the two feet. The force on the heels and balls of the feet should be even from starting the draw right through to the completion of the shot.

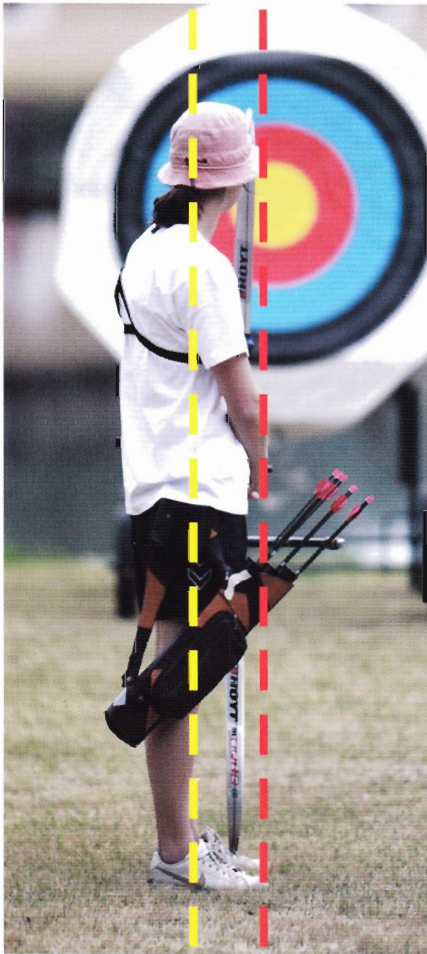


Figure 130

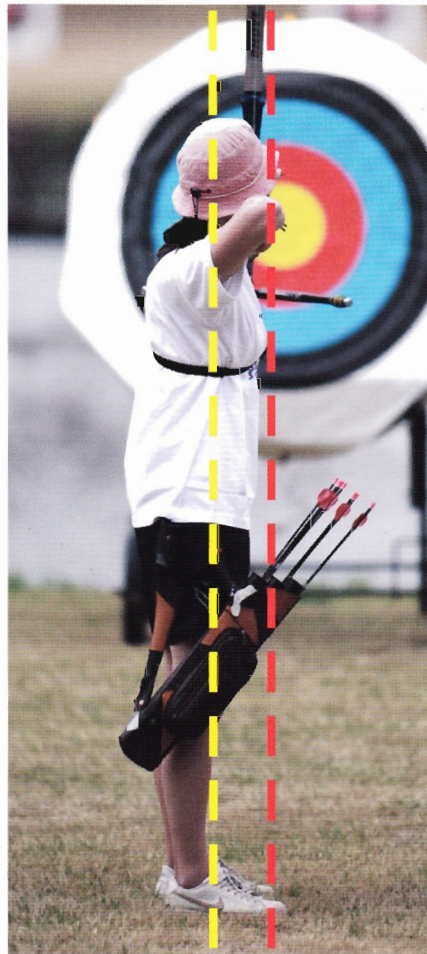
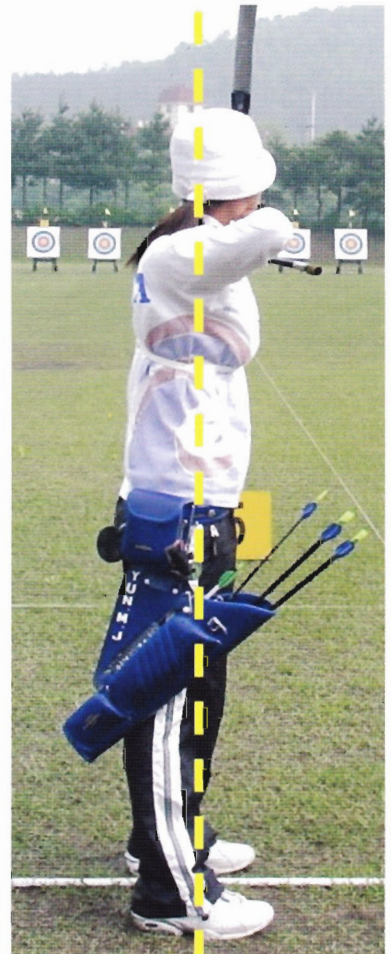


Figure 131





At full draw the chest should not be raised nor should the buttocks stick out, but sometimes it does happen as shown in [figure 132](#). The reason why this phenomenon happens is that the archer is using a bow that is too powerful for them and they breathe in too deeply when starting the draw. This causes the chest to rise up which will jeopardize the correct line up at full draw and may even cause interference with the travel of the string during the release. So it is very important that the archer uses a bow that is not too powerful for them and they breathe correctly during the set up and drawing periods. Quite often women archers have an added problem where they bend at the waist, the buttocks stick out, and chest rises up because they are breathing with the chest at the time of full draw. So, they have to be careful not to let this situation happen. But if it does happen, the string gets to touch the chest at full draw and the bottom limb gets to be pushed away and the bow gets canted (clockwise for a right handed archer) as shown in [figure 133](#), this interferes with the balance and the center of the body which keeps moving at the time of extending. If the chest gets pushed out forward too far the archer cannot extend naturally because the shoulder muscles will be under tension and there will not be enough space on the back to get sufficient movement.



Figure 132



Figure 133





The position of the scapula at full draw

It is not good practice to let the scapular (shoulder blades) to get too close together when at full draw. The reason why this happens is that the bow shoulder gets raised up or is moved back into the body. The position of the two scapulas should be as shown in **figure 136**, with the scapula of the drawing arm positioned slightly lower than the scapula of the pushing arm. If a line is taken from the two scapulars the scapula of the pushing arm, as seen from behind, should be slightly forward of the scapula of the drawing arm as shown in **figure 137**.



Figure 136



Figure 137





The method of using a clicker

After the beginner has mastered the basic skills the next step is to start using the clicker (draw length check). However, many archers seem to introduce a lot of changes of the posture when using the clicker for the first time. The most common reason is, that it is very difficult to progress the skill of extending correctly using a light draw weight bow without a clicker, to extending correctly using a heavy draw weight bow with a clicker, which is preferred for use in competition. Consequently, one of the most important things is that the archer must have the power and the skill to control their own competition bow, and after mastering the basic posture completely they then can move on to using a clicker.

When to introduce the use of a clicker

Before being introduced to a clicker it is essential that the archer has mastered the basic posture completely otherwise the archer will tend to concentrate on pulling the arrow through the clicker rather than concentrating on their own posture. When the archer has developed the skill, and has the ability, to control their own competition bow they should be encouraged to use a clicker, because very often when an archer is concentrating on aiming the power of the extending often fades and the arrow tends to creep forward before the release. If the archer does not have enough power or control due to the bow draw weight being too heavy the drawing fingers often tend to curl during the extending period to help draw the bow to the correct draw length. This action aggravates the extending period and the archer cannot control the release which becomes sluggish and inefficient.

After gaining the basic posture skills with the practicing bow, the archer should fix a clicker onto the practice bow and use it, and when progressing to a competition bow the archer should not use limbs that are too strong for them to control.

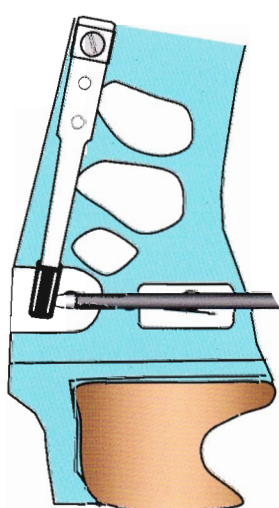


Preparation training for using a clicker

Before using a clicker, the coach should explain to the archer how one should be used, it is good to re-enforce the skills of aiming and extending until the arrow is pulled back far enough to activate the clicker. As shown in figure 138, after anchoring, and when aiming the arrow point should not be allowed to creep forward. The archer must keep the arrow moving back continuously until the release, as shown in figure 139, because, if after the clicker has activated the arrow is allowed to creep forward as shown in figure 140, the release fingers also get to move forward and the driving force of the arrow is reduced.

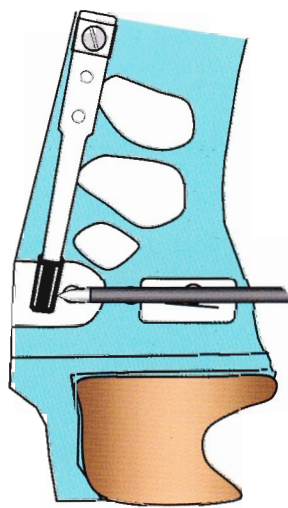
When introducing the clicker preparation training, it is helpful to enforce the timing of the shot in order to shoot sharply after the clicker has been activated. When aiming and extending, the coach can make a sound which is similar to that of the clicker either with mechanical objects or by making a sound with the voice, as soon as the archer hears the sound they should release quickly.

After practicing this method, and when a clicker has been fitted to the archer's bow, they can get to release quite quickly after the clicker has been activated.



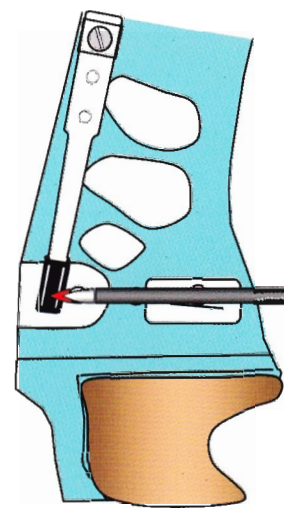
Aiming

Figure 138



Release

Figure 139



Critical point

Figure 140



The using a clicker and extending for the beginner

When the beginner uses the clicker for the first time it is advisable to get them to extend by the easiest method, and in the early stages the beginner should not expect to have the same extending feeling that the elite archers have. When the beginner starts to use a clicker, extending using a simple method is better than trying to extend using a complicated method. You can see in [figure 141](#), the beginner should push the pivot point on the bow with the pad of the thumb and the bow shoulder should extend forward toward the centre of the target. And, the force direction of the drawing elbow (extending force line) should extend back away from the target with the drawing elbow a little higher than the arrow line. The force is divided equally across the body with the centre line passing between the two scapulars and down the centre line of the body. The area that demands special attention for the beginner is that the drawing elbow should not be lowered or moved forward at the time of extending, and, the archer should not curl the fingers to help with the extending. If the archer curls the fingers, as shown in [figure 142](#), the string will move along the chest at the time of extending. The string should not move when extending because the string is the centre of the balance while extending.

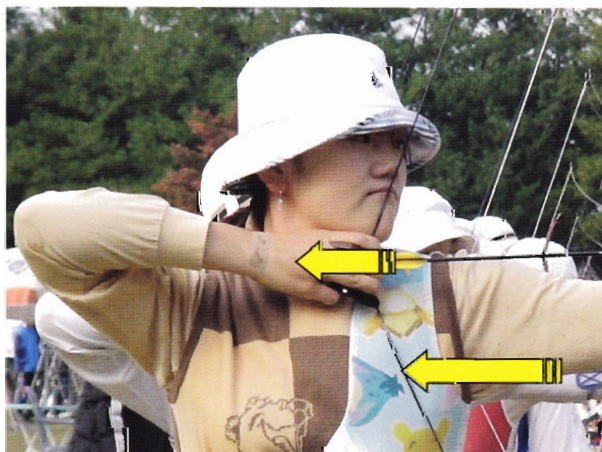


Figure 142

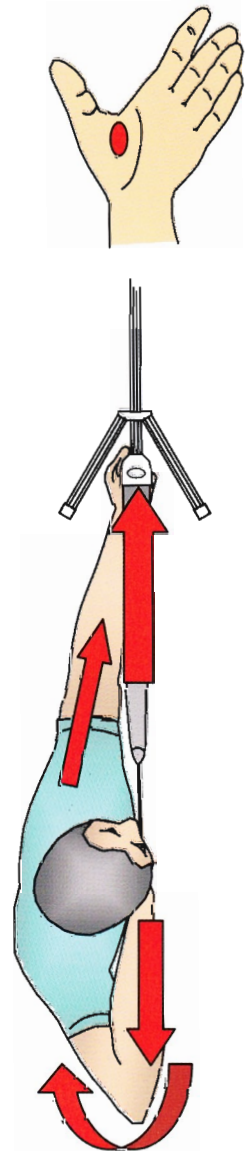


Figure 141



The selection of the arrow length

One of the most important things is that the beginner must select the correct length of the arrow to suit their own arm length and general physique before using the clicker. If the length of the arrow is not correct, the posture at full draw cannot be correct, and this will cause many problems to occur when extending. The correct arrow length is determined by having the archer draw the bow, with an arrow attached, to the full draw position and ensuring the archer's posture is correct. The position of the clicker should be chosen after drawing the bow several times and confirming the most natural position to where the arrow point was drawn. The location of the bow shoulder, the anchor, and the drawing elbow should be correct in order to determine the accurate length of the arrow as shown in figure 143.

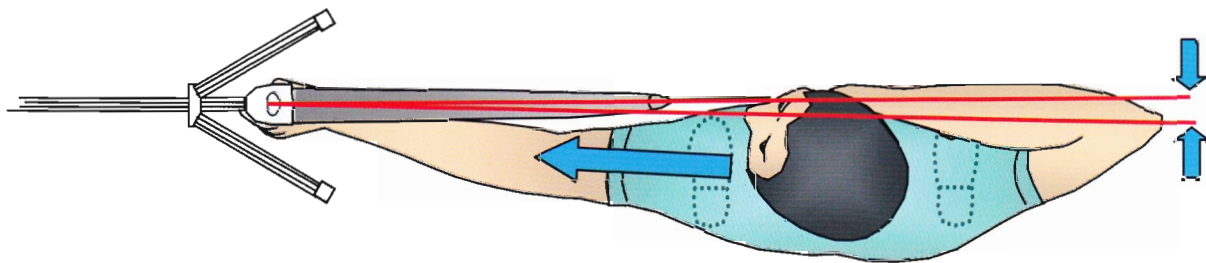


Figure 143





Checking the arrow length for the growing young archer

When young archers have their growth spurt (usually in the low teens) they tend to grow very quickly. If a young archer starts to get taller, a change also becomes evident in the drawing length. As you can see in figure 144, for a young archer, their height and length of the arms should be measured and recorded, and then should be rechecked every 3 to 6 months. After taking these measurements it will be noticed that, as the archer becomes taller the length of the arms become longer, as shown in figure 145, when this happens the clicker should be moved back toward the archer, or if this cannot be done for safety reasons then longer arrows must be used. If the young archer became taller, and continues to use the same length of arrow without moving the clicker back, it will be difficult for them produce the correct posture at full draw, and this will cause changes to the angles of the upper body and a relaxed and efficient shot will not be achieved.

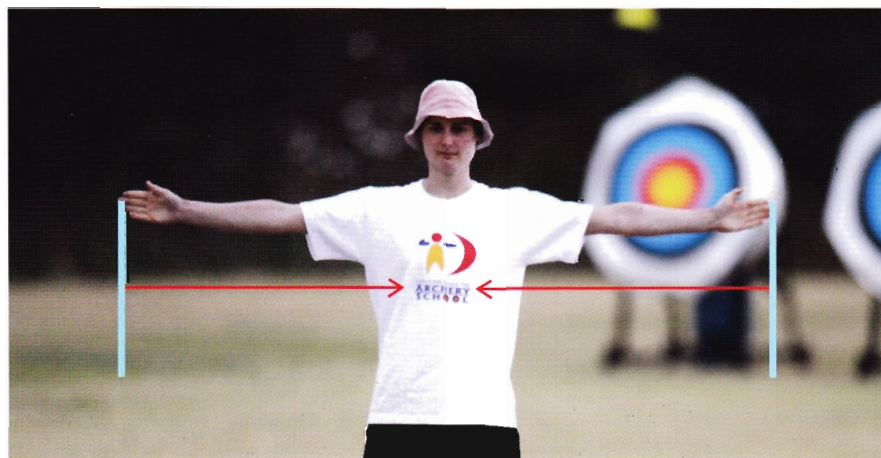


Figure 144

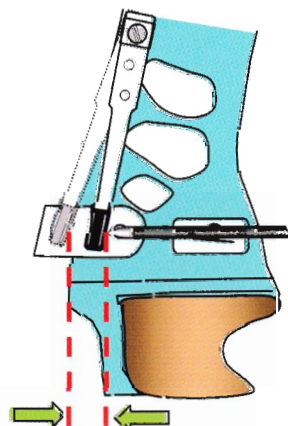
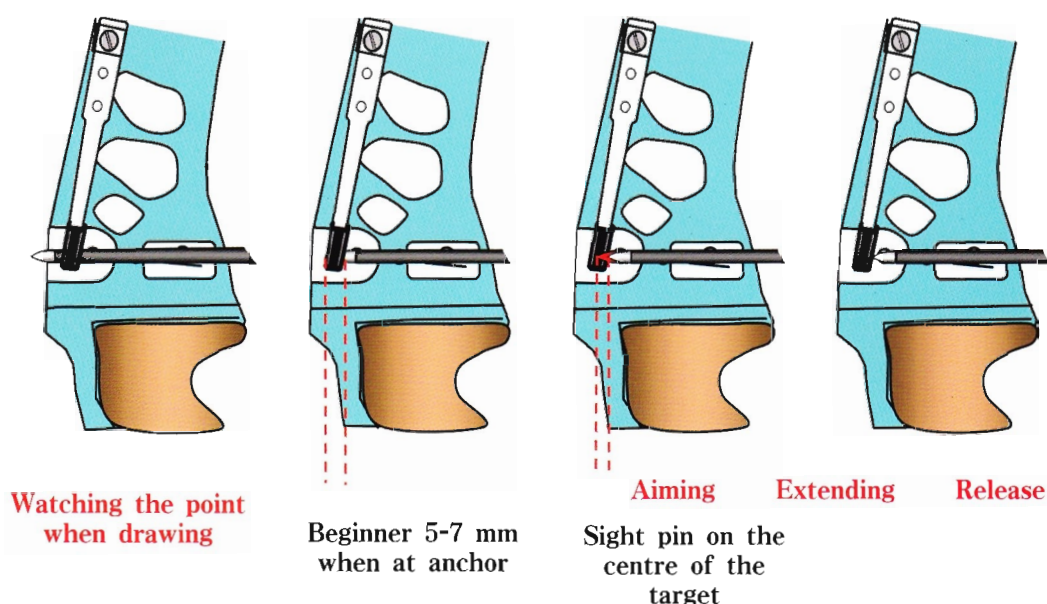


Figure 145

The first step to using a clicker (To draw a bow watching the arrow point)

Often the beginner does not have a constant draw length because the foundation of the posture is not fully mastered. Therefore, when using a clicker for the first time, it is better to watch the arrow point when coming to full draw. When the archer comes to the anchor position but is not yet at full draw for the arrow being used, the extending time increases and tension is applied to the muscles of the arms. Therefore, the archer uses an incorrect method of extending in order to complete the shot quickly. If the archer pulls the arrow out from under the clicker without preparing for the shot physically and psychologically, the archer will then make a poor release due to surprise of the clicker activating. After making such a mistake, the extending time becomes longer because the archer is worried about pulling the arrow out from under the clicker too quickly. And, the archer gets to develop the bad habit where the extending time is too long. That is why, for the beginner, it is better to draw the bow watching the arrow point until it gets to the correct position before starting to aim and extending. See pictures below for the correct sequence of watching the arrow point whilst drawing the bow.





- A. As shown in **figure 146**, the archer draws the bow whilst watching the arrow point after lining up the sight at 12 o'clock on the blue or black ring of the target at the time of setup.
- B. When the drawing elbow has reached its full draw position and the string hand has come to the anchor position, the location of the sight pin should be placed on the centre of the target. At this time the draw length should be such that point of the arrow is about 5mm to 7mm from the position where the clicker is activated as shown in **figure 147**.

If the beginner draws to within 1mm to 3mm of the clicker activating as the more advanced archers do, once in a while, the archer will make a poor release because the arrow is pulled out from under the clicker too quickly, and without being fully prepared for the shot and the archer gets to be surprised. The best extending time is approximately 2 to 3 seconds after anchoring.



Figure 146

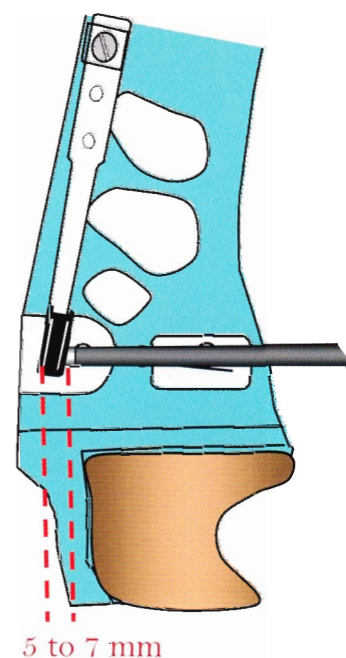


Figure 147

A. The arrow point should still have 5mm to 7mm of travel to activate the clicker at the time of anchor, the archer's eyes should then move to the sight pin again. The location of the sight pin at this time should be placed on the centre of the target. If the sight pin is not located on the centre of the target; the archer should modify the location where the sight pin is located when drawing the bow, as mentioned in "A". The archer has to practice this so that the sight ends up on the centre of the target by controlling the height of the pushing arm. In particular, when aiming, the archer must maintain the line and direction of force, of pushing and drawing, and not let the arrow creep forward as shown in [figure 148](#) when getting the arrow point to activate the clicker.

B. Extending is started after completing the aiming but it is often difficult for the beginner to extend using the scapula. Therefore, the beginner, as shown in [figure 149](#), should stand firm with the centre of the bow grip and the bow shoulder in line and pointing toward the target, the bow shoulder should not be move back toward the trunk of the body or allowed to rise up. And, if the power of the drawing elbow is moved back continuously, the archer can use the scapula naturally. The area that demands special attention at this time is the position of the string on the chest; this should not move backward or forward and should be stationary during the extending period. If this can be done an accurate balance between pushing and pulling will be achieved.

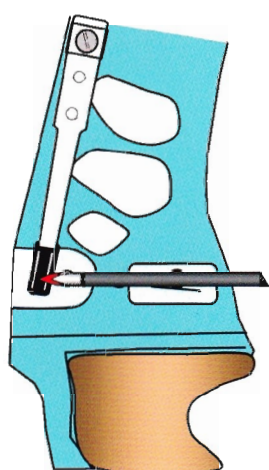


Figure 148

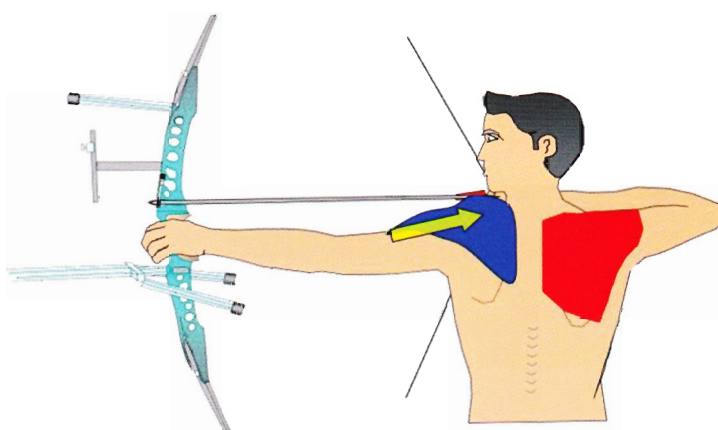


Figure 149



The second step of using a clicker

After becoming proficient at drawing the bow while watching the arrow point, the archer can move on to drawing the bow without watching the arrow point. Before using this method, it is necessary to check that the archer can draw the bow to a constant arrow length all the time. This can be confirmed by having the archer close their eyes and coming to full draw, then checking where the arrow point is in relation to the clicker. Get the archer to do this several times, if they draw the arrow regularly to a constant length, the archer can progress to drawing the bow without watching the arrow point.

- A. At the time of set-up the archer lines up the sight at 12 o'clock on the blue or black ring of the target. After drawing the bow and anchoring, the sight must be on the centre of the target.
- B. Drawing the arrow to a constant length can be a little difficult depending on the skill level of the archer, but when completing the full draw and after anchoring, as shown in figure 150, the arrow point should have 1mm to 3mm left under the clicker.
- C. The archer then extends completing the full draw.
- D. If the archer's drawing length is constant, it is better to have 1mm to 2mm of arrow point under the clicker. If the arrow point is in this position the extending time will become constant, the archer will extend much more efficiently.

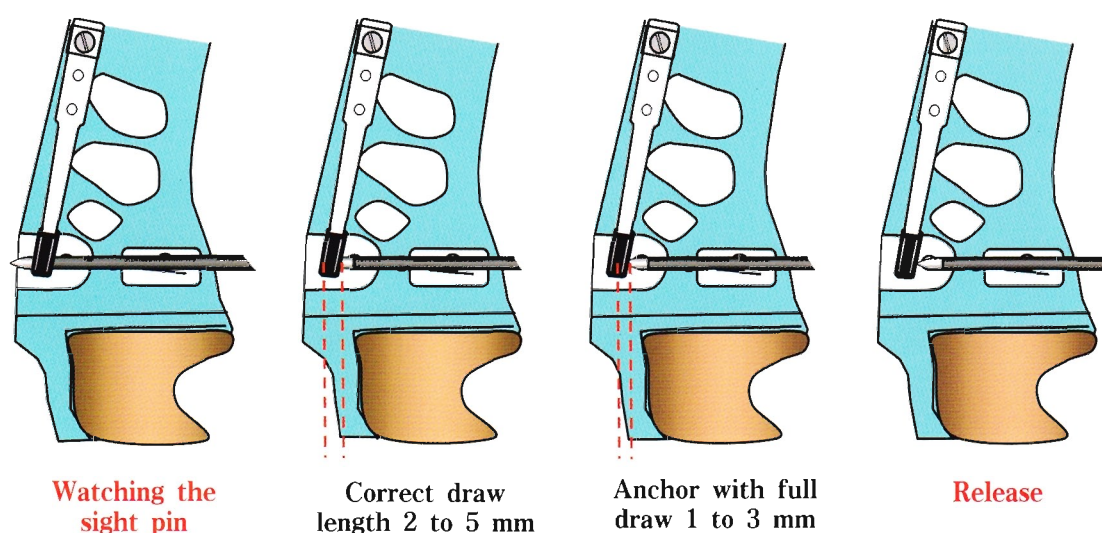


Figure 150



Extending:

Extending is the action by which the arrow is pulled out from under the clicker. The purpose of using the clicker is so the archer can draw the arrow to a constant draw length every time. However, many archers cannot shoot a good score because they have many problems that happen at the time of extending. To achieve a good score the archer must master the method of accurate extending. The angles of the upper body, shoulders, and arms must be correct when at full draw to be able to produce a good extending posture. If the angles of the upper body etcetera are not correct the direction of extending cannot be in a straight line because the draw force line and power line would not be on the same line.

The method of extending

- **The direction of the pushing arm and drawing arm when extending.**

The direction of the extending is very significant to make the arrows group well. When extending, the bow grip and bow shoulder should be pushed firmly toward the centre of the target as shown in **figure 151**. The centre line of the bow grip, the arrow, and the drawing elbow should be in a straight line. And, the drawing elbow has to slightly increase the force whilst rotating round to the back and keeping the same angle and the same. The centre of the force at this time should be placed on the centre of the two scapulas as shown in **figure 152**.

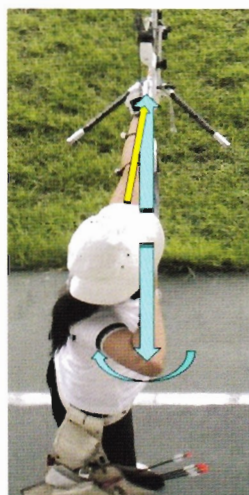


Figure 151

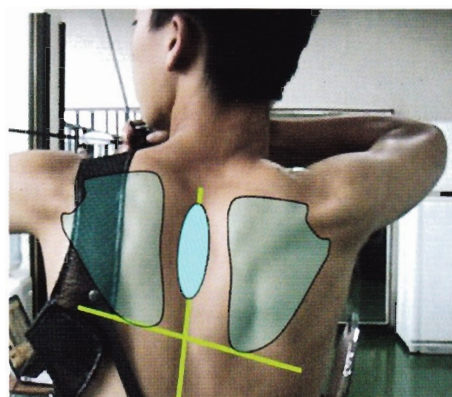


Figure 152





• The balance of extending:

When extending, one of the most important things is that the balance of the extending should be constant. The centre of the balance is placed on the centre of the two scapulas and when extending the string by the archer's chest should not move. As shown in **figure 153**, the power should be divided equally between the forces of the pushing arm and drawing arm into a 50/50 split because if the power of the pushing arm is deficient, the bow shoulder moves back or rises up.

If the force of the drawing arm is not sufficient, the drawing elbow is either pulled forward or moved down. The most important thing at this time is to hold the anchor strongly, this way the correct balance can be maintained. If the archer holds the anchor weakly, the balance becomes unstable and the arrow line will move slightly to the right or left. Consequently, whilst at anchor the string should be placed quite strongly on the chin and not placed so that it only just touches the chin.



Figure 153





• The time of extending:

Once coming to the anchor position the time taken to complete the extending should be no more than 2 to 3 seconds. If the extending time is too short, the archer is surprised because the arrow is pulled out from under the clicker before the preparation for the shot is completed, which results in mistakes being made.

When the time of extending is too long, the direction of extending and balance changes, and the archer feels uneasy psychologically.

When shooting on a windy day or if the archer becomes tense, the time of extending increases which can induce many errors. It is better for the extending time to be kept between 2 to 3 seconds but even if it is longer than this the archer has to develop the ability to keep the extending period accurate and tidy.

The common reasons why the extending period increases are:

- P The physical condition of the archer cannot handle the demands being put onto it, or
- P The weather condition is not conducive to good archery, or
- P The archer is becoming too tense during competition.

When the time of extending is quite long during practice sessions, the archer will sometimes abandon the shot and relax the bow down and wait for a few seconds before restarting the shooting routine. If this kind of action is allowed to continue the archer can form a bad habit of relaxing the drawn bow down even if minimal tension is experienced. So for this reason, during a practice session, in spite of the fact that the time of extending is quite long, the archer should keep making an effort to extend with the correct method and timing.





• The location of the scapulas:

The scapular of the arm pushing the bow should stand firm and push strongly toward the target, it should not move back to the centre of the body at the time of extending as shown in figure 154. The scapular of the arm drawing the bow is turned inward when extending. The two scapulas at this time make a diagonal line across the back as shown in figure 155.

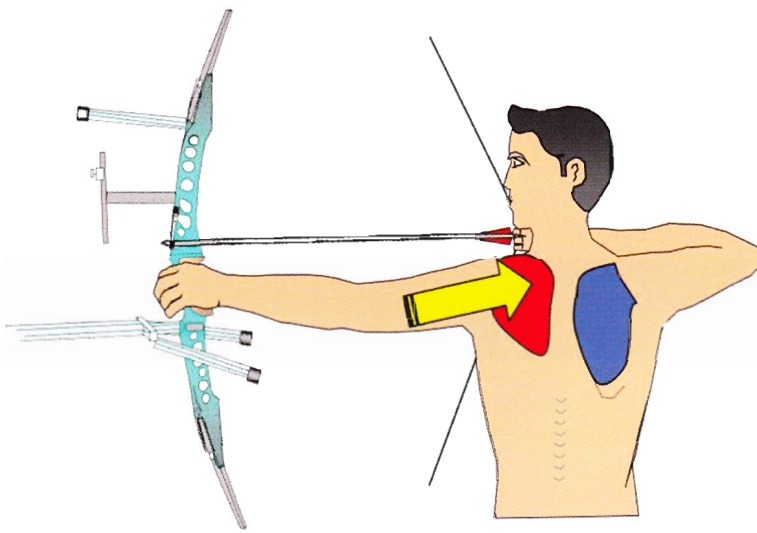


Figure 154

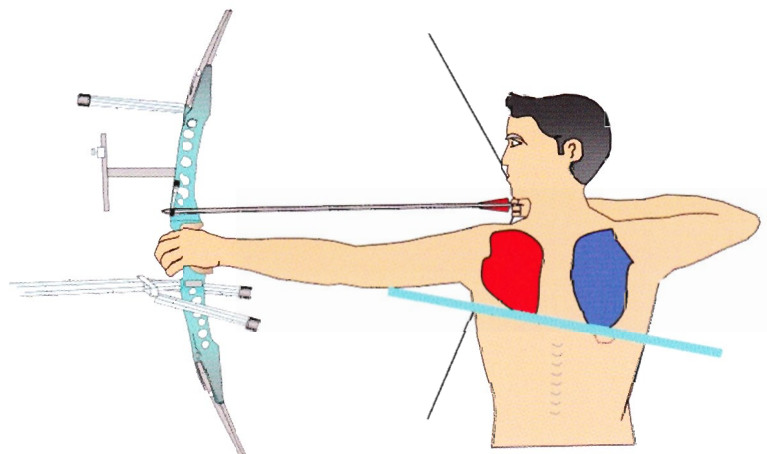


Figure 155



The necessity of “the feeling” training of extending

One of the most important things is that the archer should develop accurate basic skills to have a good feeling of extending. The archer who developed the correct basic skills will experience the accurate feeling during the extending period. However, the archer who did not develop the correct basic skills will not experience the correct feeling. Therefore, it may be necessary to revisit, or change, the basic posture set-up for the archer to experience the new extending feeling.

There are cases, that although many archers extend to activate the clicker, they do not know how to extend accurately. Even many experienced archers do not use the correct method of extending. The beginner archer or the novice with minimal shooting experience does not have the sensitivity of the muscle action, because the muscles around the scapulars have not developed sufficiently for archery. Good practice will remedy this.

Therefore, it is very important for the archer to develop the correct feeling. When extending with the correct and accurate method, the muscles being used for extending are being developed continually. On the other hand, when extending using the incorrect method, the muscles which are not needed for extending are being developed, and the archer will not get to use the correct muscles.





The method of training “the feeling” of extending

With the archer at full draw, as shown in **figure 156**, the coach puts his arm over the archers bow arm gripping it under his armpit and at the same time holds the archers shoulder with his hand. The coach, with his other hand, holds the archers drawing elbow and by gripping the bow arm under his armpit pushes the drawing elbow toward the extending force line with the other hand. The balance of power on the two arms should be equal at 50% – 50%, with the pushing and drawing speed being just slower than the normal extending time. This way the coach can help the archer to experience the extending feeling on the scapulas. When conducting this exercise the archer should not assist with the extending, the coach uses only their own power to make the archer extend. This way the archer can experience the correct extending feeling.

When the archer has a perfect anchor, it can prevent the drawing hand from moving backward during the extending period. If the drawing hand does move, the archer cannot experience the correct feeling of extending.



Figure 156

Release

The release is very important among the skills of archery, and it is not uncommon for archers to make many mistakes at the time of the release. The main problem usually happens at the time of extending before releasing, but ultimately, the mistake affects the release.

If an archer who has developed a good technique of extending and releasing makes a mistake, quite often the arrows still land somewhere near the centre of the target. However, if an archer who does not have a very good technique makes a mistake the arrow will miss the centre of the target by quite a wide margin. The method and efficiency of the release has a great influence on the flight of the arrow.

When releasing, the string frees itself from the fingers and starts its forward movement, the direction and efficiency of this movement depends on the method and quality of the release. For the archer who has the good release, the deviation to the forward movement of the string would be minimal and constant, which would produce a good arrow flight and the chance of a mistake would be decreased. If the beginner does not develop a good and efficient release, it will take a lot of time and the effort later on in order to change the release action, so the beginner must develop a good and efficient release very early in their archery career.





The form of the fingers at the time of release

The location and correct hooking of the fingers is very important to produce an efficiently release, if the fingers are not correct the action of release will vary depending on the position of the hooking and the relaxation time of the fingers.

The best method of release is that the three fingers which are hooking on the string should be released simultaneously at the time of shooting. As shown in **figure 157**, if the fingers which are hooking the string are released from the ring finger to the forefinger in a 1, 2, 3, order, the movement of the string will be erratic and not constant. The archer should not develop the habit of having the third finger just resting on the string as shown in **figure 158**, as this would produce an inefficient release. As shown in **figure 159**, if the string is placed too far on the inside of the first joint, the archer gets to release late after the clicker is activated. And, if the string is placed on the outside of the first joint, the archer gets to release pressing on the string with fingers which would deflect the forward motion of the string as shown in **figure 160**. With this increased finger pressure on the string the sideways movement of the string is increased, the arrow flight will be jeopardised and the possibility of a good hit is decreased.

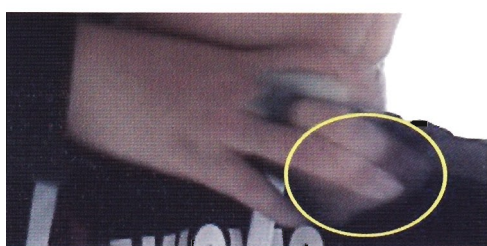


Figure 157

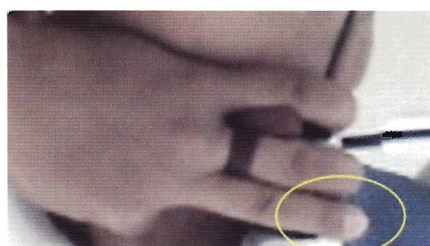


Figure 158

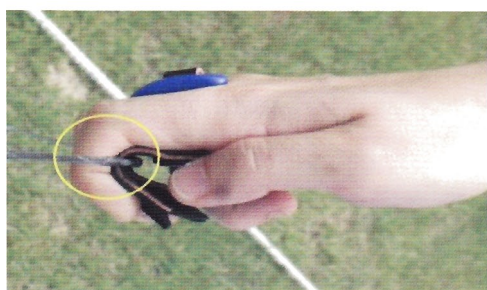


Figure 159

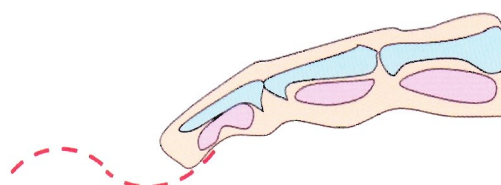


Figure 160





As shown in **figure 161**, when releasing, the joint of the wrist should maintain the at the time of release as shown in **figure 162**.

If the wrist is bent, as show in **figure 163** the elbow tends to be in the forward “opened” position this will cause the elbow to move down during the extending period. If this happens, an efficient release cannot be performed because the force and the direction do not follow the extending force line. When the force is relieved from the wrist during the release of the string the joint of the wrist tends to bend and tension appears in the fingers, as shown in **figure 164**. The movement of the elbow should be used, not the hand. When using the elbow, as shown in **figure 165**, the drawing hand, wrist, and elbow are all brought into a straight line which will help to produce a relaxed and efficient release.

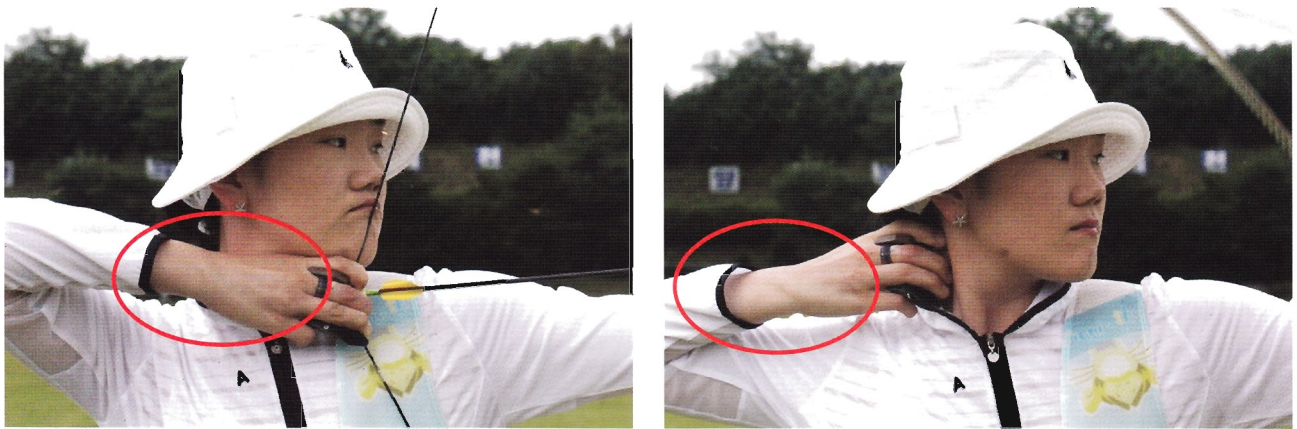


Figure 161

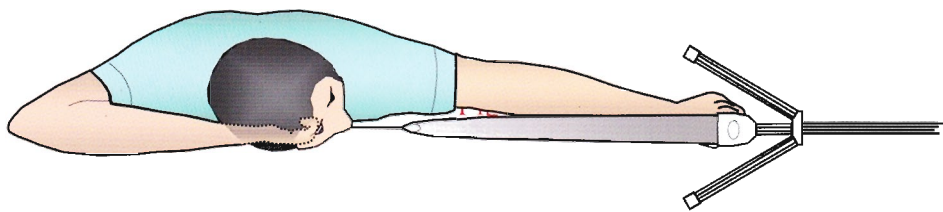


Figure 162

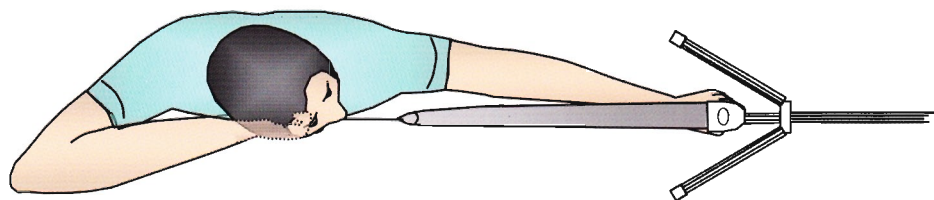


Figure 163



Figure 164



Figure 165



The form of the elbow at the time of release

The angle at the drawing arm elbow, during the time of release, should be smaller than the angle at the time of full draw as shown in figure 166. If the angle becomes larger when releasing, it is usually because the elbow is opened due to the wrist being bent, which causes the elbow to move down as shown in figure 167.

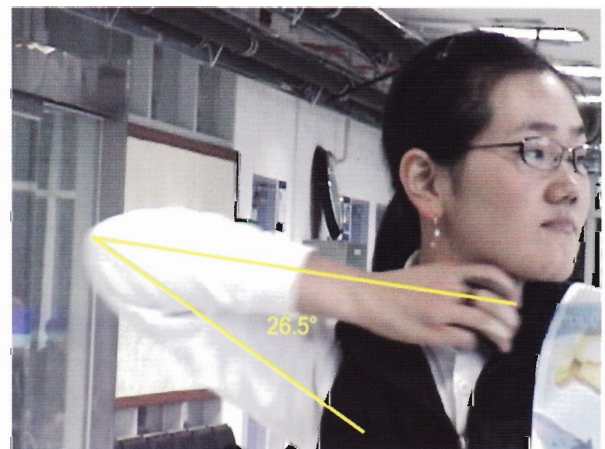
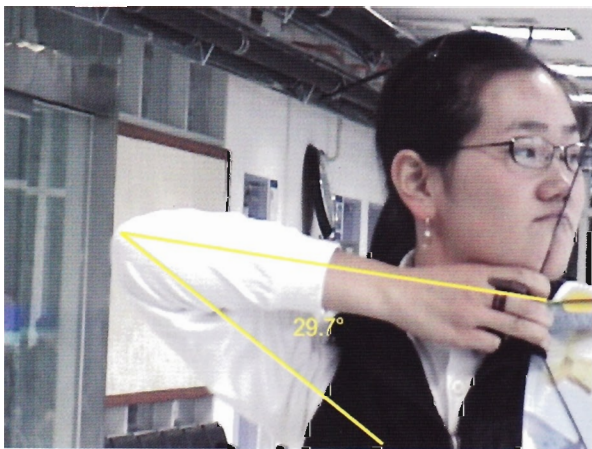


Figure 166

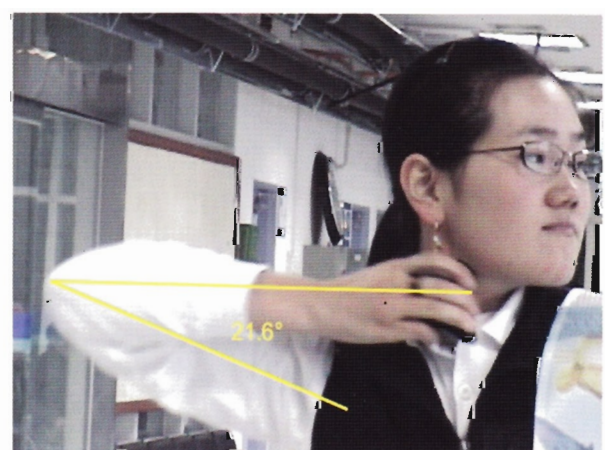


Figure 167

The direction of release

The direction of release as shown in **figure 168** should be progressed to the extending force line. The direction of release should always be constant and the hand has to move back along the chin in line with the force line from the point of the anchor. When releasing with the elbow continually moving backwards the archer can release keeping the hand movement accurate and in the correct direction, but if the archer releases using just the movement of the hand, as shown in **figure 169**, a poor release becomes evident due to the changes to the direction of release.

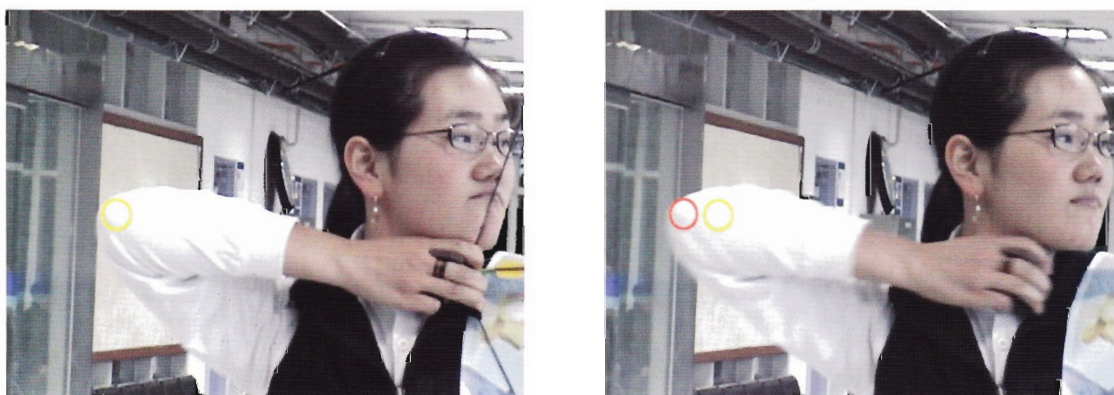


Figure 168



Figure 169





The distance of hand travel during the release

As you can see in [figure 170](#), generally, the length of hand travel during the release is dependent on many things but the hand should finish up just under the ear. When the hand stops in front of the ear, quite often it is because the hand moves slightly forward as the string is released. But if the release hand travels too far movement of the body becomes evident at the time of release, as shown in [figure 171](#). Also, this could cause the elbow to move down when releasing. When training the beginner to master the release it is better to train them to use minimal hand movement after releasing the string. After mastering the release using minimal string hand movement, the beginner can then move on to having a slightly longer hand movement. If the beginner releases with quite a long string hand movement from the beginning of their training, the whole action gets to be too long and it is very difficult to change it later.



Figure 170

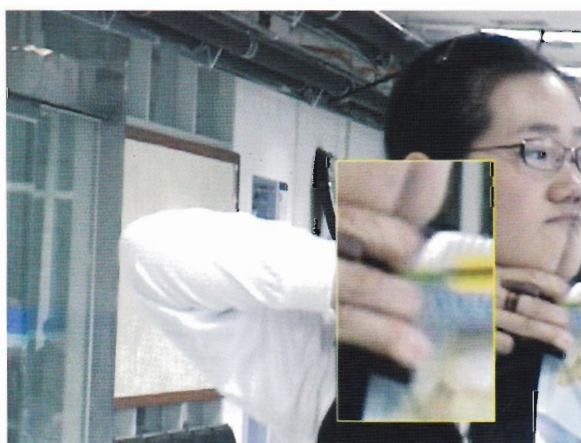


Figure 171



The speed of release

The speed of release means the time between when the clicker is activated and when the fingers release the string. It is at this moment when many archers make a mistake. If the fingers free themselves from the string quickly after the arrow point is pulled out from the clicker, the archer can reduce these mistakes. As soon as the clicker is activated the archer should relax the flexor muscles and allow the fingers, which are hooked on the string, to free themselves from the string very quickly. The most important thing at this time is that the direction of the force should be the drawing direction. If the power does not move back and in line, the archer will release the string after the fingers have moved forward a little with the string. The archer should continue the backward elbow movement whilst the fingers are opening which will develop a good and efficient release. If the archer makes the release using only the hand, the fingers are opened and the string will follow the movement of the fingers which will affect the efficiency of the shot. The archer has to train hard to be able to release quickly and efficiently after hearing the sound of the clicker.





Follow through

The follow through is an important part of the posture for finishing the shot. This is very important in all sports. The most important reason is that if the archer makes an effort to produce a good follow through, extending and releasing gets to be efficient automatically and prevents many mistakes.

The archer should not move the fingers or the centre of the body and should not have any unnecessary bodily movement to produce a good follow through at the time of extending.



The direction of follow through

As shown in figure 172, the direction of the follow through should be maintained along the extending force line. If a change happens to the direction of the force or posture at the time of shooting, it is difficult to maintain a continual standardisation of the shot every time. The direction of force on the bow grip should be toward the centre of the target as shown in figure 173, and the drawing elbow should continually move back in a straight line. It is important that the balance of the power is maintained at the time of extending, and the head and body should be stable and never move. If the balance of the force is moved to one side or the other, it is difficult to produce an accurate balance.



Figure 172

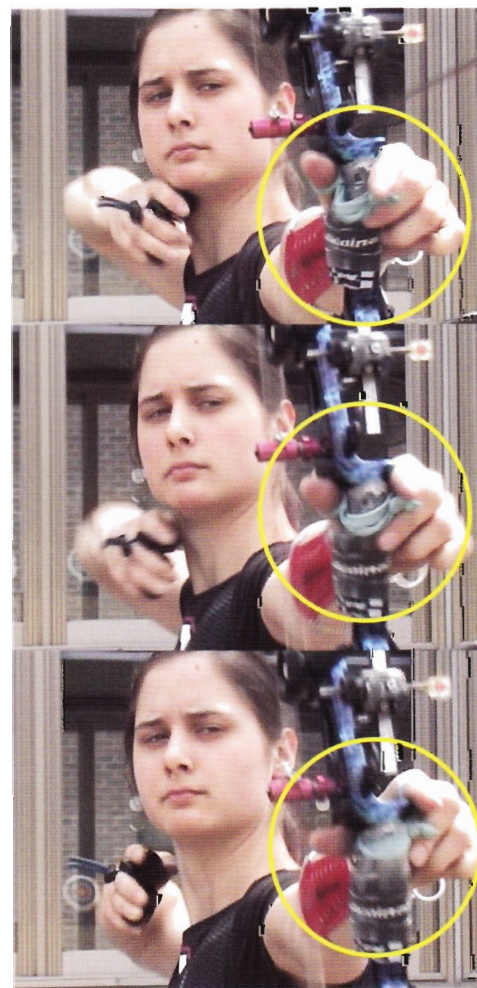


Figure 173



The free movement of the bow

It is very important that, as shown in **figure 174**, the bow is free to move toward the target and in the correct direction at the time of shooting. If the direction of the bow does not face toward the front, as shown in **figure 175**, the bow will move to the right or left. As you can see in **figure 176**, when holding the bow with fingers at the time of shooting, the bow does not have freedom to move and is moved sideways by the archer. This will cause the direction of the arrow flight to be in a similar direction to which the bow was moved. Quite often beginners learn archery using a basic practicing bow, as shown in **figure 177**, and they practice holding the bow grip with the fingers and not using a bow sling. And, the archer may only start using a bow sling when changing to a competition bow. In this case, the archer worries that the bow will fall to the ground, so they hold the bow at the time of shooting. Therefore, a bow sling should be used from the time the beginner starts archery, so they get used to letting the bow have free forward movement when making the shot. This way the beginner gets used to not holding the bow and only pushing the bow, and the habit where the archer holds the bow at the time of shooting will disappear.

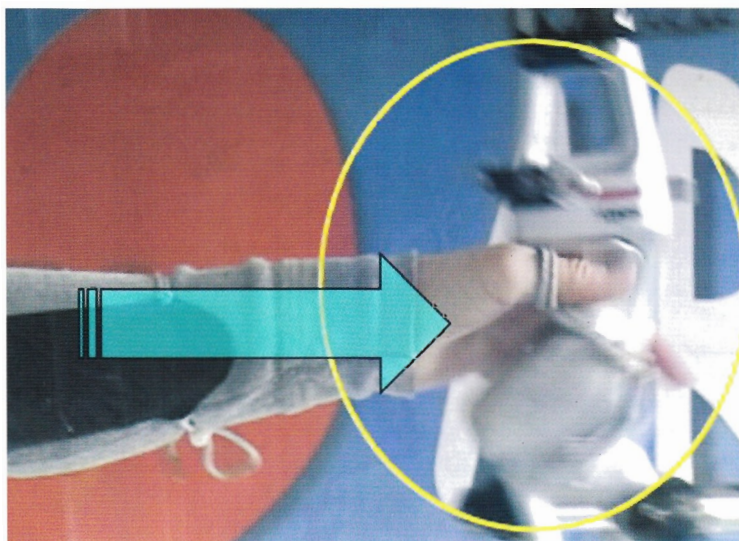
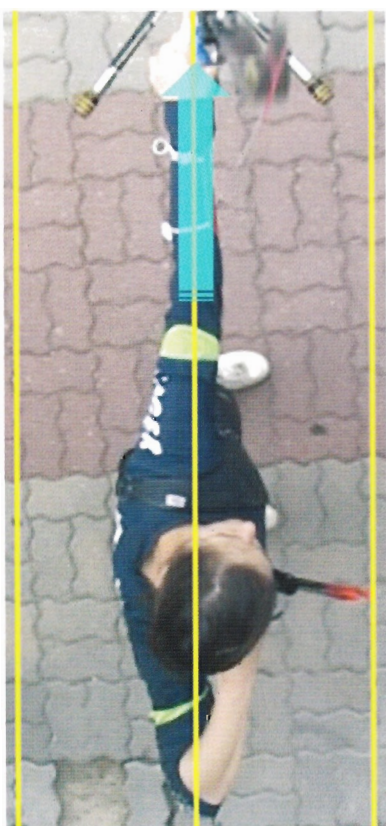


Figure 174



Figure 175



Figure 176

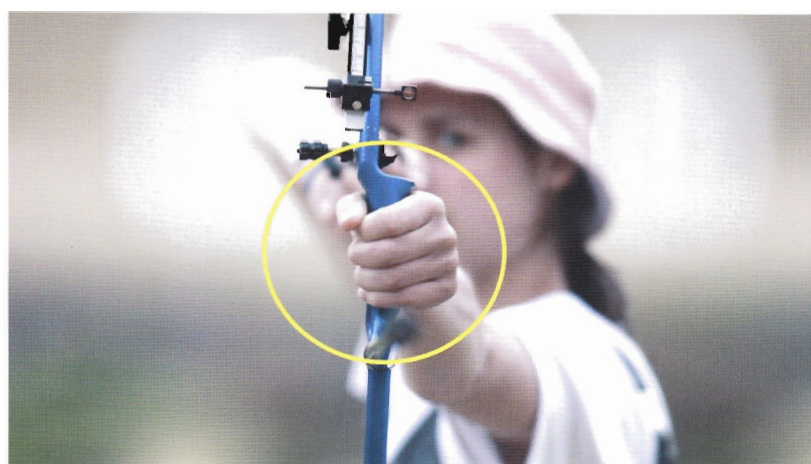


Figure 177



The progressive training method for the beginner

Step 1 - Training with the empty hands.

If the raw beginner draws a bow, as shown in **figure 178**, their posture will be bent and it is difficult to get the correct position of the head and face or develop the correct posture. Therefore, if the archer practices good body alignment using a stretching band before being given a bow to use, it will be more beneficial in developing a good posture. The archer's feet should be the same distance apart as their own shoulder width. The archer then follows the actions as instructed by the coach who uses the prompt “ready, one, two, three, four, five, but giving a pause between each command to allow the archer to take up each position.



Figure 178



Ready: As shown in **figure 179**, the body straightens up and is ready to continue.

One: As shown in **figure 180**, open the two arms. The face should be placed on the centre line of the body and the shoulders should be level and comfortable.

Two: As shown in **figure 181**, the head turns toward the target.

Three: As shown in **figure 182**, the drawing hand is fixed under the chin by bending the drawing arm. The centre line of the body should be vertical and the drawing elbow should be placed slightly above the horizontal line of the shoulders which should be same height at this time.

Four: The simulated length of the release should not be too long; the fingers of the string hand should end up just below the ear, this movement should be controlled to ensure the drawing elbow does not move down as shown in **figure 183**. Also, it is just the movement of the drawing elbow that gives this movement to the drawing hand, the fingers and should not be used to get this movement. After the simulated release the archer holds that position until the coach gives the next command.

Five: The coach then gives the command “Five”, the archer then lowers the arms and relaxes, then waits for the next routine. Following this routine develops a good follow through. Many beginners do not follow through correctly after releasing because they tend to let their arms relax down too quickly.



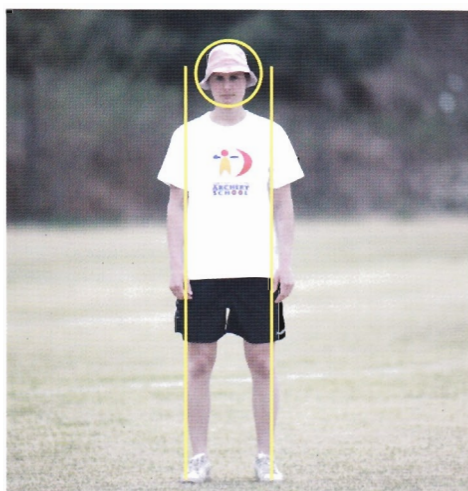


Figure 179



Figure 180



Figure 181



Figure 182

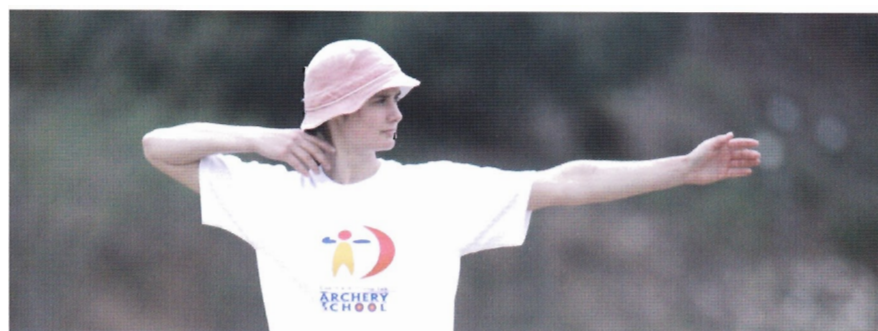


Figure 183



Step 2 - Drawing a rubber band

When drawing a rubber band, the body should be straight and vertical as shown in **figure 184**. Most beginners who draw a bow for the first time cannot take up the correct posture as their bodies generally lean backward at the time of the draw because they concentrate on hitting the centre of the target rather than concentrate on their posture. If the beginners practice the basic skills starting with a rubber band or stretching band, a good basic posture can be mastered. It is good practice to master the posture of stance, setup, drawing, anchor, and full draw using this method. When practicing this method, in the early stages it is more effective when the coach gives the order of procedure to the archer, because when the coach gives the commands the archer can think about the posture of that section rather than what to do next. So the coach uses the prompt “ready, one, two, three, four, but giving a pause between each command to allow the archer to take up each position.

Ready: Hook the three drawing fingers on the band.

One: Set up. The coach teaches the action of setup and the accurate position of the body at this time.

Two: Come to the anchor position. The position of the anchor and the angles at full draw are taught by the coach.

Three: Release. The coach guides the action of release and the follow through.

Four: The archer relaxes the arms down in preparation for the next complete routine.



Figure 184





- A. **Stance:** as shown in **figure 185**, the two feet should be kept in a straight line toward the target. The width of the two feet should be the same width of the archer's own shoulders or just a little wider, the centre lines of the two feet should be slightly open at approximately 10 degrees.
- B. **Setup:** As shown in **figure 186**, the pushing arm is placed level with the height of the eyes and the drawing hand is placed at a height between the eyes and the mouth. The height of the drawing elbow should be placed a little higher than the horizontal line of the rubber band at this time; this will help to get the correct position of the elbow at the time of the anchor. As shown in **figure 187**, the rubber band should be drawn from the underneath the pushing hand.
- C. **Drawing:** The rubber band should be drawn slowly using the drawing elbow. This will allow the beginner to experience "the feeling" of the shoulder and the drawing elbow during this exercise. The archer's concentration at the time of the draw should be centred on posture, that is, the body should not be bent, and the location of the head should not be changed.
- D. **Anchor:** As shown in **figure 188**, the drawing hand should be placed under the chin. If the hand is placed above the under part of the chin, i.e. up the face, it will be difficult to produce a good anchor.
- E. **Full draw:** The body at full draw should be vertical as shown in **figure 189**, the head should be on the centre line of the body and the height of the drawing elbow should be a little higher than horizontal line of the rubber band.



Figure 185



Figure 188



Figure 186



Figure 189

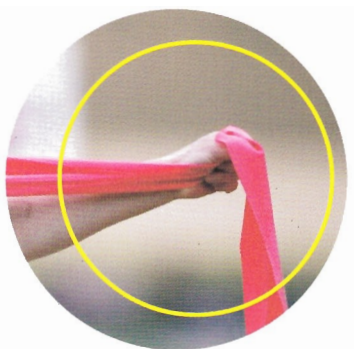


Figure 187



Step3 - Drawing the bow

The use of a bow sling

When the beginner exercises with a practicing bow, it is essential to use a bow sling. If a bow sling is not used, the archer usually develops a habit where they hold the bow at the time of shooting because they feel the bow will fall to the ground. When the archer holds the bow grip with the fingers, when shooting, the bow arm cannot be turned correctly. This action prohibits the bow shoulder from being set accurately which will inevitably jeopardise creating a good power force line. As you can see in [figure 190](#), the bow sling should be used on the thumb and the forefinger because the bow jumps toward the target at the time of shooting, and with the finger sling in this position it will have minimal influence on torquing the bow. If a wrist sling is used as shown in [figure 191](#), the archer tends to hold the bow because the bow will slip down too much at the time of shooting. And, as shown in [figure 192](#), when using a finger sling on the thumb and the middle finger the sling has to be a little longer and the bow hand gets to turn inwards when shooting which could also torque the bow.

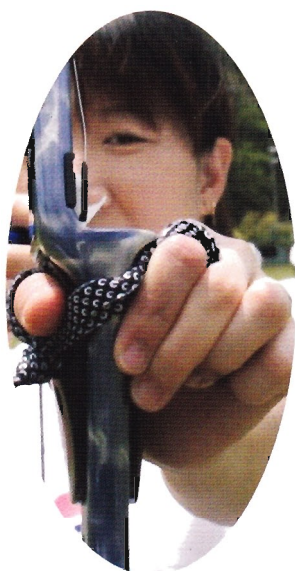


Figure 190



Figure 191



Figure 192

The use of the stabilizer on the practicing bow:

As shown in **figure 193**, it is advisable to use a stabilizer which is short and not very heavy on a practicing bow. The reason is that when shooting using the bow sling without a stabilizer, and as long as the archer does not hold the bow, the upper limb of the bow will come toward the forehead as shown in **figure 194**. If a stabilizer is used, the upper limb of the bow will turn toward the target as shown in **figure 195**. This process will help develop a good habit and will be useful when progressing to using a competition bow.

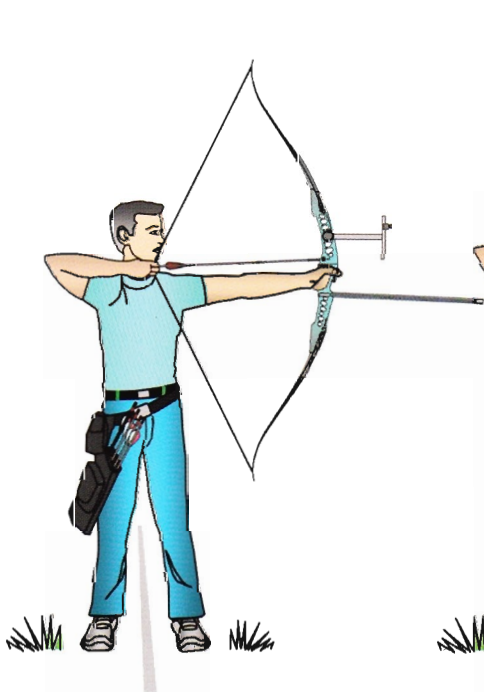


Figure 193

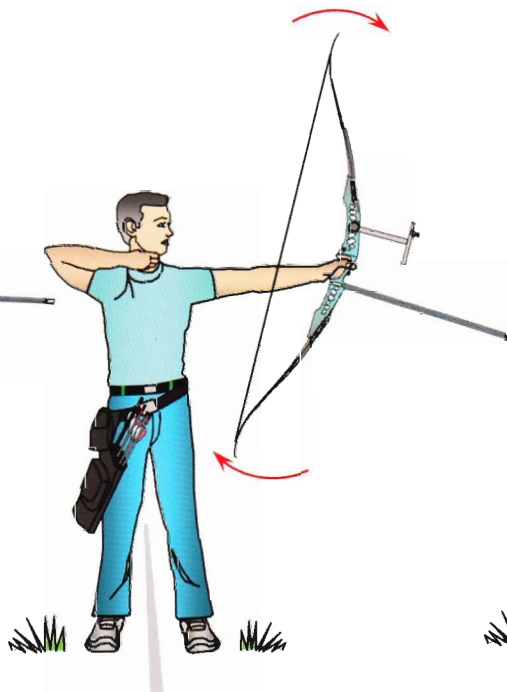


Figure 194



Figure 195



Grip

As you can see in [figure 196](#), the bow hand is placed on the centre of the bow grip and pushes forward naturally. The bow hand should not be pushed up from the bottom of the grip or too much tension will be applied to the bow hand at this time as shown in [figure 197](#). The hand is put on the bow grip being as relaxed as possible and should be pushed naturally and evenly at the time of setup. The palm of the bow hand has to face toward the ground at this time

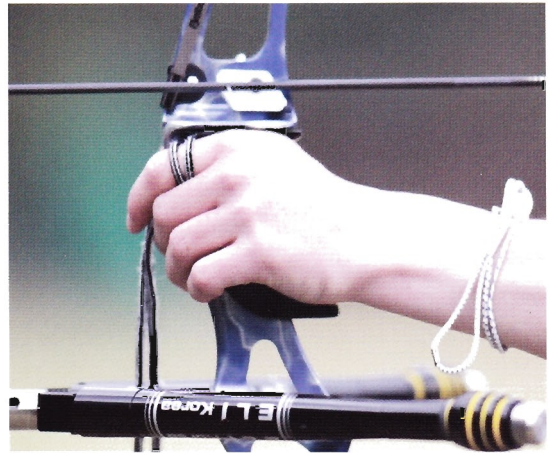
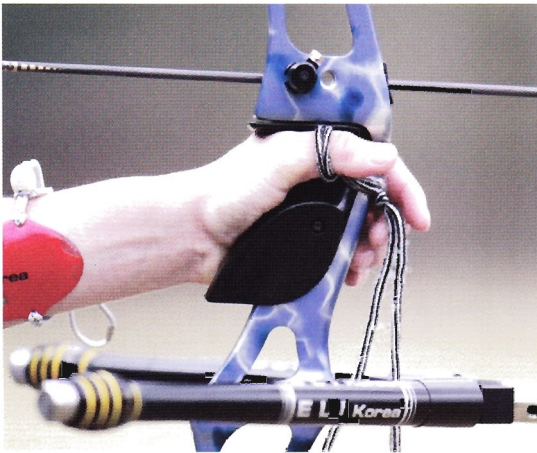


Figure 196

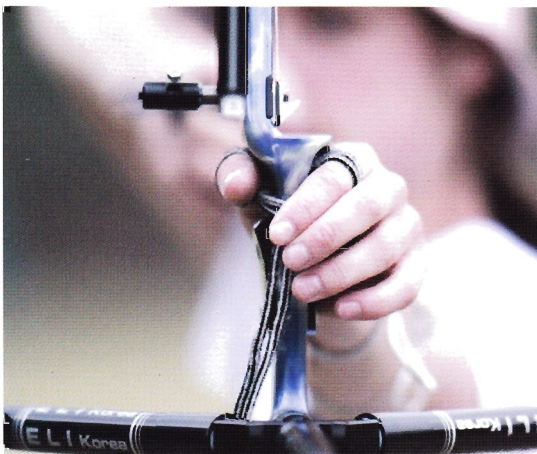


Figure 197

The posture of the body

The posture whilst in the relaxed standing position should be upright with the vertical line down the centre of the body, the chest should also be relaxed and not raised up at this time. The stomach should not be allowed to move forward nor the upper body allowed to move back. The two feet should be in a straight line with the target, with the waist and shoulders maintaining this same line, as shown in **figure 198**. The archer should be relaxed when they draw the bow, if any tension creeps in at this time it will soon transfer to other muscles and will affect the stance of the whole body. Therefore, the archer has to maintain a relaxed and the comfortable posture.

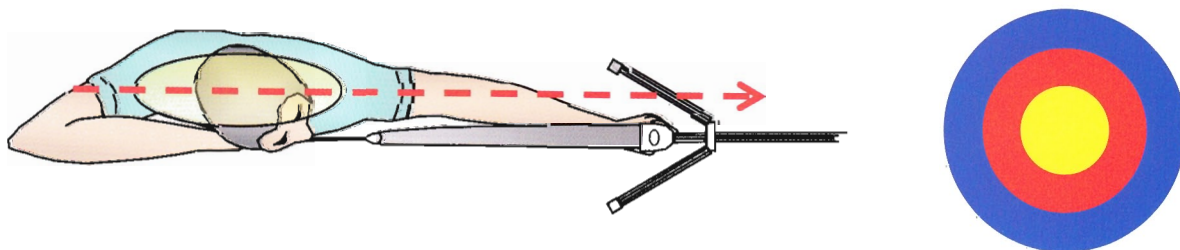
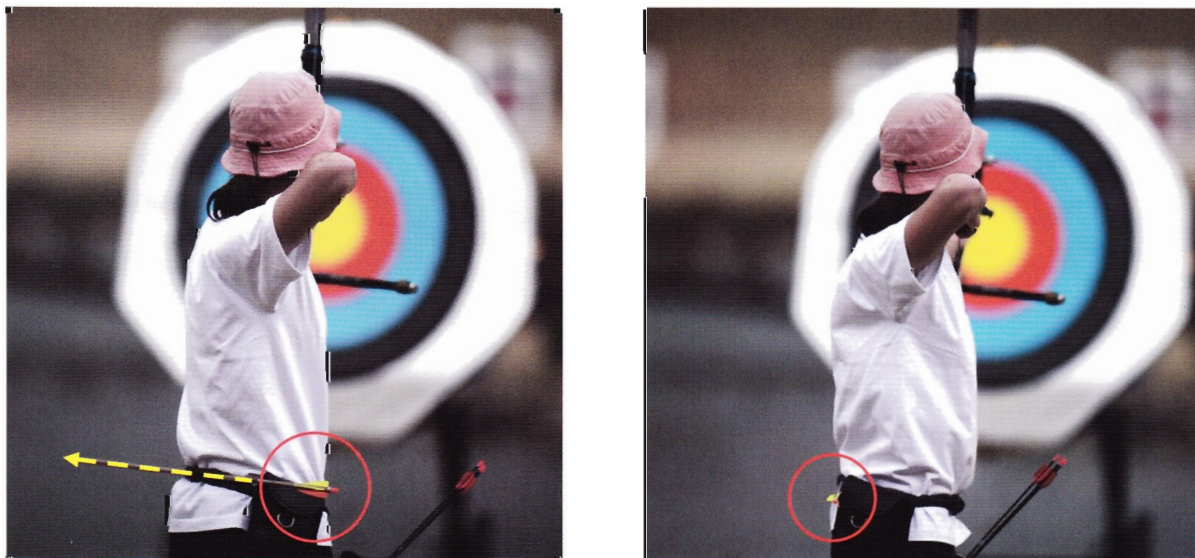


Figure 198



Practicing hooking the string fingers for the beginner

Quite often beginners draw and shoot the bow and arrow without any previous practice of hooking the string fingers onto the string. This often produces tension in the hand which affects the efficiency of the hooking and the action of the release. Consequently, it is more effective to master the accurate feeling and the method of hooking before actually shooting a bow.

To develop a good and efficient hooking action the archer hooks the string with the first joints of the string hand and lets the arm stretch down comfortably by their side, the bow riser should hang free at this time as shown in [figure 199](#).

The arm, the wrist and the back of the hand should be in a straight line at this time. To put a little pressure onto the string fingers the coach gently presses down on the bow. As shown in [figure 200](#), the archer gets to experience the feeling of having only the first joints of the fingers hooked on the string at this time. After experiencing this, the coach holds the bow whilst the archer holds their string hand in the anchor position, the coach then gently pulls the bow away from the archer.

The archer experiences the feeling of having some resistance to the hooking fingers at the time of the anchor, as shown in [figure 201](#). And then, as shown in [figure 202](#), the coach holds the bow a little way from the archer who then draws the string using the elbow. If this action is repeated many times, the archer can experience, and develop, the feeling and the action of hooking. One of the most important things is that when the archer draws the string it should be drawn without any conscious thought of the arrow.



Figure 199

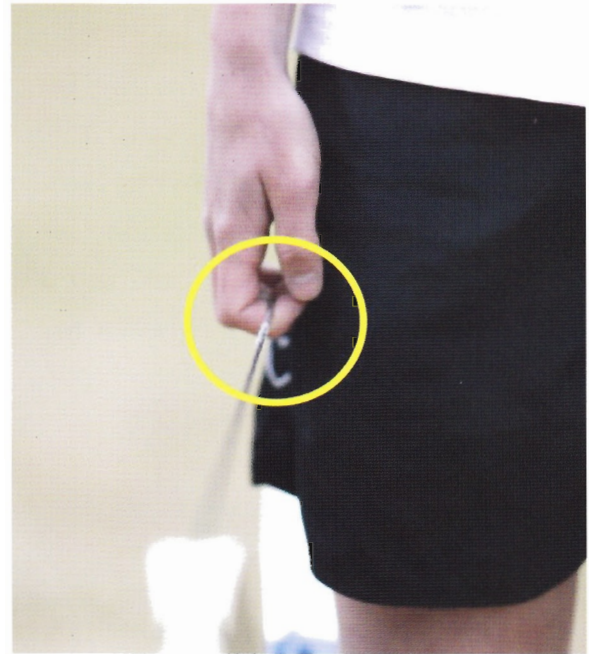


Figure 200



Figure 201



Figure 202



The height of setup

When at setup using the sight pin, the height of the pushing arm should be such that the sight pin is placed at 12 o'clock on the blue or black scoring zone on the target. If a sight pin is not being used the bow hand should be placed approximately at the height of the eyes as shown in figure 203. The height of the drawing hand should be on a level line that is approximately between the eyes and mouth. At this point of the set up the drawing elbow should be a little higher than the pushing arm but definitely no lower than the horizontal line of the pushing arm as shown in figure 204.



Figure 203



Figure 204

Drawing

The archer must draw the bow using the elbow of the drawing arm, and at the same time the pushing arm and shoulder should push toward the target as shown in [figure 205](#). The balance of the power between the drawing arm and pushing arm when drawing the bow should be a 50% to 50% split. Most beginners, as shown in [figure 206](#), draw the bow using mainly the power from the drawing arm, this causes the body to lean backward or the bow shoulder to rise up which is then moved back toward the body.



Figure 205



Figure 206





Anchor

The archer anchors after the drawing hand has been drawn toward the chin in a straight line. When the drawing hand is placed too low under the chin or is drawn to the outside of the chin for anchoring, as shown in [figure 207](#), the length of the draw becomes longer than the archer's correct draw length. And, when the archer starts using a clicker, the chin gets to be moved at the time of drawing as the archer is trying to find a position for anchoring, as shown in [figure 208](#). The anchor position should be such that the string is between the centre of the mouth and the end of the outside of the mouth as shown in [figure 209](#), but which ever place is chosen the string must always end up in exactly the same position, and at this time the string should be placed on the centre of the nose. If the string position is not constant and deviates to the inside or outside of the nose at the time of anchoring as shown in [figure 210](#), the position of the string, when aiming, deviates from original line up position on the bow riser, which will induce the arrow to hit to the right or the left on the target.



Figure207

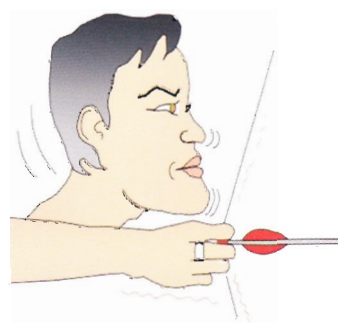


Figure 208

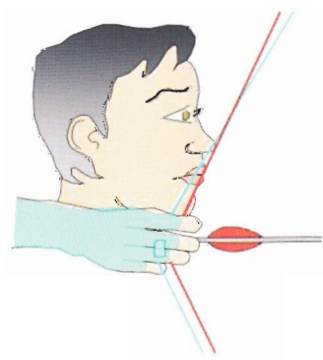


Figure 209

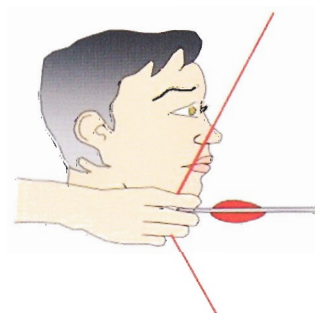
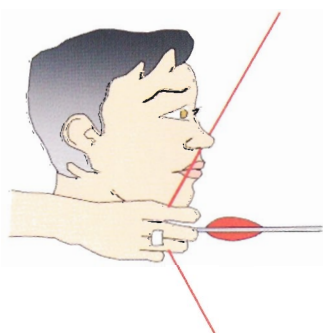


Figure 210





The use of the kisser button for anchoring

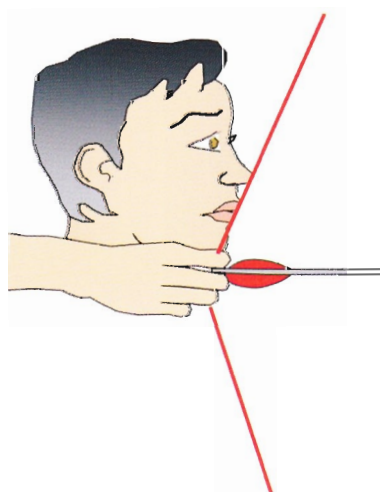
It is effective for the beginner to use a kisser button to help with correct positional anchoring. For the coach to find the correct location of the kisser button the archer should nock an arrow then come to full draw using their usual anchor position. Then, make a mark at the centre point of the archer's lips; this is where the kisser button should be fixed as shown in figure 211. If the archer exercises coming to full draw and getting the correct position with the kisser button it will help develop the habit where the archer anchors at the same position every the time. After mastering this, the archer should concentrate on getting the correct position, and feeling, with the hand on the chin without searching for the kisser button. For this exercise the coach need not always check the location of the anchor position, the archer can develop the habit of producing an accurate anchor by themselves.



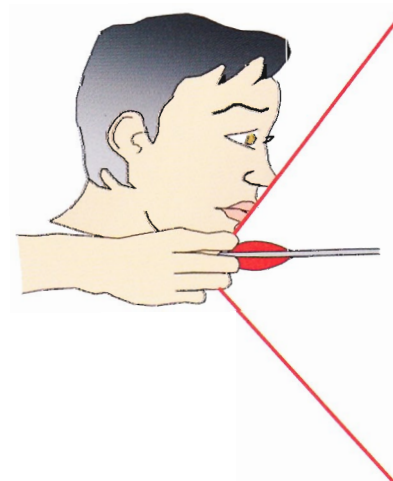
Figure 211

The effect the bow length has on the anchor position

When using a practicing bow, do not use one that is too short for the archer. If a short bow is used the archer will develop the habit of dropping the head down at the time of anchoring, as shown in **figure 213**. This is because the archer tilts the head to get the string to touch the nose; this is not a good habit to develop and should be discouraged as it will jeopardize head and body alignment in the future. Consequently, it is better to use the longer bows of (64, 66, 68, 70 inch) than the short bows of (54, 58 inch) so that the head can take up an upright and relaxed position.



Long Bow



Short Bow

Figure 213



Full draw

As shown in [figure 214](#), the head should be in line with the centre of the body which has to be upright and straight at full draw. At this time there should be a straight line from the drawing elbow passing through arrow nock to the pivot point of bow grip as shown in [figure 215](#). In order to maintain an accurate body posture the chest should be kept low and the buttocks should not stick out.

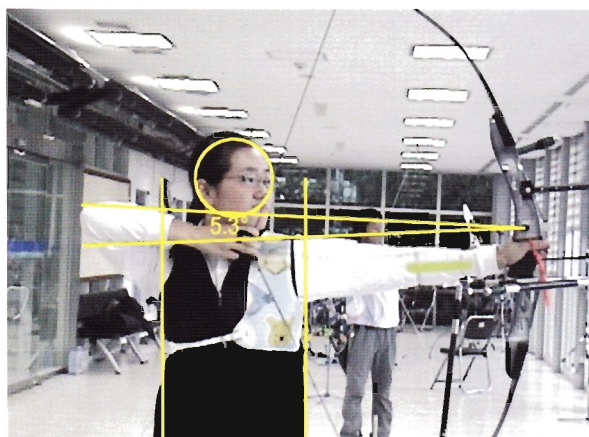


Figure 214



Figure 215



Step 4 - Preparation practice of the release

The mistakes of the most archers become evident at the time of the release, although the reason of the mistakes often begin with faults in other skills, all faults connect with the release. If the archer who has a good release makes a mistake, the arrows will still hit somewhere near the centre of the target. On the other hand, if the archer who has a “not so good” release makes a mistake, the arrows will hit wide from the centre of the target, and may even miss the target altogether. When beginners start learning archery they should learn and master the release correctly, because if they develop a bad release they keep using the acquired release and it is difficult to change it later on. Many archers who shoot a bow for the first time have not done any preparation practice for the release. For that reason, when at full draw and before releasing, the archer feels uneasy mentally and too much tension is applied to the drawing hand. In consequence, the archer develops a forward release and then it becomes very difficult to change it or master the correct posture for the release. However, if the archer does the preparation practice for producing a good release before starting to shoot the bow, it will help to develop a good relaxed and efficient release.





Practicing the release feeling for the fingers:

As shown in figure 216, not using an arrow the archer draws the bow approximately 12.5cm to 20cm (5-8inch) and practices how to release the string by just relaxing the fingers. The archer should progress to pulling back the string using the elbow and then relaxing the fingers as shown in figure 217, do not release by opening the fingers, the flexor muscles should just relax letting the fingers be pushed out of the way by the string. To develop the correct speed of the release the coach holds the bow with one hand and the archer's string wrist with the other. The coach then counts "one, two, three" and archer releases on the command "three" with a little help with the follow through action from the coach. The elbow moving back and the fingers relaxing should be carried out at the same time the coach says "three." To progress, the archer has to make an effort to release faster than the helping hand of the coach when the command "three" is given. The three fingers should all relax at the same time and not open at different times. The next step is, as shown in figure 218, the bow arm is bent and drawing hand is anchored in the normal position, the archer exercises the release with the helping hand of the coach as shown in figure 219. This exercise will help the beginner to develop the "feeling" of the release easily and quickly.



Figure 216



Figure 217



Figure 218



Figure 219



The length of travel of the release

The archer does the release exercise bending the bow arm and anchoring the string hand as shown in [figure 220](#), or the archer could use an elasticated second string on the bow. The coach helps the archer develop the feeling about the length of release by holding the archer's string wrist and assisting with the movement at the time of the release. The length of the beginner's release should be such that the elbow does not move down after releasing as shown in [figure 221](#), the height of the elbow after the release should be the same as it was at full draw. The travel of release at this stage should be quite short because the travel of the release will increase a little when a competition bow is used due to the increased power of the bow. If, when releasing, the string hand travels further back than the ear the drawing elbow will move down too much. If this happens it would be effective to return to training the release at the word of command "one, two, three" until the travel of the string hand returns to an acceptable length. Also by releasing with a controlled elbow and keeping it at the correct height the release can be executed softly and gently. If the release is performed by physically opening the fingers, the wrist will bend and the elbow will move down as shown in [figure 222](#)



Figure 220



Figure 221

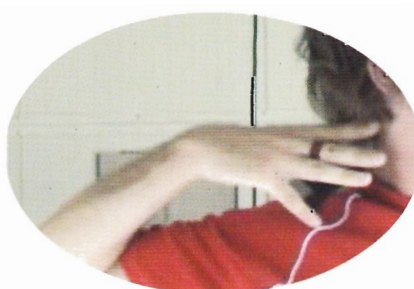


Figure 222





The direction training of the release:

The archer comes to full draw with the coach holding the back of the drawing arm and the wrist of the archer. As shown in figure 223, as the archer releases the string the coach helps the backward movement of the drawing arm. The coach also helps to keep the drawing hand in close to the archer's neck preventing it from moving out at the moment of release. The drawing arm should not be opened or moved up or down during the time of release, also the drawing hand should move back on the same horizontal as it was at the time of the anchor. As shown in figure 224, when the drawing arm does not be open or the elbow does not be move down, the direction of release becomes correct.



Figure 223

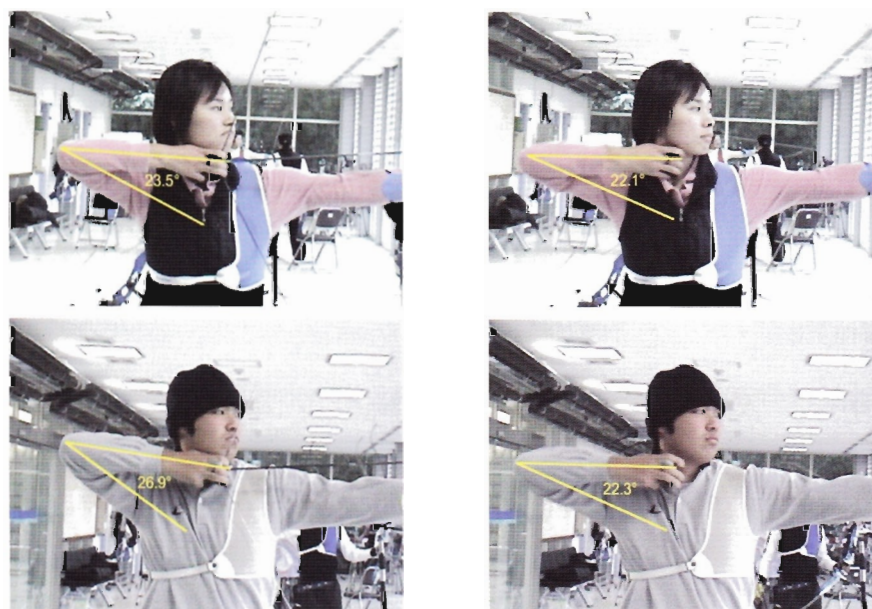


Figure 224

Step5 - The exercise for the “follow through”

After the release the bow will turn so that the bottom limb will touch the archer just around the hip area as shown in [figure 225](#), or the bottom limb may just touch the side of the archer’s leg, or, may even just skim past the leg, which ever the limb does it should do it regularly. After the release, the bow arm should maintain the height and position it was in at the time of aiming. As shown in [figure 226](#), another method is that the joint of the first finger on the bow hand could be lined up with a position on, or just below, the target when shooting, and after releasing the position of the archer’s bow hand should be kept close to the same location. If it is not, the pushing hand was moved in a direction other than straight forward at the time of shooting. Using this method the archer can notice the position of their bow hand whilst aiming and confirm it has not moved after the release is made. Whilst executing every shot the archer should make every effort to ensure that the position of their bow hand ends up in the same location as it was whilst aiming.

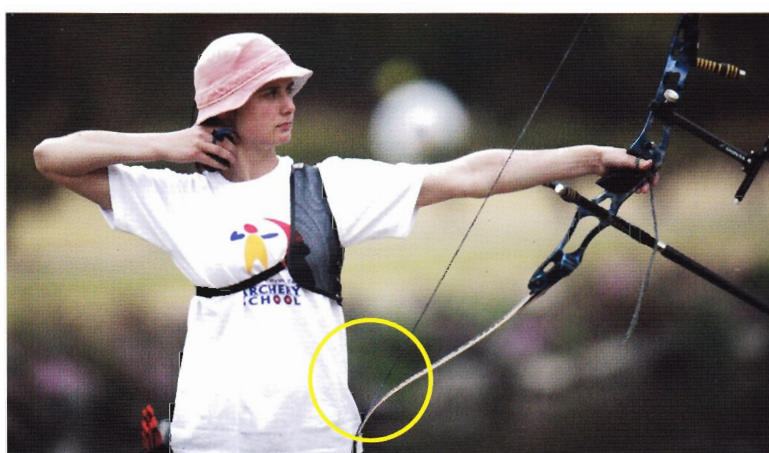


Figure 225

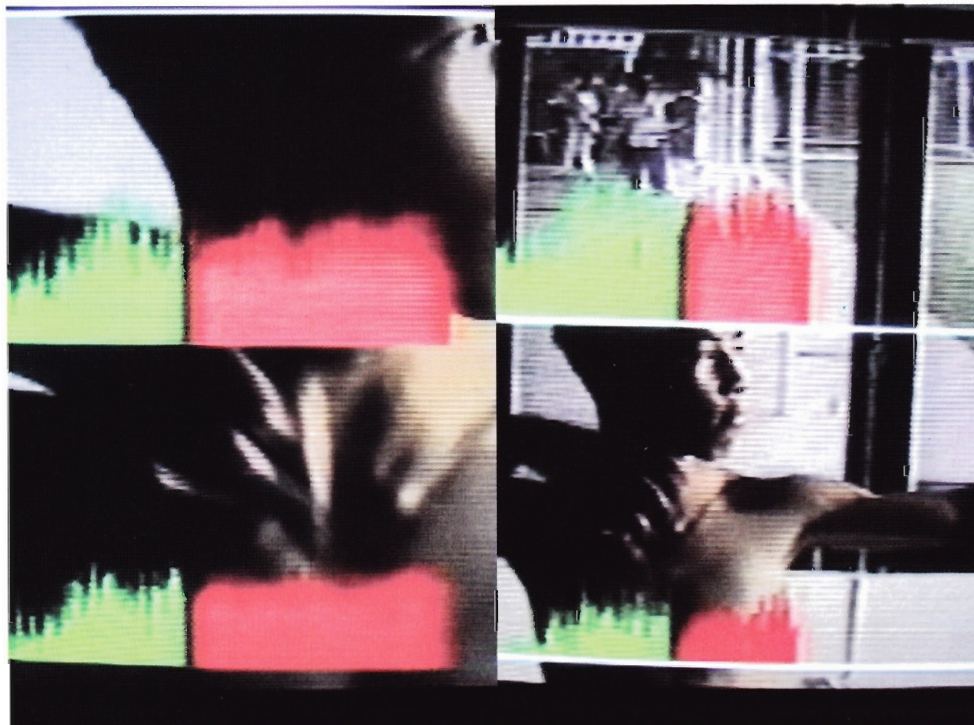


Figure 226



The analysis of the posture and method of the modification

- The points to consider when extending:







The ring finger slipping off the string

There are many archers who let the ring finger slip off the string at the time of extending as shown in [figure 227](#). If the ring finger slips off the string the gripping pressure the archer puts onto the fingers is still there and the ring finger presses onto the string. This makes the archer feel uneasy as they try to stop the finger slipping off the string. If the archer does press the string with the ring finger it will cause the string to have a wider deviation at the time of the release, and the arrow will strike the target to the left of centre for the right-handed archer, and vice versa for a left-handed archer. When releasing, if the three fingers do not release from the string at the same time, as shown in [figure 228](#), the direction of release is not constant because the ring finger curls inward or downward as the rest of the fingers are released. This will cause the extending time to be inconsistent and the force of the release to be erratic; all this will have a bearing on the string movement which will affect the arrow grouping in the target.

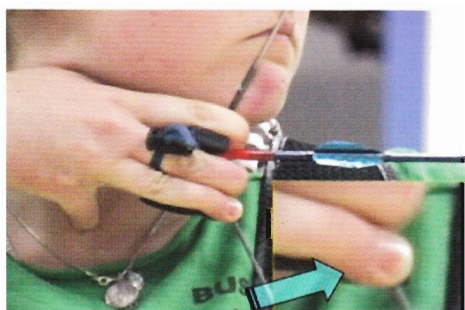


Figure 227



Figure 228

The causes

- P The drawing elbow is raised too high.
- P The hand is twisted toward the outside when anchoring.
- P The string is hooked on too far to the outside of the finger tab..
- P The ring finger has straightened and not held the position of the hook at the time of anchor.
- P The string is hooked nearer to the end of the fingers than the first joint.
- P Extending through the clicker by curling the fingers.

Modification

After checking the finger tab, make sure the position of the string locates correctly on the fingers for the best position for hooking. The archer, who hooks with the string too far down the fingers before drawing the bow, as shown in [figure 229](#), will find that as the weight of the bow increases during the draw the string will slip toward the tips of the fingers. It is best to place the string a little inside of the first joint of the fingers during “set-up” as shown in [figure 230](#), then as the weight of the bow increases during the draw the string will slip into the first joint automatically at the time of anchor.

Whilst in the anchor position the hand should not be twisted or the wrist bent, and the height of the drawing elbow should be just above the arrow line. The direction of the ring finger should face a little inward at this time as shown in [figure 231](#). And, as shown in [figure 232](#), if the second joint of the ring finger is bent slightly, the first joint of the ring finger bends automatically. If the archer lifts the elbow up too high whilst in the anchor position, the ring finger tends to slip off the string. Sometimes it may help to overcome this problem if the tab has an anchor plate fitted to it, but beware, because the archer may fix the anchor plate too hard to the chin which will cause them to extend with the hand. If the anchor is fixed completely, the drawing elbow is not used, and the extending is done using the hand and the string will not slip off the fingers efficiently.

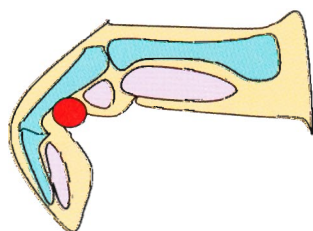


Figure 229

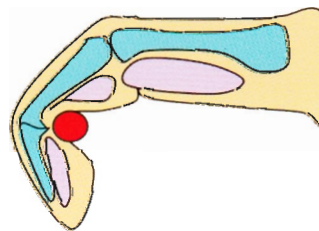


Figure 230

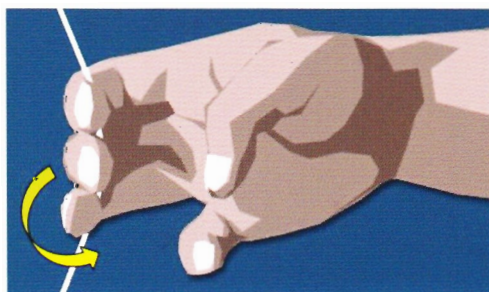


Figure 231

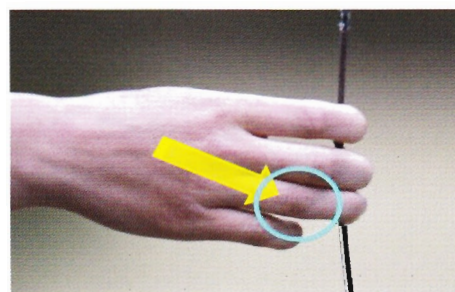


Figure 232



The ring finger is bent inward at the time of extending

Many beginners as shown in figure 233 extend using the fingers. When this happens tension is applied to all the fingers at the time of the extending and the scapula of the drawing arm will not be used. If the extending is forced by bending the fingers, as shown in figure 234, the location of the string also moves backward with the forced extending, then, when the clicker activates the archer will action the release by opening the fingers and the speed of releases is slow and not relaxed. In this situation the archer produces a forward release and a forward movement of the elbow at the time of release.



Figure 233

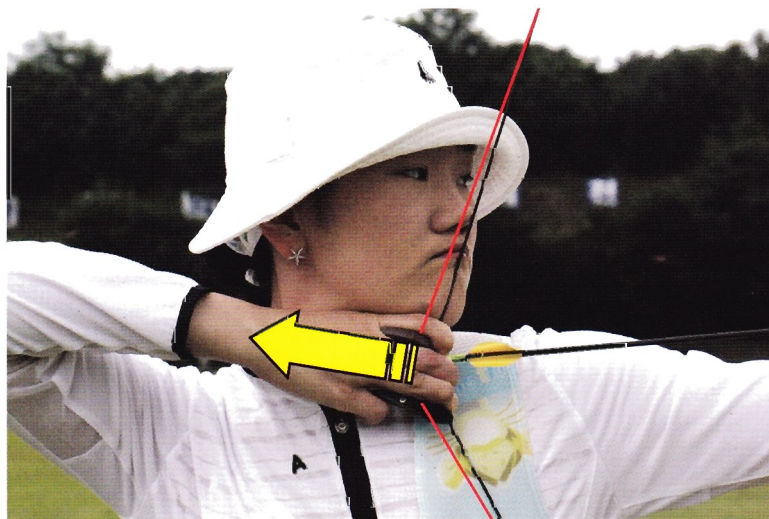


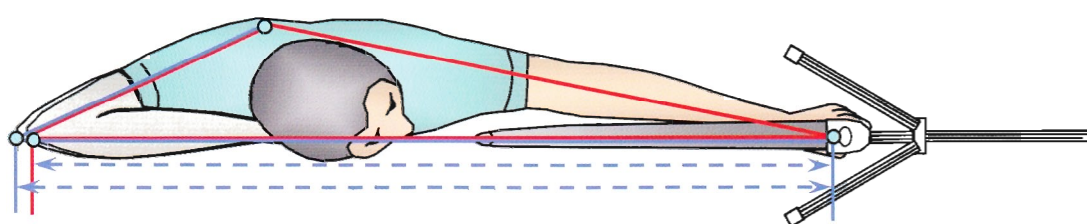
Figure 234

Causes

- P The bow is strong for the archer to handle.
- P The weight of the extending is mainly on the drawing arm and not balanced at 50% on the bow arm and 50% on the drawing arm.
- P When anchor is not positioned correctly.

Modification

At first, the archer has to check whether the finger tab is the proper size. If the finger tab is too big, the archer should use a correctly fitting finger tab so they can anchor correctly. The important thing at this time is that the string should be firmly positioned on the chin and located correctly on the mouth, once in this position the string should not be moved backward anymore. The archer extends using both shoulders, the bow shoulder pushing the bow grip toward the target and the drawing shoulder extends away from the target, the drawing hand should not move, as shown in [figure 235](#), and the angle at full draw gets to be increased. If this method is mastered, the balance of the 50% becomes quite naturally. And, when extending, if the string does not moved back along the chest but stays stationary, it means that the archer extends correctly without curling the fingers.



The hand is moving backward.

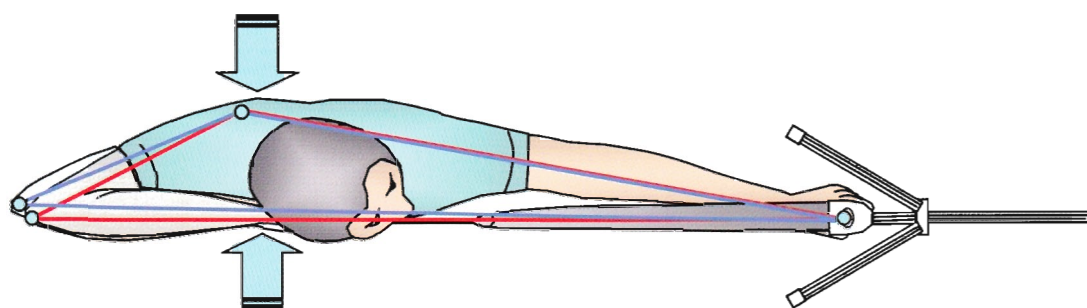


Figure 235



The arrow nock is lifted up by the middle finger

Sometimes the finger under the arrow presses upward during the time of the release due to tension in the fingers when extending, as shown in [figure 236](#). When this happens, the arrow lifts up off the arrow rest which will then strike high in the target. On checking the finger tab there will be a tell tale mark which is a small area on the leather that is pressed down by the nock of the arrow, as shown in [figure 237](#).

Causes

- P The middle finger is curled inward when extending.
- P The middle finger is pressing upward under the nock when hooking.
- P When extending, the drawing elbow is lowered changing the direction of the force causing the elbow to drop down at the time of release.

Modification

As shown in [figure 238](#) a finger spacer can be fitted to the tab which will keep the fingers apart and reduce the possibility of the middle finger applying pressure under the nock. As shown in [figure 239](#), the forefinger should lightly touch the top of the arrow and this light pressure will gently press down on the arrow nock. The direction of this light force will not have any downward influence on the arrow flight because the arrow is placed on the arrow rest.

However, when the under part of the arrow nock is lifted up by the middle finger, as shown in [figure 240](#), at the point of the release the arrow moves up or out from the arrow rest. Therefore, when placing the fingers on the string the forefinger should lightly touch the upper part of the nock and the middle finger should be placed so that there is a small gap between the finger and the nock of the arrow. Sometimes, the forefinger presses a little too hard on the nock of the arrow which can cause a little soreness in the forefinger. If this happens, try making the backing leather of the tab a little larger than the facing leather as shown in [figure 241](#), this will help to prevent any soreness. In addition, when at dull draw ensure the drawing elbow is a little higher than the arrow line, the elbow should maintain this height and the fingers should not be forced to curl at the time of extending,

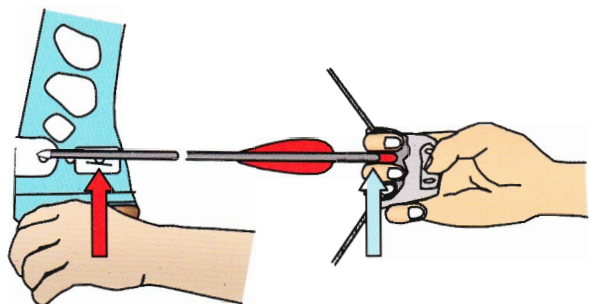


Figure 236



Figure 237



Figure 238

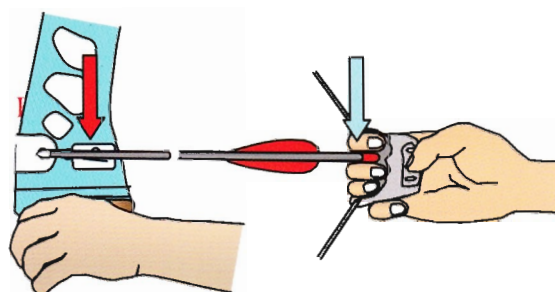


Figure 239

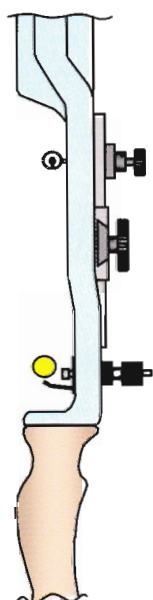


Figure 240



Figure 241



The anchoring hand is moved back when extending:

When extending, the anchoring hand should not move along the archer's face. If the archer does move the hand along face when extending, tension is applied to the hand and when the arrow activates the clicker the archer releases late, this usually has an adverse effect on the flight of the arrow which may then not strike the centre of the target. Another problem that might become evident is that the face might move backward with the drawing arm when extending as shown in figure 242.



Figure 242

Causes

- P When the hand is not fixed on the chin completely at the time of anchor.
- P When drawing back with the hand or curling the fingers during the time of extending.

Modification

The drawing hand should be set on the chin completely and correctly at the time of anchoring. At this time the string is placed firmly on the chin as shown in [figure 243](#), and the forefinger and the upper part of the hand is located under the jaw bone. If the finger tab is wider than the hand, as shown in [figure 244](#), it will prohibit the hand from taking up a good anchor position. Therefore the tab should be modified to ensure it does not extend past the upper part of the hand or interfere with the hand when being placed in the anchoring position.

When the archer uses the hand to complete the action of extending it is impossible to get an even force of extension across the body. If the archer extends with the bow arm and shoulder, the force gets to divide correctly, the hand does not move back and the power can be divided equally across the body at the time of extending.

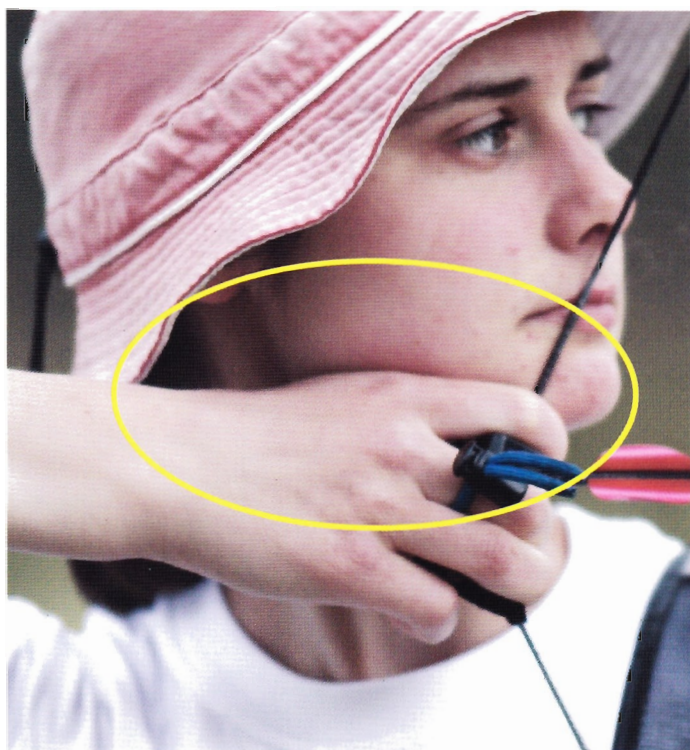


Figure 243



Figure 244



The arrow point creeps toward the target when aiming

If the archer uses the system of drawing the bow whilst watching the arrow point there is a potential problem where the arrow may creep forward when the archer changes their focusing point from the arrow to the target for aiming as shown in **figure 245**. If this happens the extending time will increase because the draw length is not consistent, this will interrupt the extending time which also becomes inconsistent, and the rhythm of extending will be destroyed.

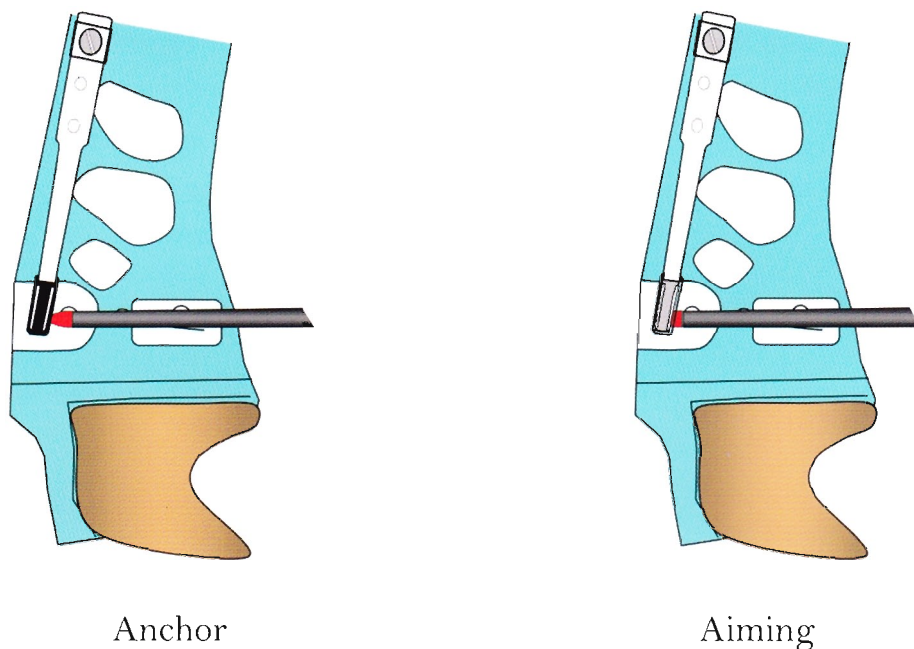


Figure 245

Causes

- P When coming to full draw the chin is moved toward the string.
- P When the archer's eyes are moved to the sight pin and the target after watching the arrow point, the archer does not extend and the drawing force relaxes when concentrating on aiming.
- P When the bow shoulder rises and the bow arm moves back at the time of anchoring.



Modification

When going through the set-up routine, the bow shoulder should push toward the target and the chin should not be moved toward the string when coming to the full draw position. The archer should remember to extend continuously starting at the moment when body is correctly set and the sight pin is on the aiming point. Extending is started from the time of anchor and if performed correctly and continually during the change of vision from the arrow point to the sight pin, it can prevent the arrow point moving toward the target. After the beginner has developed a constant draw length by watching the arrow point, it is more effective if they progress to develop a constant draw length without watching the arrow point.





The elbow moves down at the time of extending

The reason the drawing elbow moves down at the time of extending is that the extending power is not controlled by the shoulder and back muscles, and all tension is applied only to the drawing hand. The head will lean back at this time and the direction of force of the bow shoulder pushing the bow will rise up, so the direction of the extending force cannot be inline toward the centre of the target.

Causes

- P The upper body is leant backward away from the target.
- P The bow shoulder rises up at the time of extending.
- P The archer extends using only the drawing hand or fingers.
- P As shown in **figure 246**, the body is not straightened up and the bow shoulder is raised up at full draw.
- P When there is insufficient flexibility of the shoulders.

Modification

When at full draw, the head and the body should be vertical and the location of the pushing shoulder and position of the drawing elbow have to be corrected. Also, the archer should extend without putting tension into the drawing fingers or drawing hand and the bow arm should push quite strongly toward the target, and as shown in **figure 247** the elbow has to be in line with the direction of the force of extending.

The matter that demands special attention is the waist should not be bent which causes the upper body to lean backward from the target and the bow arm to rise up at the time of extending. Stretching and joint exercise are helpful for the archer whose flexibility is insufficient.

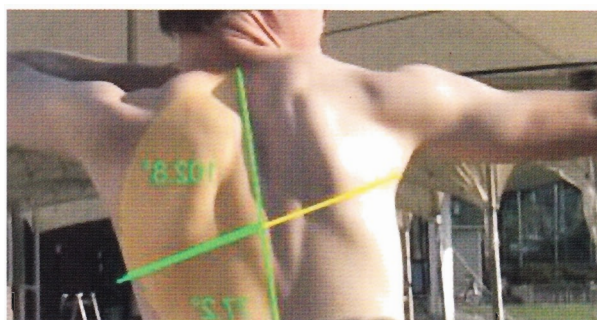


Figure 246

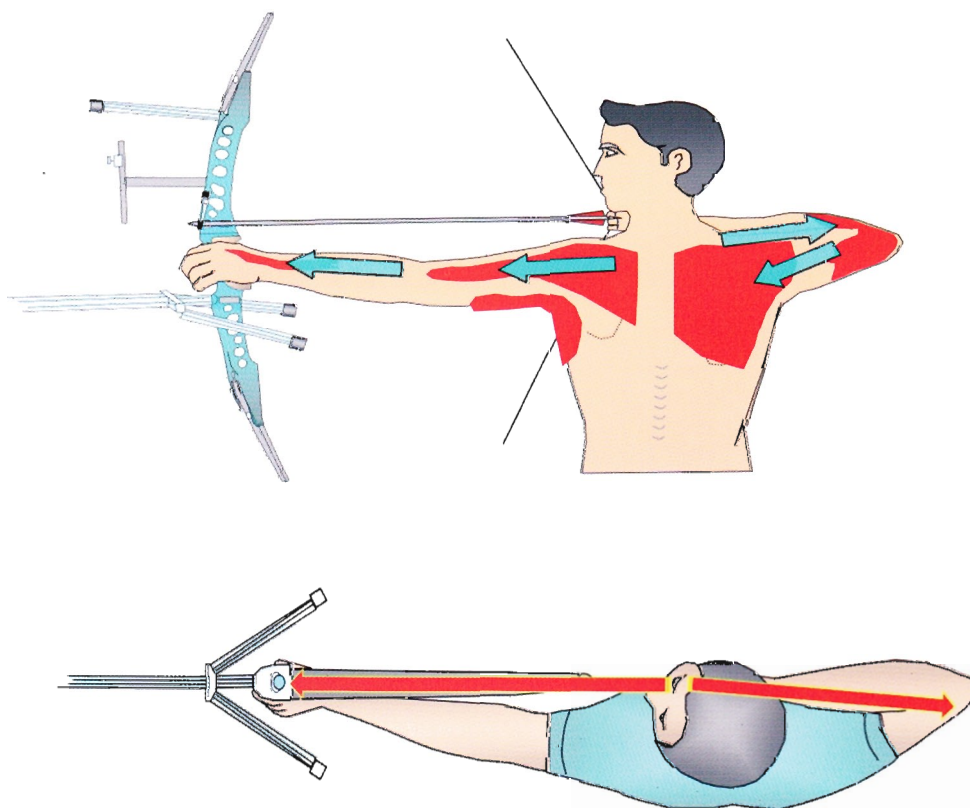


Figure 247



The bow shoulder is raised up

Sometimes the bow shoulder is raised up at the time of extending. If this happens, the balance of extending moves toward the drawing arm, and the distribution of the force also moves to the drawing arm, and the drawing elbow will move downward. The bow shoulder which is raised moves backward into the body, and at the time of the release will move forward toward the target, this out-of-line body set-up will cause the balance to totally collapse when releasing.

Causes

- P As shown in figure 248, when the shoulder is not set correctly it is moved toward the body as the bow is drawn.
- P When extending, the balance to power is mostly toward the drawing arm.

Modification

As shown in figure 249, the shoulder should be set in the correct position and be extended toward the target, when drawing the bow, to prevent the shoulder from rising up. If the bow shoulder is too relaxed or the shoulders are not set in line with the target the bow scapular will move backward and up as the archer comes to full draw. This is because the upper body will tend to collapse forward as the scapular moves backward, so the bow arm has to be supported and push toward the target quite strongly if this is to be avoided.

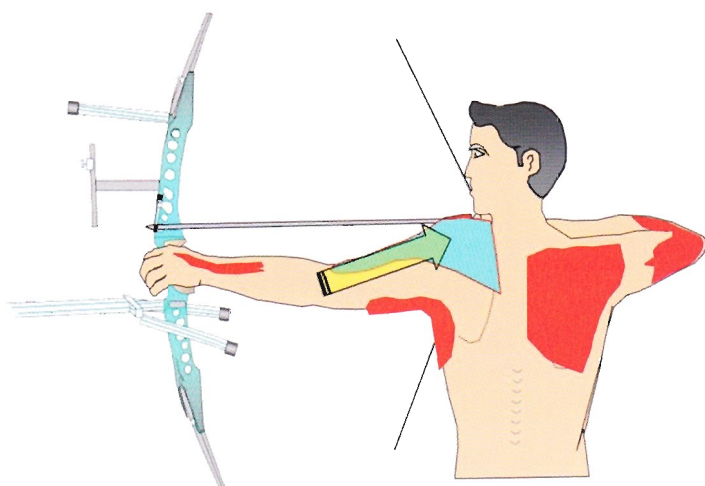


Figure 248

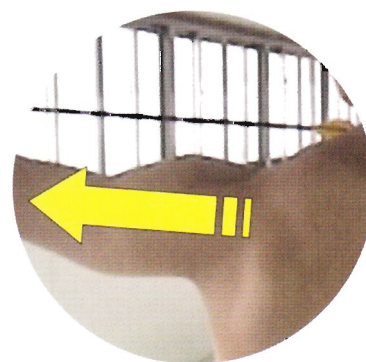


Figure 249

Rotating the pushing arm:

As shown in **figure 250**, if the pushing arm is rotated during the time of extending, the triceps muscles and the power of the shoulder muscle shown in **figure 251** tend to relax. This will make it difficult to extend accurately and the power of the pushing arm will collapse and the balance will be uneven at the time of the release. The direction of the force on the pushing arm should be maintained and in a direct line toward the target when extending.

Causes :

- P The reason is that the shoulder moves back and the tension of the arm is relaxed at the time of release.

Modification:

When releasing, the tension of the shoulder and the arm should be maintained toward the extending force line. In particular, the bow arm and shoulder should be set in the correct position at the time of set-up.



Figure 250

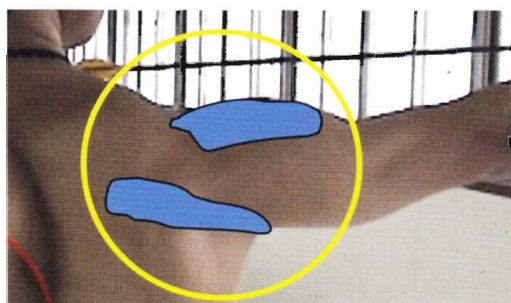


Figure 251

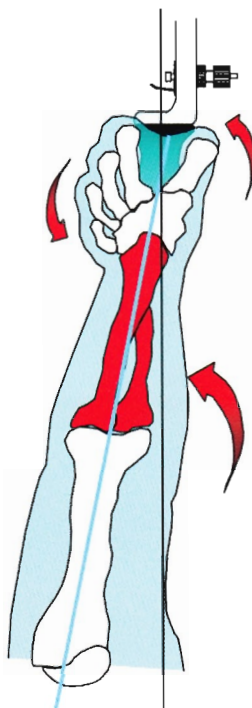


Figure 252



The change of the bow grip:

If the bow grip does not fit the archer's own hand correctly their hand may slide round, or up, the bow grip during the period of extending as shown in figure 253. If the bow hand slips on the bow grip or the direction of the force on the grip is changed, the direction of extending will be affected and the archer will feel uneasy psychologically. And, when it is raining or the palm of the bow hand is perspiring, the bow hand will slip even more.

Causes :

- P The bow grip does not correctly fit the archer's hand.
- P The direction of the force which is pushing the bow is not accurate at the time of extending.
- P The bow hand slides round the bow grip.

Modification:

The bow manufacturing companies do not produce bow grips to suit all the various sizes and shapes of the archers' hands. Therefore, the archer should endeavour to remodel the bow grip to fit their own hand. It is better to remodel the grip whilst it is on the bow using a commercially available grip maker as shown in figure 254. When the archer puts their hand on the bow grip it should always fit naturally, and always be comfortable

When extending, the archer's hand should not slip on the bow grip and the pressure should accurately push the centre of the grip toward the centre of the target.

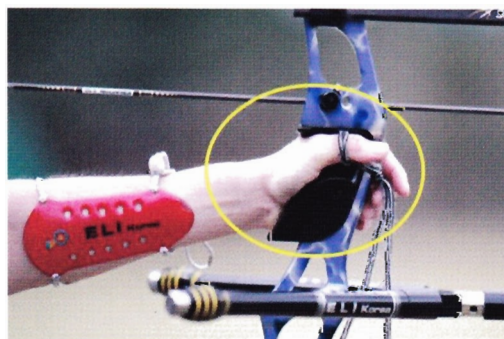


Figure 253



Figure 254



When extending, the change of the location of the string on the chest:

As shown in [figure 255](#), the position of the string on the chest should never move while extending. If the string does move the centre of the extending balance will be moving because the string is in the central location of the extending balance.

If the string is kept moving backward at the time of extending:

Sometimes the archer may come to full draw then continue the extending by just using the drawing fingers as shown in [figure 256](#). If the archer extends using the fingers, most of the power will be in the hand and the extending balance remains the drawing arm. When this happens the drawing elbow is moved down and the string is drawn strongly, or plucked, at the time of the release and, the phenomenon where the string moves forward with the fingers as they open happens. In this situation, the drawing elbow should be raised up and the drawing hand should be set on the chin completely at the time of anchor. When extending the archer should push the bow hand and the bow shoulder toward the target, the balance of the pushing arm and drawing arm should be equal - each doing 50% of the work. Actually at this time, the bow shoulder is not moved toward the target and only the pushing power is being used, the back muscles will be used which will prevent the string from moving back along the chest.

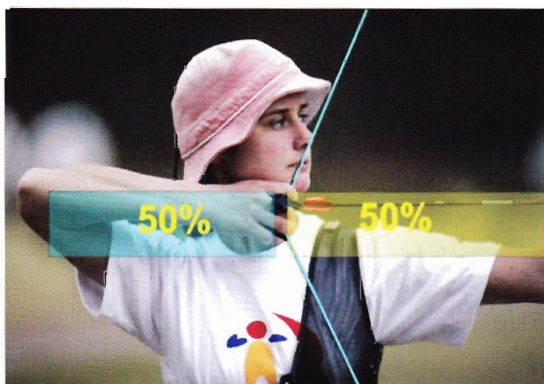


Figure 255



Figure 256





If the string is pulled away from the chest when extending:

Some archers do not get the bow shoulder in a straight line with the shoulder of the drawing arm at the time of full draw, or the drawing elbow is stuck out and is not in a straight line with the arrow as shown in [figure 257](#). In this case, as shown in [figure 258](#), the drawing elbow is moved forward or the pushing shoulder is moved back at the time of extending, therefore the string will come away from the chest and the chances of producing a poor release will be increased. This backward movement of the bow shoulder will cause the bow not to have free movement at the release and the bow will not keep its forward inline movement at the time of shooting. Also if the bow is too strong for the archer to complete the full draw, the same problem happens where the string moves away from the chest. If the bow shoulder can be set completely in a straight line to prevent this happening as shown in [figure 259](#), it is easier for the drawing elbow to get in a straight line with the arrow quite naturally. The arrow line and the angle of the shoulder become narrow and the direction of the power is more in line with the target and the drawing elbow at the time of extending, which will prevent the string from coming away from the chest when extending.

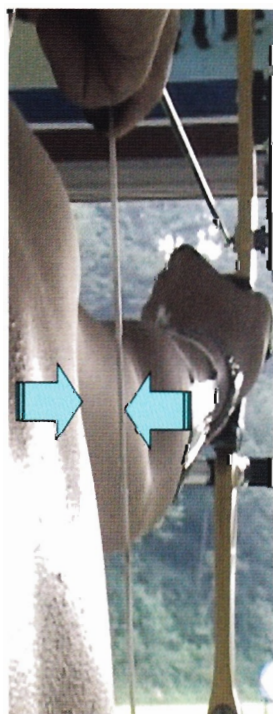


Figure 257

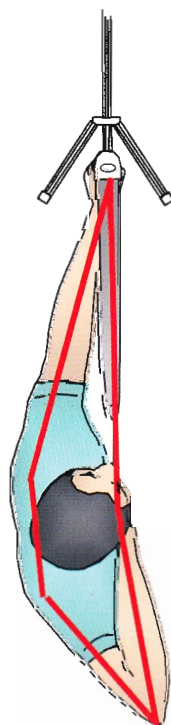


Figure 258

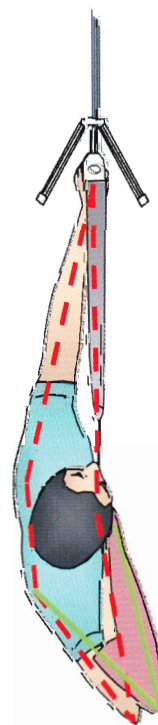


Figure 259

Leaning the bow left or right

As shown in figure 260, there are many cases where the archer leans the bow right or left at the time of extending, and quite often actually shoot the bow with it leaning, and in many cases the body is also inclined to the same direction and angle of the bow. If the bow is inclined, the arrow will fly in the direction of the leaning bow, if the top limb leans to the right the arrows will hit to the right on the target, and if the top limb leans to the left the arrows will hit to the left. And the position where the arrows hit on the target differs depending on the angle of the leaning bow, the more acute the angle the bow leans, the further off centre the arrow will hit the target, and if the archer makes a small error when executing the shot the error will be magnified because of the leaning bow. As shown in figure 260, another situation could arise and that is when the bow is leant to the right (a right handed archer), the arrow lies on the arrow rest pressing on the pressure button, but if the bow is inclined to the left as shown in figure 261, the arrow could slide left along the arrow rest and fall away from the pressure button.

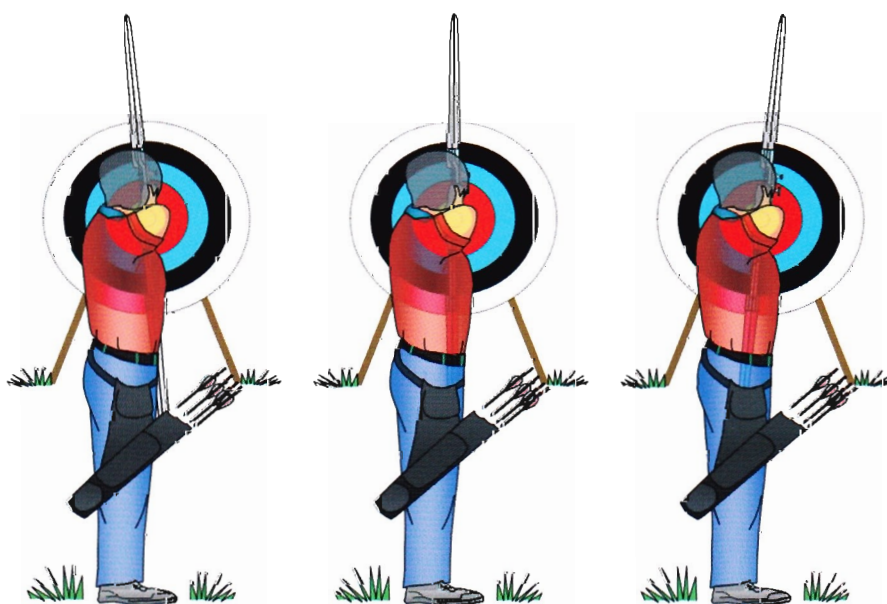


Figure 260

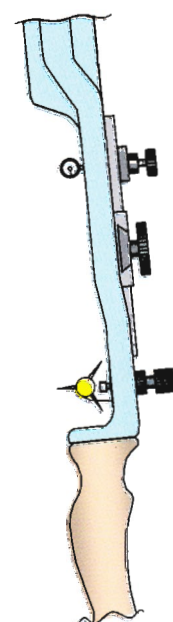


Figure 261



When a bow is inclined to the left

When extending, the reason the bow inclines to the left is usually because the chest is raised up when extending and the centre line of the upper body is inclined backward as shown in **figure 262**. If the chest is raised up at the time of extending, the archer cannot acquire the accurate direction of extending or use the back muscles correctly resulting in an inconsistent draw length. The reason the archers draw length will be inconsistent is it depends on the angle of lean of the bow. To rectify this, the archer should stop using the clicker for a while, stand up straight, and try to rectify leaning the bow. If the body is straightened up, the position of the bow also becomes vertical. The archer may have a feeling that the bow is inclined to the right at this time, but this is only a feeling, in fact the bow will be upright. If the archer feels uneasy with this they could try shooting the bow whilst inclining the bow a bit further to the right past the upright position, after a short period of time the bow could be brought back to the vertical position and the bow would never be leant left again. To overcome this problem it is imperative that the chest should not be raised up at the time of extending and the correct direction of the extending has to be maintained.



Figure 262

When a bow is inclined to the right

If the bow is leant to the right, the arrows will fly toward the direction which the bow is inclined i.e. right. The main reason why the bow leans toward the right is the upper body is inclined toward the front and the bow follows the lean with the body as shown in **figure 263**. When extending with the body leaning forward the pushing arm and the drawing arm are not in a straight line, this causes the bow hand to turn forward which will force the bow grip to be turned inward as shown in **figure 264**. To rectify this, the archer should ensure the upper body is upright and the centre line of the body is placed accurately over the two feet at the time of set-up, and must keep the correct direction of the pushing force on the bow grip whilst extending. The archer should stop using the clicker for a while when trying to rectify the leaning of the bow. After shooting without a clicker for a while the archer's draw length will get a little longer, when the draw length is constant the clicker may be reset and used again. It will be found that after shooting without a clicker for a while the draw length will get a little longer. The bow should be vertical at the time of set-up and the archer has to maintain the bow in this vertical position right through until the shot has been completed.



Figure 263

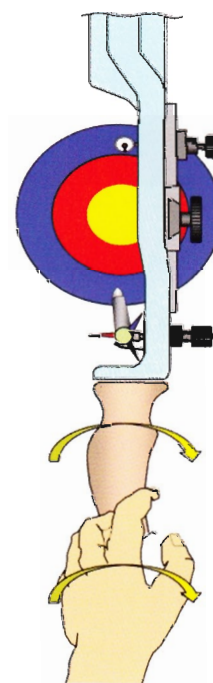


Figure 264



If the bow moves back toward the body when extending:

The archer needs to observe the movement of the bow, in detail, at the time of extending. As shown in figure 265, there are times when the bow moves back toward the archer's body, they may not feel this and the action goes on un-rectified. If the bow does move back toward the body, the balance of power at the time of extending has changed which will jeopardise the chance of producing a good release.



Figure 265

Causes

- A. The reason is that the pushing power on the bow arm has been reduced and the majority of the power of extending is performed by the back part of the drawing force. If the archer extends using the hand or by moving the elbow down, the bow will move back toward the body.
- B. If the pushing shoulder is raised up or is moved back at the time of extending, the bow will move back toward the body. On releasing, the power which was moving back gets to be moved toward the front again, which disturbs the balance after the release.

The method of the modification

As shown in **figure 266**, the method to remedy this situation is that the archer should position the bow shoulder correctly at the time of setup which should be maintained whilst drawing the bow. Then extend pushing the bow arm toward the centre of the target with the same power that is apportioned to the drawing arm. If the power of the pushing arm is stronger than the drawing arm during this exercise the power distribution must be modified to keep the balance of power equal at 50% pushing and 50% pulling.



Figure 266





When extending, the bow moves downward

In some cases the bow moves downward at the time of extending as shown in **figure 267**, and when making a careful observation at the time of extending, it can be observed.

Cause:

Usually the problem is caused by the direction of the force on the bow grip is pushing downward and not to the centre of the target at the time of extending.

The method of the modification:

When extending, if the power of the grip is pushed the centre of the target accurately as shown in **figure 268**, the bow will constantly settle on the correct place to complete the shot.

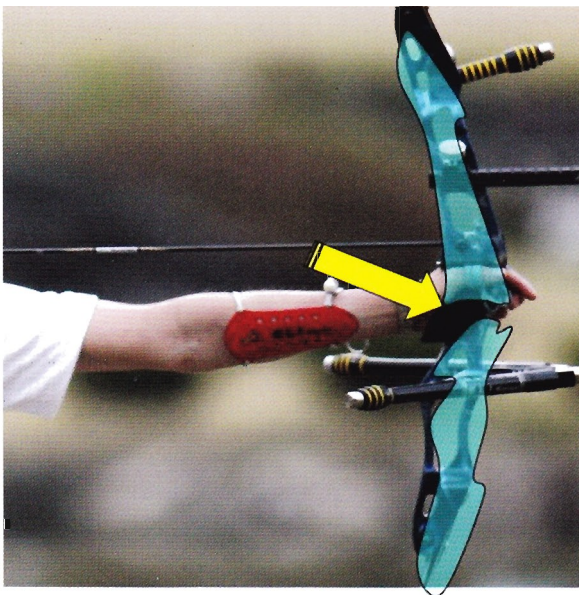


Figure 267

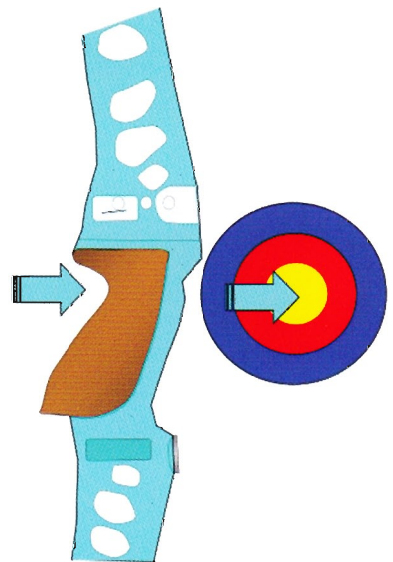
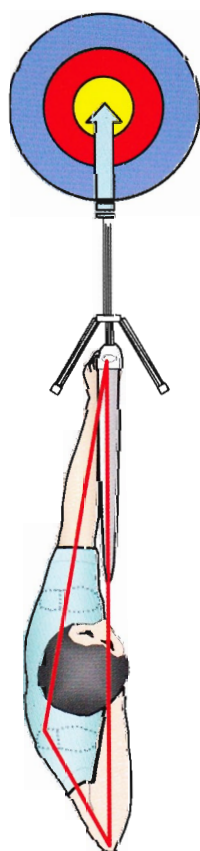


Figure 268

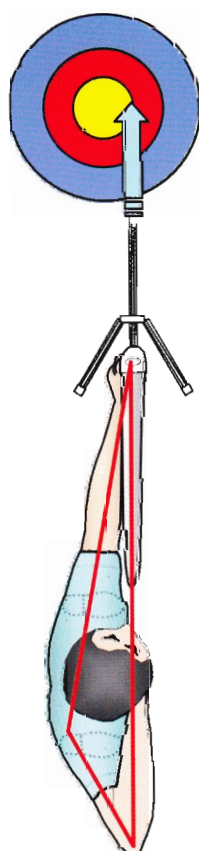
The change of the centre line of the body

As shown in **figure 269**, many archers do not know that if the centre of the body is moved at the time of extending the arrow group pattern will get larger and the location of the arrows on the target will be inconsistent. If the centre line of the body gets to move, as shown in **figure 270** the sight pin will move from the centre of the target so the body has to be realigned to keep the sight pin on the centre of the target before releasing the arrow. Sometimes the archer will change the whole set-up, including the angles, whilst at full draw as shown in **figure 271**. If the change is a result of body movement and there is no change to the angles of the body, the sight pin should be moved back onto the target by reversing the direction which the body was moved. The extent of the body lean will differ depending on the time when the centre of the body is moved, this will have an adverse effect on the extending time. Consequently, the accuracy of the shot will be jeopardised and the position where the arrows hit the target will not be consistent.



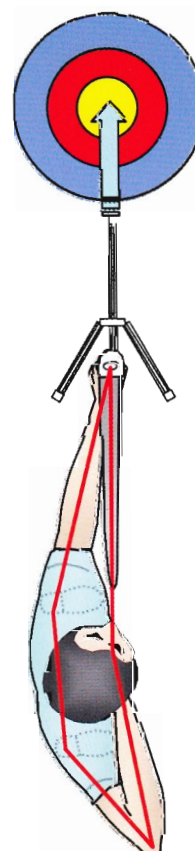
No movement of the body.

Figure 269



The body has moved.

Figure 270



Angles changed at full draw.

Figure 271



The cause

The main reason why the body leans is the centre line of the body is not set accurately during the set-up procedure. The weight has probably been centred over the heels, and when the archer moves their weight onto the centre of the feet they tend to lean forward as shown in figure 272.

The method of the modification:

The method which can prevent the body from leaning is that before set-up, the centre line of the body should be placed over the centre of the two feet. The waist should not be bent and the buttocks should not be stuck out. This way the chest is kept down and the centre of the upper body is kept in line with the centre of the lower part of the body

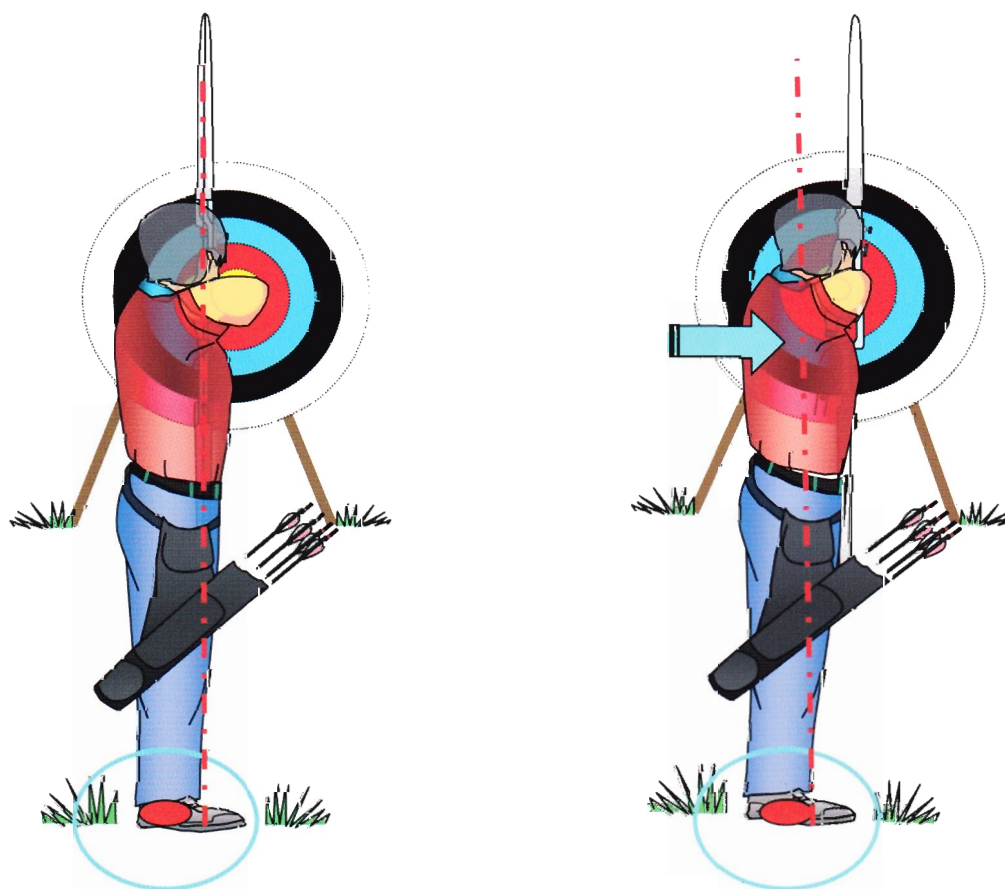


Figure 272



The position change of the string alignment when extending

Sometimes the location of the string alignment changes at the time of extending but some archers do not feel this change, and many do not even check the position of the string. Many archers who have a lot of experience or have a very high skill level do not check the location of the string, because of this high skill level the position of the string is fixed constantly in the correct place. However, the change to the position of the string happens to the many intermediate archers at the time of extending. Although the archer may shoot with a good feeling and the good posture, the majority of their arrows will spread left and right on the target because of the changing location of the string at the time of extending.

Cause:

The reason the location of the string alignment changes is that the angle of the face changes when extending. If the angle change of the face is to the right, as shown in [figure 273](#), the change to the position of the string will be to the left and the arrows will hit right on the target. And, if the angle change of the face is to the left, as shown in [figure 274](#), the change to the position of the string will be to the right and the arrows will hit left on the target.

The method of the modification:

When extending, the direction of power in the bow arm should be to the centre of the target to prevent it, or the head, from changing the angle of the face. The archer who has not mastered retaining the alignment of the string should endeavour to keep the sight pin with the string in their vision while extending. The focus of the eyes as shown in [figure 275](#) should be on the sight pin with the string blurred and lined up down the back of the riser. The string should maintain this line up right through until the completion of the shot. So it is important that the head is set and held in position correctly to prevent the string alignment position changing which will reduce the possibility of the arrows spreading across the target.



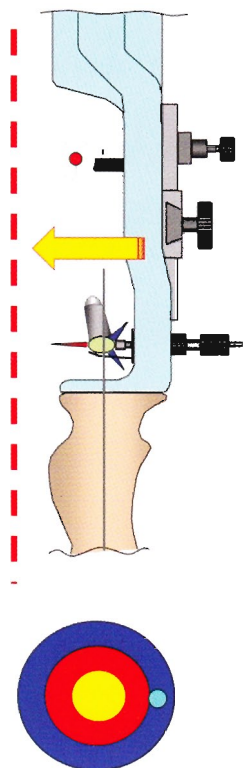


Figure 273

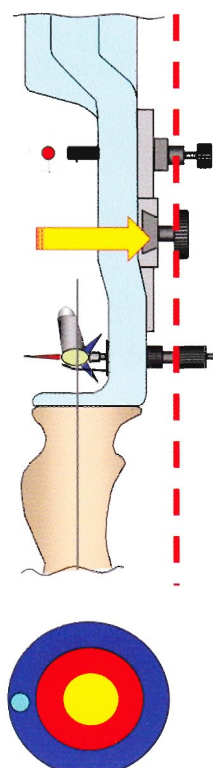


Figure 274

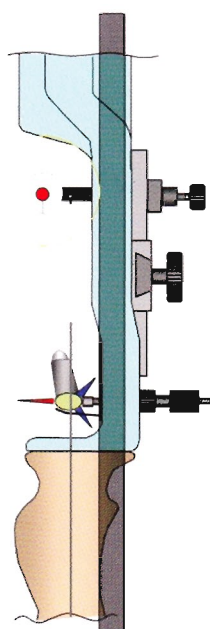


Figure 275



The change of the string alignment when extending

Sometimes the location of the string alignment changes at the time of extending but some archers do not feel this change, and many do not even check the position of the string. Many archers who have a lot of experiences or have a very high skill level do not check the location of the string, because of this high skill level the position of the string is fixed constantly in the correct place. However, the change to the position of the string happens to many intermediate archers at the time of extending. Although the archer may shoot with a good posture, the majority of their arrows will spread left and right on the target because of the changing location of the string at the time of extending.

Cause:

The reason the location of the string alignment changes is that the angle of the face changes when extending. If the angle change of the face is to the right, as shown in [figure 276](#), the change to the position of the string will be to the left and the arrows will hit right on the target. And, if the angle change of the face is to the left, as shown in [figure 277](#), the change to the position of the string will be to the right and the arrows will hit left on the target.

The method of the modification:

When extending, the direction of power in the bow arm should be to the centre of the target to prevent it, or the head, from changing the angle of the face. The archer who has not mastered retaining the alignment of the string should endeavour to keep the sight pin with the string in their vision while extending. The focus of the eyes should be on the sight pin with the string blurred and lined up down the back of the riser. The string should maintain this line up right through until the completion of the shot. So it is important that the head is set and held in position correctly to prevent the string alignment position changing which will reduce the possibility of the arrows spreading across the target.



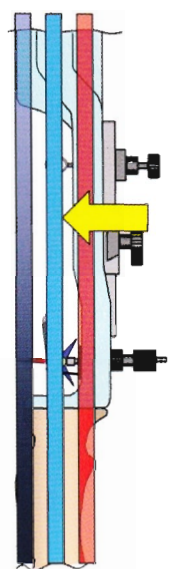


Figure 276

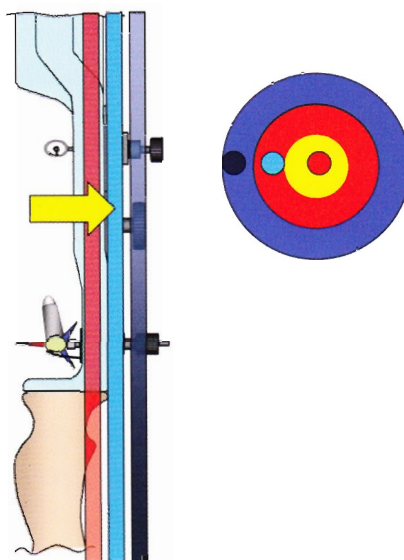


Figure 277

The imbalance of the extending power

There are many archers who do not have total control of their extending time, this often causes an imbalance of the power during the extending period, and this imbalance will not be consistent due to the inconsistent time. Quite often this extended time and imbalance is caused by the body not being set correctly during the set up period, this body imbalance will aggravate the drawing procedure leaving the draw length short when coming to the anchoring position. If a clicker is being used the archer will find they have to work harder during the extending period to activate the clicker, which will cause an imbalance of the power when extending. When becoming tense or the wind blows during the competition it is a sure sign that the extending time will increase. When the extending time increases the archer should not extend by putting extra force into the drawing hand they should continue concentrating on keeping their form. If the archer always extends keeping the same direction and constant balance the arrows will be more likely to be hit in the centre of the target. The most important thing for developing good extending is that the archer should train to develop the ability to maintain the same balance and direction of power at all times. Even though the extending time may vary, the archer always should extend with the same balance and the same direction.

The inconstancy of the extending time

Many intermediate archers make errors at the time of shooting because the extending time is not constant. If the archer identifies the cause accurately and swiftly the extending time can be kept reasonably constant and the errors would be reduced.

Cause and the method of the modification

- A. As shown in **figure 278**, moving the chin forward when coming to the anchor position will alter the draw length by a similar amount to the distance the chin is moved. Consequently, the extending time becomes inconsistent. When the anchoring hand is moved down away from the chin as shown in **figure 279**, the drawing length gets to be longer, and if a clicker is being used it could activate before the archer is ready. Therefore, the archer should ensure the head and chin remain in the correct position during draw and anchoring periods.
- B. If the bow shoulder is moved back when drawing the bow, as shown in **figure 280**, many changes can happen to the natural draw length, the amount of change depends on the position of the shoulder. The bow shoulder should be set in the correct location at the time of set-up, the pushing power should be maintained toward the target, and the shoulder should not be allowed to move back to the body when drawing the bow.

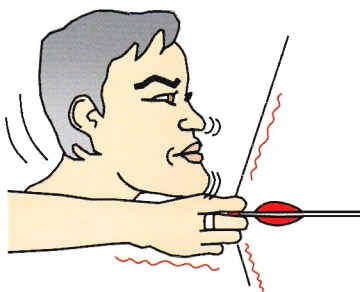


Figure 278

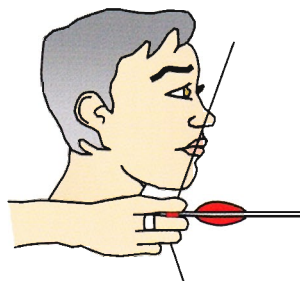


Figure 279

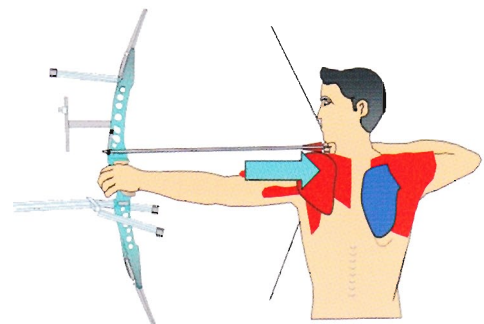


Figure 280



- C. If the upper body is leant away from the target at the time of drawing the bow, the bow shoulder gets to rise up as shown in **figure 282**, and the draw length will not be consistent. When drawing the bow, the upper body should be fixed centrally over the centre line of the body and the archer should draw the bow dividing the power accurately between the pushing arm and the drawing arm.
- D. As shown in **figure 283**, if the archer does not draw the bow fully and correctly, the body will not be completely in line at full draw, so the draw length will not be consistent. After anchoring correctly and with the drawing elbow set in the correct location a constant draw length can be obtained.
- E. If the position of the anchor is not consistent, the length the arrow is drawn will not be consistent and the archer will have difficulties in getting the clicker to operate, so the archer should develop the habit of having a correct and consistent anchor position.
- F. When it rains, or a strong wind blows, or it is cold, the archers' muscles tend to become tense which often affects the draw length. When this happens the archer has to make a special effort, when drawing the bow, to spread the body enough in order to make sure the arrow operates the clicker at the right time. The archer who watches the arrow point when drawing the bow has a definite advantage in these circumstances.

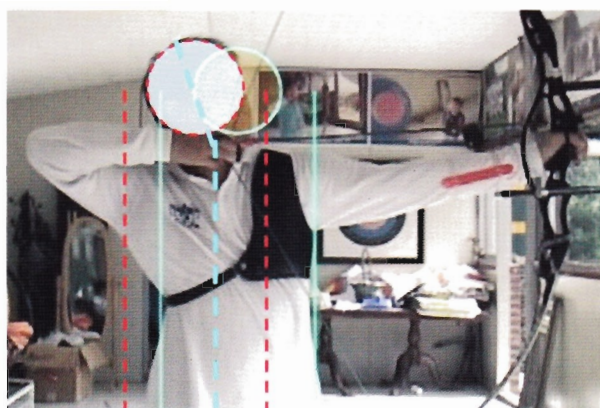


Figure 282

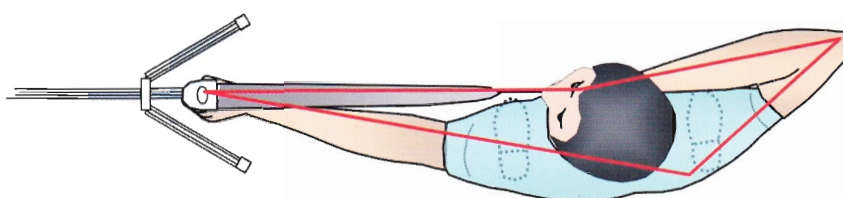


Figure 283

The fingers of the bow hand or the drawing hand move when extending

Cause and the method of the modification

Some archers have the problem where the fingers of the bow hand are bent inside continually or are moved up and down at the time of extending as shown in [figure 284](#). This finger action makes it difficult to get a good extension because of the movement of the fingers has some effect on the muscles of the bow arm. Not having a good extension the archer cannot produce a good follow through. The bow hand should not move and the fingers should not exert and force on the bow grip. And, when extending, sometimes little finger on the drawing hand moves as shown in [figure 285](#), the muscles of the drawing arm are stimulated and tension is applied to the hand at the time of release, so it is important that the fingers on the drawing hand should not be moved.

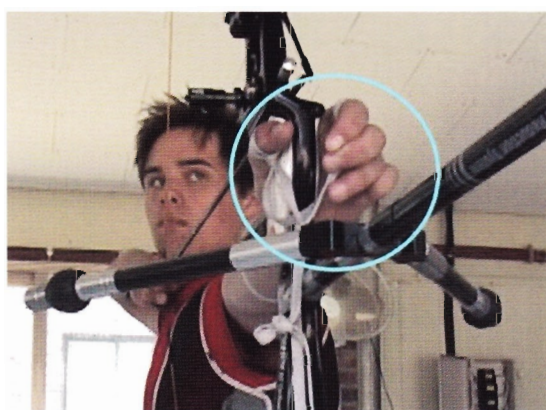


Figure 284



Figure 285



Problems that happens at the time of the release

It is essential that the three fingers should release from the string at the same time as shown in **figure 286**, but there are many archers who do not achieve this and their fingers do not release at the same time as shown in **figure 287**. Whilst at the anchor position and aiming many archers let the third finger open which then presses onto the string, and subsequently when the extending is complete the other two fingers get to release the string. When this happens, although it may seem a small mistake, the string will move sideways when the string is released from the fingers which affects with the arrow flight. Training should be undertaken to ensure that the three fingers all release from the string at the same time.

Cause:

- A. The third finger is not hooked onto the string correctly, and when at full draw it straightens and presses onto the string making the archer feel uneasy that the fingers will slide off the string when extending.
- B. The hand forcibly opened out at the time of the release.
- C. The elbow is moved down at the time of the release.

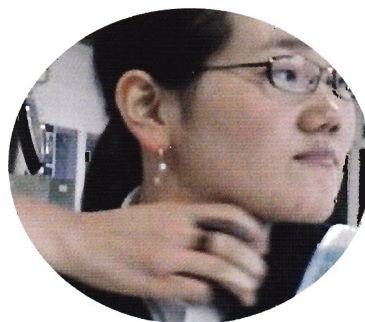


Figure 286

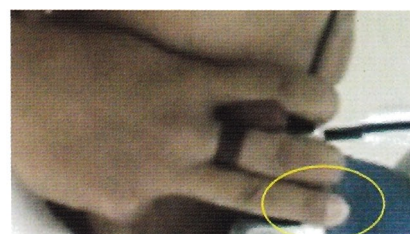
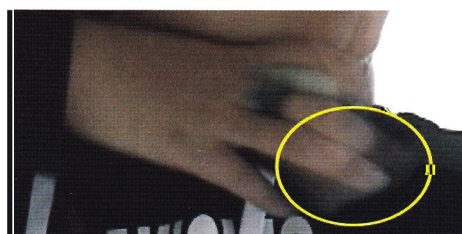


Figure 287

The method of modification

The method of the modification for these problems is that all the fingers should be hooked onto the string accurately at the time of the set up, as shown in [figure 288](#). If the second joint of the third finger is bent, the first joint will bend quite naturally. The direction of movement of the drawing elbow at the time of the release should continue along the line of the extending and the string hand, after the release, should still face inward

An arrow can be put inside the drawing elbow of the archer as they come to full draw, and then after the release the archer can confirm the angle of the arrow and know if the direction the extending and release were correct. If arrow stays vertical after the follow through the direction of the elbow was correct, but if the arrow turns so that it is horizontal the elbow did not follow the extending line and the drawing hand rotated at the time of release. As shown in [figure 289](#), the coach can help the archer to overcome this problem by putting their fingers inside the archers drawing hand and help modify the direction of movement during the release. The archer should not use a clicker at this time but just listening to the coach who will give the command “one, two, three”, the archer should release very quickly on the command “three”. This should be practiced until the archer releases instantly on “three”, when this is achieved the archer can then return to using the clicker.

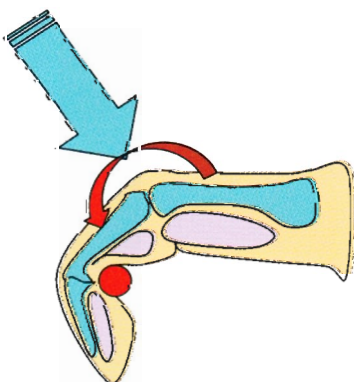


Figure 288



Figure 289



The elbow moves down at the time of release

The elbow should be in a straight line with the extending force line during the time of the release, but some archers actually move their elbow down at this time.

Cause:

The reason is that as shown in **figure 290** the upper body is leaning back, therefore the direction of extending gets to be moved down with the upper body.

The method of the modification

It is important that, the upper body is upright with the waist central over the two feet with the drawing elbow just above the arrow line. And then, the drawing hand should be released in the direction of the extending force line. It is more effective if the archer releases with the coach holding their forearm and elbow as shown in **figure 291**, this will help the archer feel the correct and accurate direction of movement.



Figure 290



Figure 291

The fingers moving forward at the time of release

Many archers have the problem where the fingers move forward at the time of the release as shown in [figure 292](#). When this happens it is because the balance between the pushing and pulling of the upper body during the extending time has collapsed at the time of release and the pushing arm has moved inward, this restricts the free movement of the bow which will then not jump forward in a straight line. And when the archer is being pressed psychologically during the competition the release will move forward even more. There are many reasons why the fingers move forward at the time of the release, so, after making an analysis and deciding on an effective remedy the archer will be able to reduce the effects causing this problem.



Figure 292



Figure 293

Cause:

- As shown in [figure 293](#), the fingers are bent inward when extending.
- When the elbow is moved forward or down during the extending period, as indicated in [figure 294](#).
- As shown in [figure 295](#), the bow shoulder moves backward at the time of the release.
- The releasing time is slow after the arrow is pulled out from under the clicker.
- When the archer is being pressed too much psychologically.
- The beginner has not developed the skills of producing a good release.

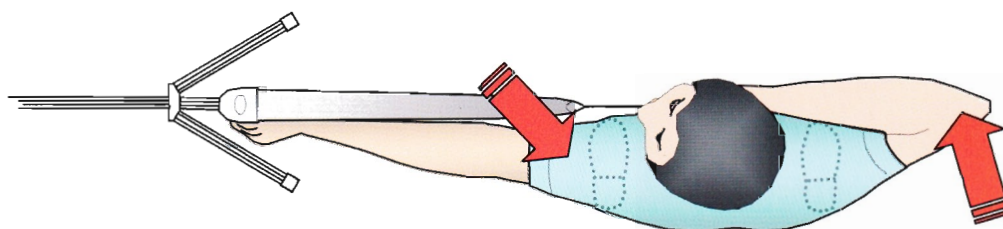


Figure 294

Figure 295



The method of the modification

- A. The archer should start by practicing without using the clicker. The action that demands special attention at this time is that when aiming the arrow point should not creep forward but keep moving backwards till the completion of the release.
- B. As shown in **figure 296**, the archer releases after drawing the string approximately 10-20cm, at this time the archer releases alone until they can produce a release by relaxing the flexor muscles allowing the fingers to be pushed out of the way by the string without them moving forward.
- C. If the archer needs help to achieve the exercise in “B” above the coach can help by holding the archer’s string hand and bow and giving the command “one, two, three”. The archer should relax the fingers on the count of “three”; the coach can feel at this time if the speed of archer’s release is too slow. Probably the archer would feel that the release is quite fast.
- D. As shown in **figure 297**, the archer is now holding the bow but with a bent bow arm and the coach still holds the bow and drawing hand. The archer draws the bow so that the drawing hand comes into the anchoring position. The coach then gives the command “one, two, three” with the archer making the release on the count of “three”, the coach at this time helps the drawing hand with its backward movement. The archer will then experience the new feeling of a very fast release.
- E. To progress from this it will be effective if the archer practices the release while the coach holds the archer’s drawing elbow and drawing hand as shown in **figure 298**. The elbow should move backward continually until the fingers have relaxed and the string has been released.
- F. The archer should continue practicing the action of the release without using the clicker. After practicing the release to the order “one, two, three” from the coach, the archer could then exercises alone but it is better to return to using the clicker step by step.



Figure 296



Figure 297



Figure 298



The wrist of the drawing arm is bent

Cause and the method of the modification

If the drawing elbow is not in a direct line with the force line when at full draw the wrist joint will be bent if it is relaxed, this will cause the archer to release using the only hand. When releasing, the power of the wrist's joint should be maintained as shown in figure 299. The archer should release using the elbow, and only the joints of the fingers should be relaxed at the time of release.



Figure 299

The hand is opened at the time of release

Cause and the method of the modification

- A. The third finger slips off the string during the extending period. The third finger should be hooked on the string in the correct position during set-up.
- B. The elbow is moved down at the time of the release. When extending, the elbow should be kept just above the arrow line.

The archer closes the eyes when releasing:

It is not good that the archer closes the eyes at the moment of the release. The reason is that when the archer released the string they were surprised which causes a natural reaction to close the eyes. If the beginner does the preparation practice of the release they will not develop the habit of closing the eyes. If the archer does have this habit they can get rid of it by shooting without the clicker and at a short distance, the archer should then practice and concentrate on keeping the eyes open.

The waist turns at the time of release

Cause

There are some archers whose waist turns at the time of the release as shown in **figure 300**. If the waist turns, the upper body will be turned at the same time and the pushing shoulder will move backwards. If the pushing shoulder moves back the archer will make a forward release and the shooting balance will collapse. The archer can find out very easily whether the waist turns by putting an arrow in their belt loops as shown in **figure 301**, and seeing if the direction of the arrow changes when the shot has been completed.

The method of the modification

As shown in **figure 302**, the hips, waist, and upper body should all be in a straight line with the target whilst at full draw and the centre line of the body should be upright.

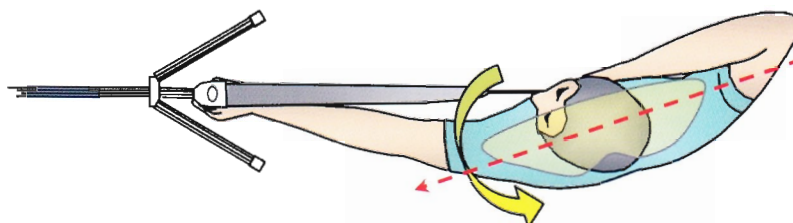


Figure 300

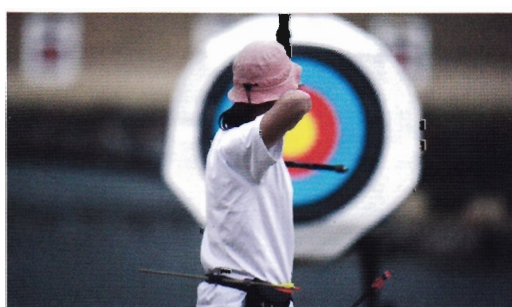


Figure 301

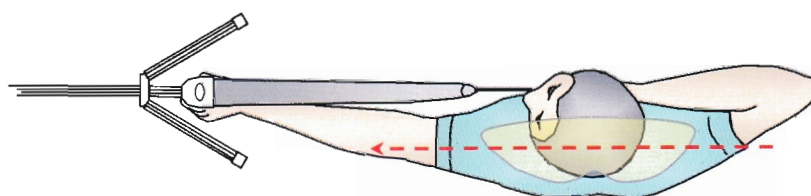


Figure 302



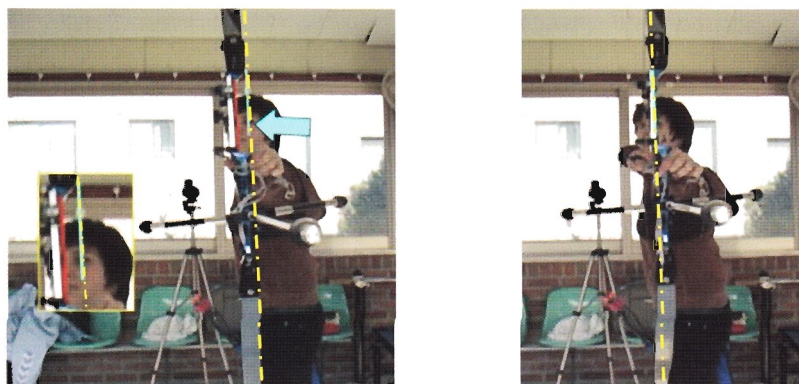
Problems that occur during the follow through period:

The direction of the free movement of the bow, and the way the archer holds the bow.

The bow should have free movement to jump toward the target when the string has been released. The jumping direction of the bow determines the direction of the arrow flight, so it is very important that the free movement of the bow is not restricted in any way. Many archers do not know the direction of movement their own bows have when they are shooting. If analyzing it through a high speed video or a video analysis program etc, the archer can quickly identify this. If a video analysis program is not available, a method which the archer can find out which direction the bow moves is shown in **figure 303**. The archer shoots the bow without using a bow sling and keeping the bow hand relaxed the bow will jump out of the archer's hand which is caught by the coach. The bow should jump straight forward toward the target at this time, but the bows of the many archers, as shown in **figure 304**, jump to the inside, so the coach must analyze the cause and rectify it.



Figure 303



Release

Figure 304

Aiming

The bow jumps to the inside:

The error of holding the bow, whilst shooting:

There are many archers who hold the bow at the time of shooting, however, most archers do not know that they do this because they use a bow sling. This habit is usually born when beginner archers use a practicing bow without using a bow sling, and after they change to a bow for competition, a bow sling is used. But, they worry that the bow will fall down to the ground so they develop the habit of holding the bow with the fingers. The archer unknowingly sets up the preparation for holding the bow during the pre-draw period, at this time the force is usually already out of line which is biased toward the inside. When this happens, the direction the bow will jump quite naturally at the point of the release, toward the inward side.

If the pushing shoulder is moved back, whilst shooting:

If the pushing shoulder is moved back at the time of shooting as shown in figure 305, the bow jumps to the opposite direction; i.e. the bow will jump to the inside. The main reason that causes this is the archer turns their waist at this time which is followed by the shoulder moving back.

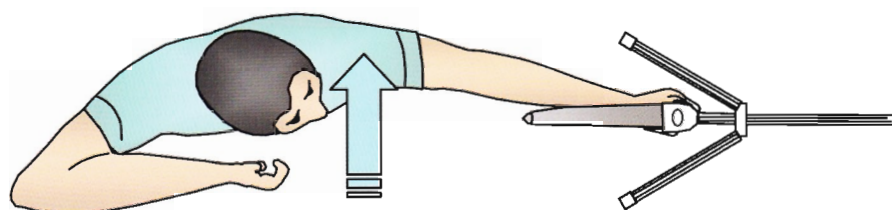


Figure 305





The bow moves downward:

When bow hand force pushes the bow grip downward when extending the bow is moved downward at the time of the release.

If the archer has this problem they should ensure that a constant forward pressure on the bow grip is maintained when extending. Consequently, the direction of force on the bow grip should be toward the centre of the target and with the bow having free movement it will jump in the correct direction.

The bow jumps to the outside.

If the archer experiences this problem, it is probably because the chest is sticking out when extending and interfering with the direction of the in line force, as shown in **figure 306**. If the chest sticks out at the time of extending, the pushing arm will not be extending along the force line at the time of the release. At this time the power of the pushing arm will be toward the back and the bow will not jump toward the centre of the target, as shown in **figure 307**.

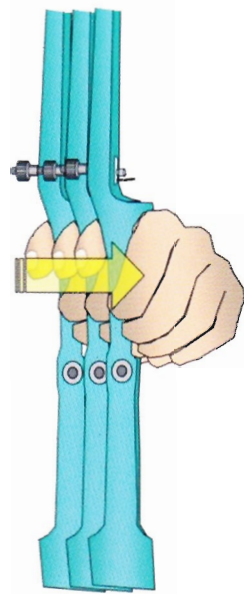


Figure 306

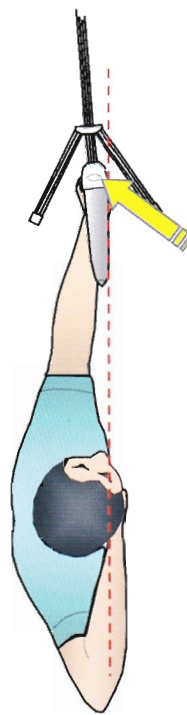


Figure 307

The training method of keeping a relaxed bow hand:

The first session of this training the coach gets the archer to place their hand on the bow using a bow sling, and the archer pushes the bow while the coach draws the bow by pulling just the string. The coach may need to put their other hand on the archers drawing shoulder to stop the archer from being pulled backward. When the string is pulled to a distance to have a sufficient amount of pressure on the archers bow hand the coach releases the string. As the archer is not aware when the string will be released they do not automatically grab the bow. This exercise can be repeated until the archer keeps a completely relaxed bow hand allowing the bow to have free movement when the shot is made.

Another training method the coach can use to help the archer to keep a relaxed bow hand when shooting is to get the archer to shoot without using a bow sling. The archer then shoots the bow whilst keeping the bow hand relaxed as shown in [figure 308](#), and lets the bow jump forward out of their hand which will be caught by the coach as shown in [figure 309](#). If the archer holds the bow at the time of shooting, the bow will not jump into the coach's hand, so the archer will know immediately if they hold the bow with their fingers. The archer will also know the direction the bow jumps if the fingers are kept relaxed. If this method of modification is practiced repeatedly, the archer will develop the habit where they can complete the shot with a completely relaxed bow hand which will not have any influence over the free movement of the bow.

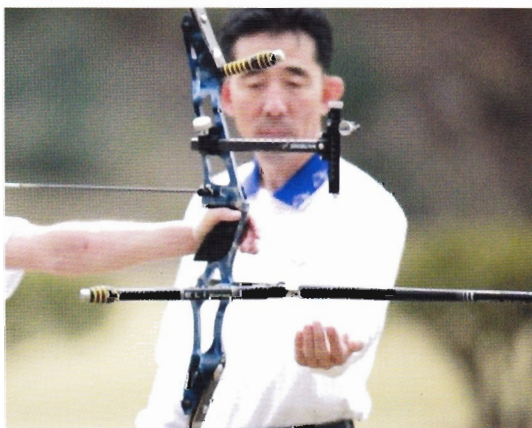


Figure 308



Figure 309



After shooting, the bow arm drops or is moved right or left:

Many archers seem to think that the shot is completed immediately they release the string, however, the posture during the follow through is very important. When the beginner starts learning archery it is essential that the correct posture, particularly whilst at full draw, should be mastered. The bow arm is the most important part of the posture during the follow through period because the direction of the bow arm greatly influences the direction of the arrow flight. If the archer makes an effort to correctly position of the bow arm at full draw, it will help to produce a good and natural extending period. This is especially important if the archer makes an error when shooting, the effect of the fault will be minimised because the power of the bow arm is directed toward the centre of the target.

The method of the modification:

Whilst standing about 3m to 5m from the target the archer comes to full draw and lines up the back of their bow hand with a spot near the bottom of the target as shown in figure 310. The archer completes the shot then confirms if the bow hand is still lined up with the same spot on the target. If it is not, this training should be carried out until the bow hand stays in line with the aiming spot on the target quite naturally. This method will help the archer to know very quickly if their bow hand drops when they complete the shot, because of the immediate feedback the archer can readily modify their posture until bow hand stays in line with the aiming spot, used on the target, after the shot is made.

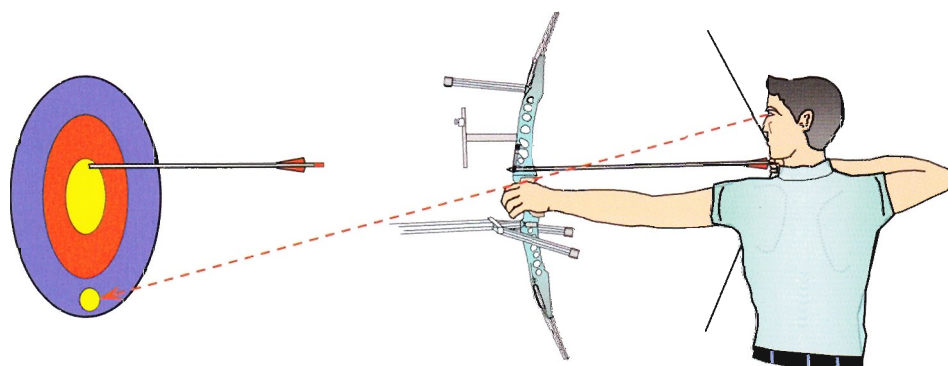


Figure 310

The centre line of the body moves toward the heels when extending:

Cause:

Sometimes an archer will raise the chest when coming to the full draw position which will move the centre line of the body back toward the heels. This will influence the bow to lean to the left (right-handed archer), as shown in figure 311, causing the extending direction be out of line and not directed toward the front in line with the target.

The method of the modification:

The chest should be moved down and the centre line of the body should be set just in front of the heels at the time of set-up as shown in figure 312. The force on the heels and the front part of the feet should be same, and the archer has to make sure the bow is vertical, and stays vertical, right through from the set up to the completion of the shot. Sometimes the chest is raised because the arrows are too long for the archer, this should be checked and if necessary shortening the draw length may be beneficial.



Figure 311

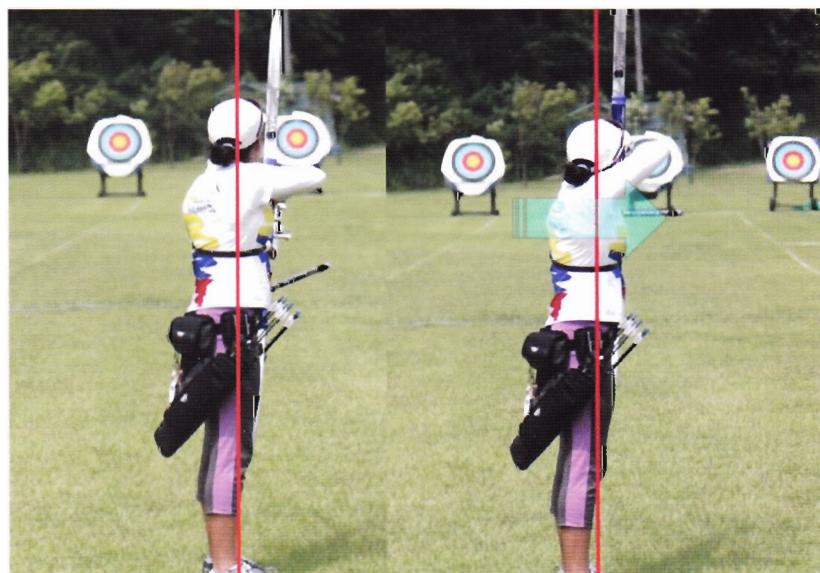


Figure 312



The body is moved toward the target when shooting:

Cause:

The reason the centre of the body is moved toward the target when coming to full draw or extending is that the centre of the body was not in the correct position at the time of the set-up. This movement will cause the arrow's to hit right and left on the target because the centre of the body is not stable at the time the clicker is activated i.e. the size of the arrow group in the target will be relative on the amount of body movement.

The method of the modification:

The centre of the body should be placed correctly and the direction of extending should be toward the centre of the target. The archer's body should be vertical and straight, with neither the chest nor buttocks sticking out. This will also help prevent the bow arm from dropping as the release is made, as shown in [figure 313](#).

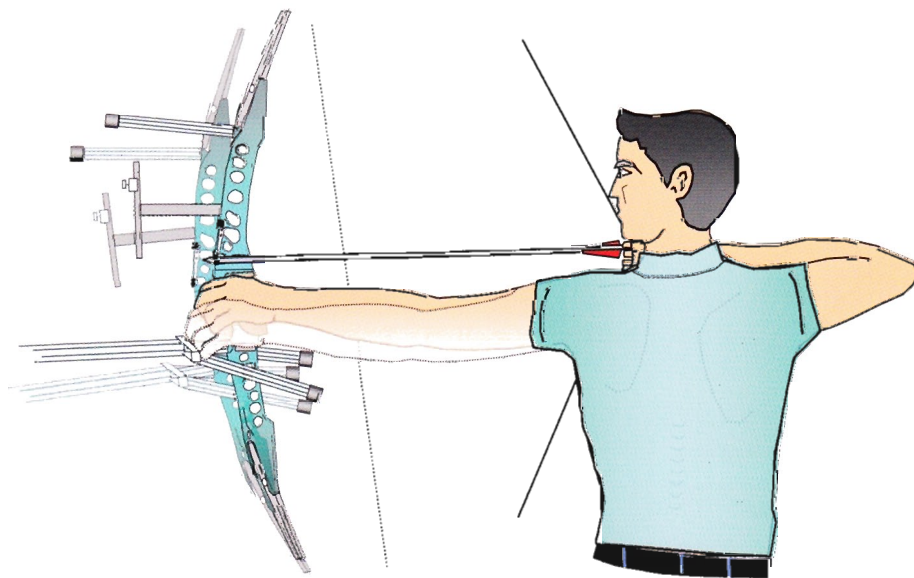


Figure 313



The consistency of the location of the bow after shooting:

When the bow swings forward after shooting, it should be constant and end up in the same position every time. If the bow does not end up in the same position every time there are many reasons to be explored, such as the balance of the body, the release, the waist turns and the bow shoulder moves back etcetera.

If the archer makes an effort that the bow should end up at a constant position, many of these problems would be rectified automatically at this time. In particular, it is good for the beginner if the bottom limb ends up touching the hip area of the forward leg, as show in **figure 314**. If the archer has an open stance, it is impossible for the bow to end up touching the leg regularly as the bow will swing in front of the body making it difficult to confirm the bow is ending up in a regular position. If the beginner has the style where the bow ends up touching the leg regularly, it will assist them in developing a good and accurate follow through.

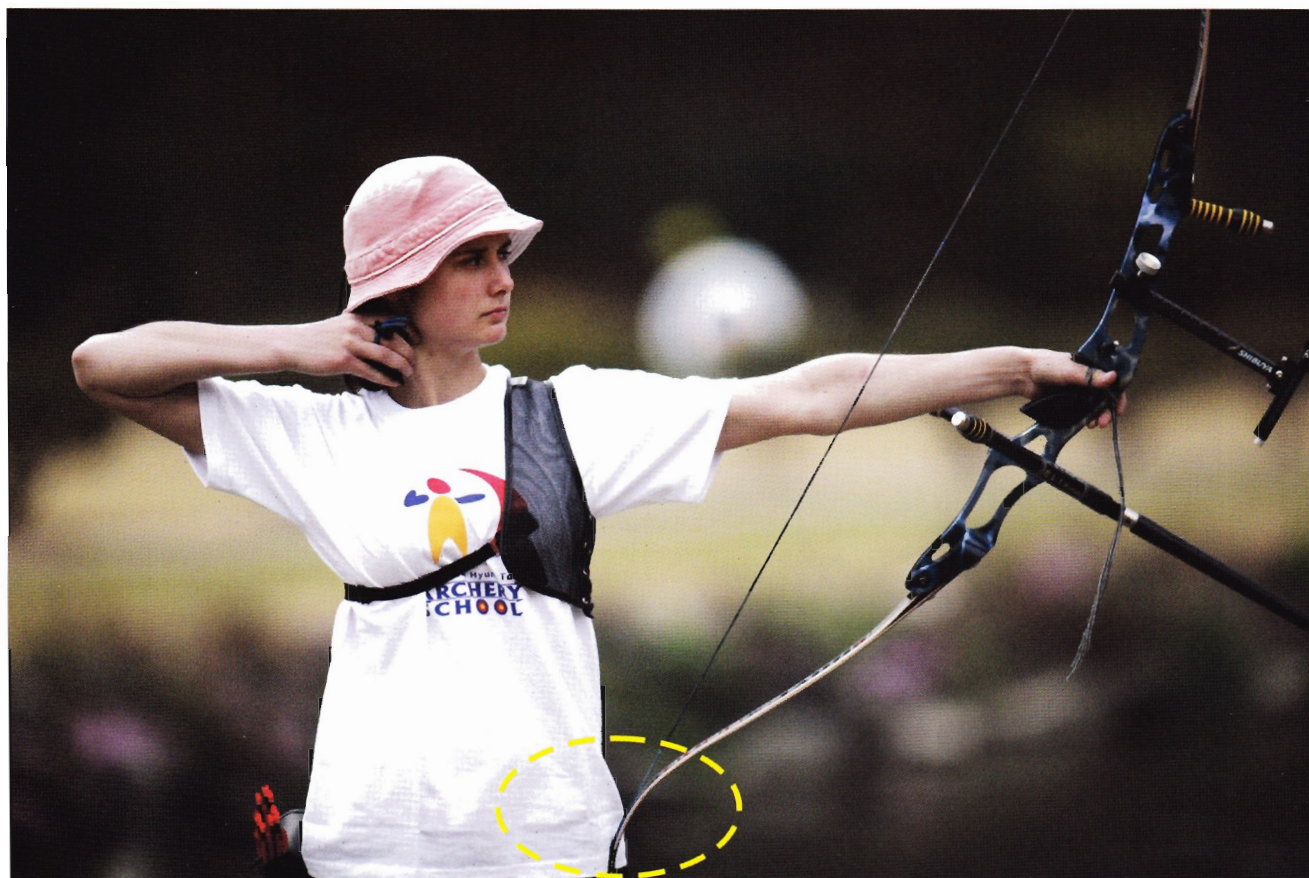


Figure 314







The relation of the posture to position of the arrow landing in the target (a right-handed archer):

The arrow hits to the right on the target:

- When the string hand moves forward during the release.
- When the bow arm is moved to the right.
- The balance of the pushing arm is weaker than the drawing arm at the time of extending.
- When the location of the string is placed to the left of the usual position when aiming.
- When the position of the string is moved to the left whilst extending.
- If the centre of the body is moved forward whilst extending.
- When the bow is leant (canted) to the right.
- The spring pressure of the cushion plunger is too weak.
- When the spine of the arrow is too weak for the draw weight of the bow.
- The sight pin is too far out to the left.
- When the string hits the bow arm quite strongly.
- The arrow is pulled out from under the clicker faster than as usual, so the archer is surprised.





The arrow hits to the left on the target:

- The balance of power favouring the pushing arm whilst extending.
- When the third finger is not hooked sufficiently onto the string and presses on the string during the extending period.
- When the location of the string is placed to the right of the usual position when aiming.
- When the position of the string is moved to the right whilst extending.
- If the string contacts the chest during its forward travel after the release.
- When the bow is leant (canted) to the left.
- When the centre of body is moved to the left.
- The spring pressure of the cushion plunger is too strong.
- When the spine of the arrow is too strong for the draw weight of the bow.
- When aiming through the left eye.
- The sight pin is too far to the right.



The arrow hits high on the target:

- The drawing elbow is moved down at the time of extending.
- Using the fingers to help with the extending and the middle finger presses upward on the nock.
- The nocking point is too low.
- When pushing on the lower part of the bow grip.
- The string moves away from the nose while extending.
- The string is not placed in the usual position on the nose at the time of anchoring.
- The teeth are open while anchoring.
- The spring pressure of the cushion plunger is too strong.
- The archer releases with too much vigour.

The arrow hits low on the target.

- The string hand is moved forward during the release.
- The string hits the arm at the time of shooting.
- If the archer does not use a clicker and draws the arrow short.
- The bow arm is moved down at the time of the release.
- The bow grip is pushed downward.
- When the anchoring hand is placed higher up the chin than usual.
- The anchoring hand is moved up whilst extending.
- The spring pressure of the cushion plunger is too soft.





Tuning the bow and using the equipment:

Tuning the bow:

The archer should be able to incorporate the four prerequisites into their archery; technique, physical strength, psychology and well tuned equipment in order to produce good scores. The compatibility and adjustments of all the equipment the archer puts together to compete in the sport of archery is very important. Even though many archers use the same technique, their scores will differ depending on the condition of the tuning of the bow. Each archer will select equipment which is compatible with, and depending on, their own physical condition. Besides, the arrow flight will differ depending on the draw weight of the bow, the length of the arrow and the form of the release. Therefore, after the archer chooses the correct bow, arrows, and ancillary equipment the archer must tune the bow accurately. In particular, as shown in [figure 315](#), the bow should be tuned so that when the string is released the arrow does not touch the arrow rest, pressure point of the cushion plunger, or frame of the sight, and should fly clearly along the centre line of the bow toward the centre of the target. When the bow is not tuned correctly any small error made by the archer will be magnified, especially when the wind condition is extreme the extent of the error becomes more apparent, so it is essential to have the bow accurately tuned in order to make good scores.

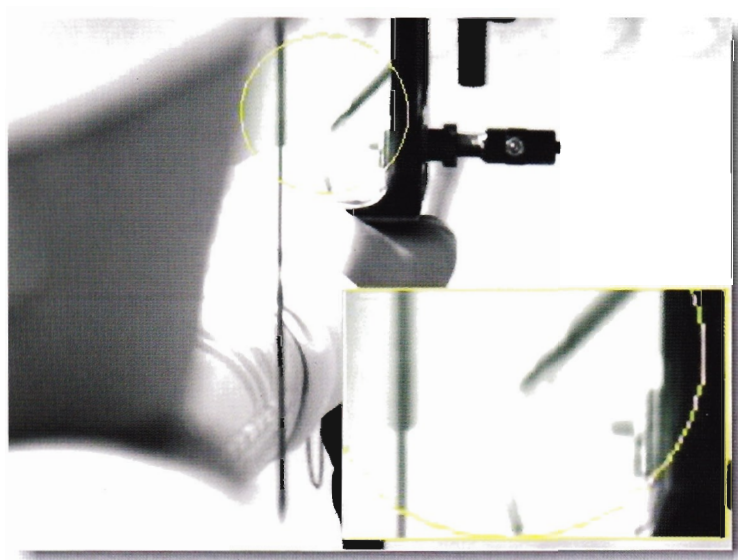


Figure 315

The arrow flight:

When an archer uses a recurve bow the fingers are used to draw the string back and to release it to propel the arrow toward the target. When the string released it moves forward faster than the fingers can get out of the way, so the string forces the fingers out of the way, this causes the string to move around the fingers in a sine wave movement as the arrow is accelerated away toward the target. As shown in figure 316, at this time the arrow bends, in a fish like movement as it travels forward, which is due the power the string is exerting on the back of the arrow and the weight of the arrow point. The arrow bends and restores repeatedly and then when the arrow has been flying for approximately 20~30 meters the bending diminishes and the arrow flies in a straight line. The amount of deflection which the arrow bends will differ depending on the efficiency of the release, and if release is not consistent the arrow flight will not be consistent and the arrows will not group consistently in the target.

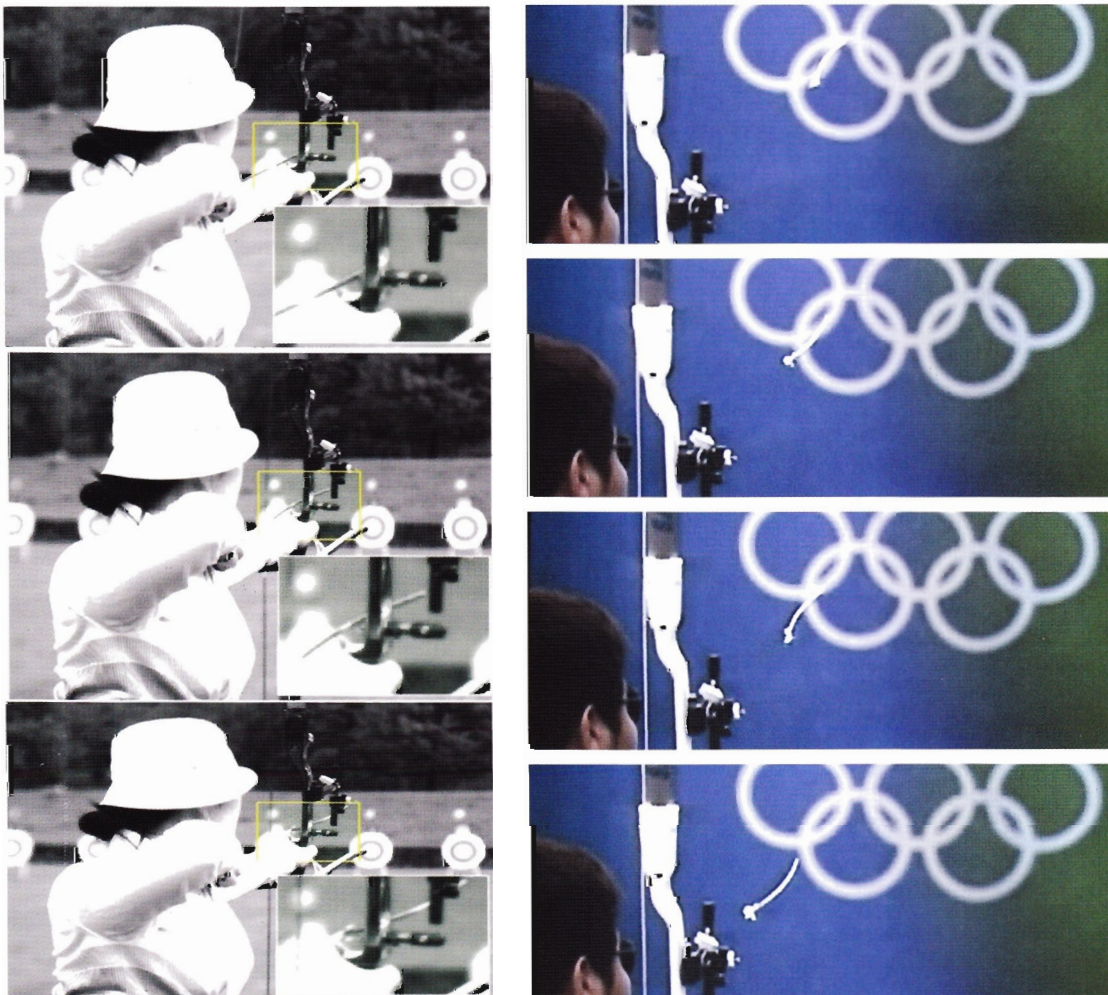


Figure 316



The rotation of the arrow:

The natural rotation of the arrow is clockwise for a right handed archer and anti-clockwise for a left-handed archer. The reason the arrow has a natural rotation is because the string is bent before the release and straightens up at as it leaves the fingers, as shown in **figure 317**. This straightening up of the string determines in which direction the arrow will spin. If the archer uses fletchings to induce the arrow to spin, they should use the correct fletchings to keep the spin in the same direction as the natural rotation. If feathers are used they will induce the arrow to spin according to the feather being used i.e. left wing or right wing.

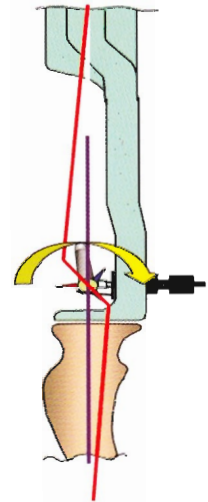


Figure 317

The flight direction of the arrow:

A. The spine of the arrow is stiff (right-handed archer).

If the spine of the arrow is too stiff for the draw weight of the bow, the arrow will fly toward the left even though the centre line of the bow is directed toward the centre of the target as shown in **figure 318**. Even though the arrow hits to the left, by moving the sight pin, the arrow can brought back to hit the centre of the target. However, in this case the centre line of the bow will face toward the right hand side of the target and only the flight of the arrow will be toward the centre line of the target. In this situation, any small error made by the archer will have a big effect on the way and direction the arrow flies.

B. The spine of the arrow is weak.

If the spine of the arrow is too weak for the draw weight of the bow, the arrow will fly toward the right even though the centre line of the bow is directed toward the centre of the target as shown in **figure 319**.

C. The spine of the arrow is correct.

If the spine of the arrow is correct for the draw weight of the bow, the centre line of the bow will be in line with the centre of the target and the arrow will fly toward the centre of the target as shown in **figure 320**. Also, to assist with this accuracy the bow will react correctly because the alignment will be correct.



Figure 318



Figure 319



Figure 320



The bow weight options for the beginner:

When the beginner starts in the sport of archery, it is better to practice using a weak bow as much as possible. And after mastering the basic technique, it is better to increase the weight of the bow step by step. The weight of the bow should be increased by about 2 to 4 pound at a time, but do it gradually. If the archer changes from a weak bow to a strong bow for competition, it will be difficult for the archer to maintain a good basic posture because the bow is heavy and powerful. The suggested bow weight for beginners is listed below.

Men: under 10 years old - 16 pound
11-13 years old - 18 pound
14-16 years old - 20 pound
Over 17 years old - 20-22 pound

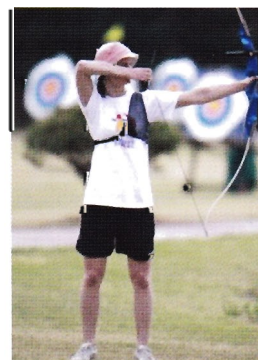
Women: under 10 years old - 14 pound
11-13 years - 15 pound
14-16 years - 18 pound
Over 17 years old - 18-20 pound

The test method of determining the bow's strength:

A method to test if the archer is using the correct bow's strength for them is as shown in **figure 321**, after anchoring for 7 seconds; the archer takes a rest for 2 seconds at the same posture as that during set-up. And then, the archer repeats the procedure. If the archer can produce the correct posture after repeating these actions for 7 repetitions, they should have enough strength and stamina to use the bow. If the archer can only manage 3 or 4 repetitions, it will be very difficult for them to produce the correct posture, because the bow is too strong.



Figure 321



Checking the arrows:

Checking the arrows is essential before going through the full tuning procedure. Although the archer uses arrows with the same spine rating, there are times when they fly differently or hit at different locations on the target. Therefore, after testing and selecting the arrows which will be used, the archer should tune using these selected arrows. There are many methods of testing arrows, the main and basic method is using a spine test machine as shown in figure 322, others include using a shooting machine, or the archer conducting a dynamic selection procedure. The dynamic selection procedure is very easy for the archer to do. The archer writes a number on the shafts that have not had fletchings fitted to them and shoots at 30 meters, then, as shown in figure 323, on a small facsimile of a target face writes down the arrows number where they hit on the target. If this is repeated for 3 or 4 ends, the archer can identify the main point of impact of each arrow. Only the arrows that grouped in the middle of the target should be used when tuning the bow and shooting in a tournament. Arrows that do not group, or group outside from the main group should only be used for practicing form and at close range

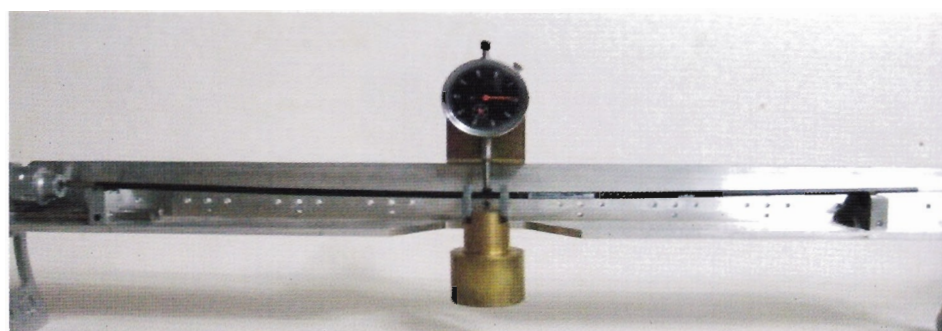


Figure 322

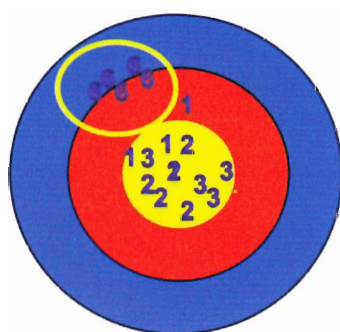
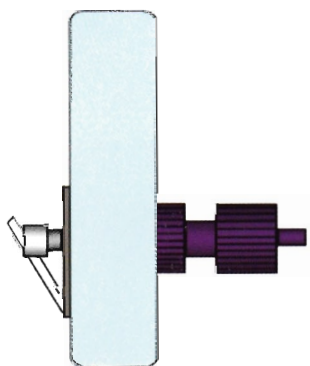


Figure 323



The spring strength of the cushion plunger:

To start with set the spring strength of the cushion plunger to the middle setting before commencing the tuning procedure. Before the introduction of carbon arrows, aluminium arrows were used. At that time, even though the spring strength of the cushion plunger was weak, the cushion plunger did not move in toward the bow very much when the archer made an error because the speed of the arrow was slow. However, when using carbon arrows, the cushion plunger moves in toward the bow quite a lot, because the speed of the arrow is very fast and the power which is exerted onto the pressure point becomes stronger. If the strength of the spring is soft, the plunger will move inward too much, so if the archer makes an error it is magnified because of the soft spring pressure in the plunger button. Consequently, it is better to have the strength of the cushion plunger set to the middle level or even to be a little on the stronger side.



The weight of the arrow point:

The arrow point which is heavy has some advantages over the light weight points, particularly in windy conditions. However, if arrows with a heavy point are being used with a weak bow the trajectory will be quite high which will not be very good in the wind. The archer who shoots the FITA 720 round could have an advantage when using 110 grams or 120 grams, but if the spine of the arrow is too weak when tuning, the archer can make the spine a little stiffer by reducing the arrow point weight.



The thickness of the string:

The thickness of the string material differs depending on the manufacturer and the type of material being used. Due to this the number of strands in the string can vary and many archers can use between 16 and 20 strands, but it is the overall thickness of the string that matters. If the string is thin (16 strands) the speed of the arrow is increased, but if the archer makes an error it will be more noticeable. When using light weight carbon arrows, a thicker string will give more stability to the arrow flight than a thin string. The archer should select the thickness of the string which is the most suitable to their shooting style, this can easily be checked during the tuning process by changing the thickness of the string and checking the quality of the arrows group.

Finger tab:

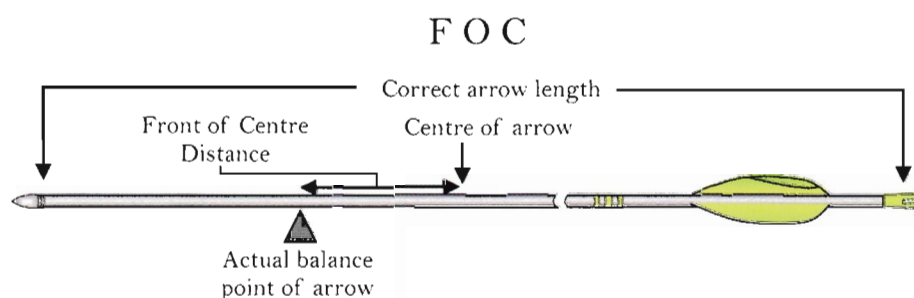
If the archer needs to change their finger tab, it is advisable to tune the bow after using the new finger tab for several days. It is very significant that the arrow flight and the condition of the tuning will differ depending on the kind of the finger tab being used, and whether it is a used finger tab, or a new one





The centre of balance of the arrow (FOC):

The balance point of the arrow is affected by the weight and length of the arrow point and insert, because if the centre balance of the arrow is well forward of the centre of the arrow, the arrow's flight, and possible accuracy will be better. This is because if the centre of balance is in the centre of the arrow, the arrow will 'float' on the air and may drift off its original course.



Changing the arrow length:

Changing the length of the arrow but keeping the same point weight will have minimal effect on changing the position of the front of centre balance position.

Arrow length	Bow weight	Point weight	FOC	Size
28inch	40lb	110g	11.4%	X-10 550
28 1/2 inch	40lb	110g	11.2%	
29 inch	40lb	110g	11.1%	

Changing the point weight:

Changing the point weight but keeping the same arrow length will have a great effect on changing the position of the front of centre balance position.

Arrow length	Bow weight	Point weight	FOC	Size
28 inch	40lb	120g	13.6%	x-10 550
28 inch	40lb	110g	12.5%	x-10 550
28 inch	40lb	100g	11.4%	x-10 550
28 inch	40lb	90g	10.1%	x-10 550

The location of the sight pin:

It is very important that the string is lined up with the same position on the riser every time and the string is lined up with the same location on the sight. It is also important that the bow is not leaning left or right when aiming and shooting.

- A. When shooting at 30 meters, it is important to keep tuning until the arrows without fletchings group is similar to the group size of the arrows that have fletchings.
- B. As you can see in [figure 324](#), the location of the sight pin is placed on the left part of the string.

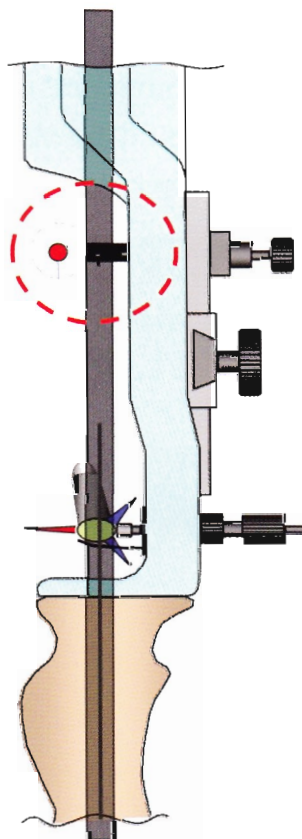


Figure 324



The equipment control after tuning:

Generally, after tuning the bow, many archers do not check the tune of the bow during practicing times. Even after the archer is happy with the tuning condition of the bow, when practicing at 18 meters or 30 meters the archer should still occasionally shoot arrows with and without fletchings to check the condition of tuning. The string height and the tiller height should always be checked before starting the practice or even during the practice. For if the string height and the tiller height are not the same as they were when the tuning was carried out the arrow group size will not be the same.

The confirmation of the location of the sight pin:

When there is an unexpected change to the location of the sight pin whilst practicing or at a tournament, that cannot be attributed to the weather, the equipment should be checked immediately. If the problem is not due to the equipment, the next thing to check is the archer's posture.

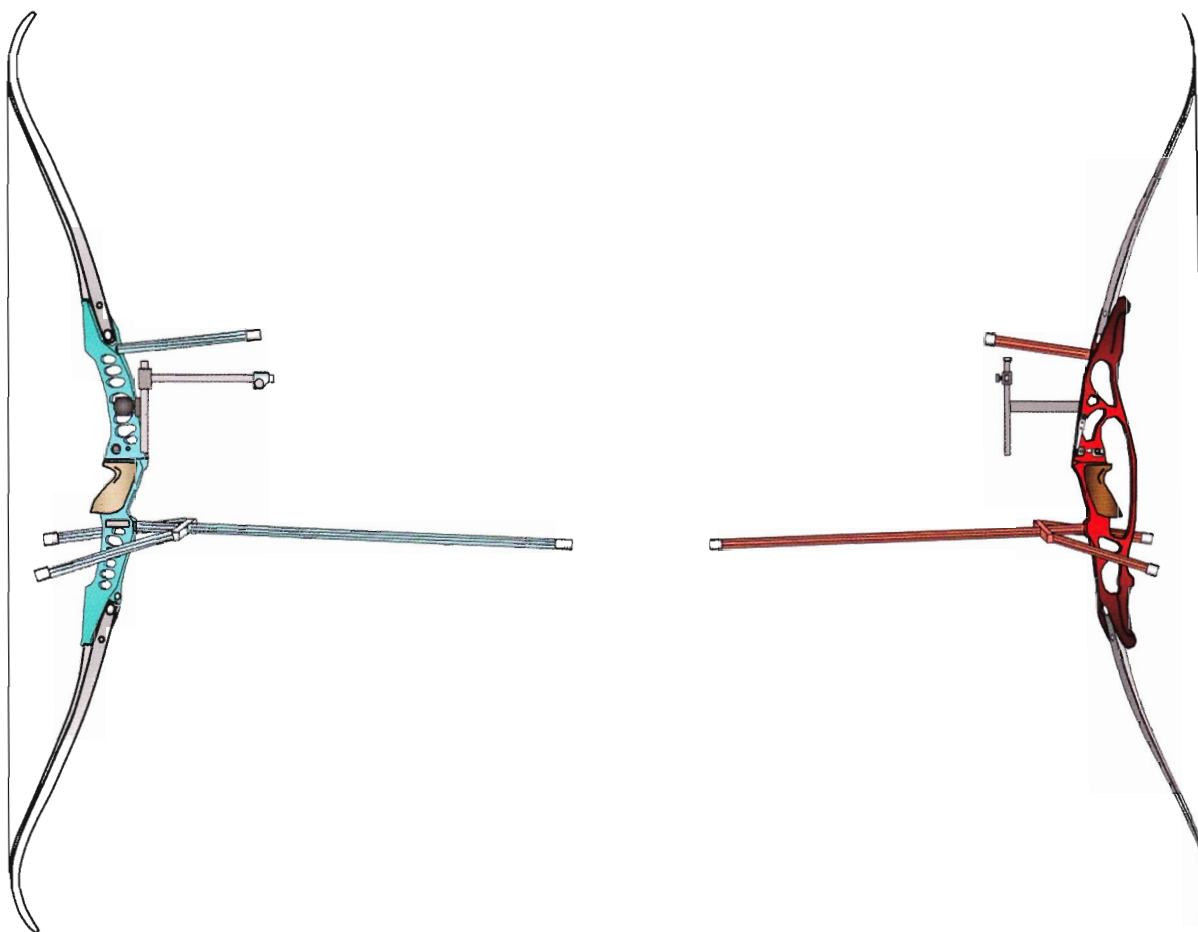
It is very important for the archer to develop a habit where the sight location is checked and confirmed regularly, and is commensurate with the shooting distance, as shown in [figure 325](#), whether it is a practice session or at a tournament.



Figure 325

Aligning and Tuning

The Recurve Bow





- Purchasing a Bow and ancillary equipment
- Limb alignment
- Draw Force Curve Charts
- Preliminary setting the bow tiller and bracing height
- Setting the height and angle of the arrow rest
- Initial setting of the arrow rest
- Initial setting of the pressure button
- Setting the arrow rest arm
- Aligning the sight bar
- Aligning up the sight
- Initial setting of the nocking point
- Serving and nocking point
- Initial setting of the bracing height
- Setting the draw length check (clicker)
- Some ideas for selecting a stabiliser system
- Selecting a stabiliser set-up that will suit the individual archer
- Nocking point set-up
- Arrow flight paper tuning test
- Bare shaft planning test
- Short distance fine tuning
- The variable distance tuning (walk-back method)
- Fine tuning
- Fletching selection
- Long distance grouping
- Dynamic arrow selection
- Getting to know your sight



Tuning the Recurve Bow:

We all want equipment that performs well and that matches our own potential ability. Nothing is worse than having the ability to shoot well but the equipment setup and its tuned level letting us down.

This section will cover the **selection, setup, and the tuning of your equipment**. It would be very difficult to write a sequence of events to suit every archer, but the following offers a step-by-step guide to help you tune your bow for optimum performance and accuracy.

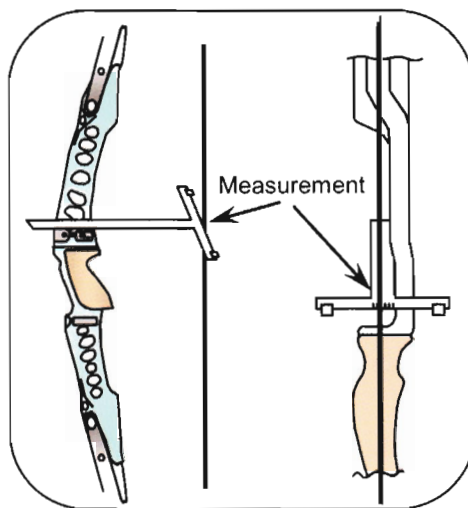
Purchasing a Bow and ancillary attachments:

The first thing is to find a shop that has the facility for shooting the bow being purchased. This is a must as although two bows may seem the same they may shoot totally differently. The following is a suggested sequence of checks to run through:

(a) Look at the bow to see if the string is in-line with the riser when it is strung. If it is not make sure that the riser being selected has the facility for adjustments to be made to correct this. If you are choosing a 'take-down' bow it may be necessary to try combinations of limbs and risers to find the best alignment and which has the least movement where the limbs fit to the riser.

(b) Most bows have a bow window that is cut, what is known as, past centre. This gives arrow clearance when shot and helps when going through the tuning routine. Place a bracing height gauge on the flat of the bow window just above the location for the pressure button so that you can measure the offset of the string. If the bow being selected is cut, say, 10 mm past centre then the centre of the string measure 10 mm from the side of the bracing height gauge that is contacting the inside of the riser window. If the gap is too great select another set of limbs or another riser. Up to 3 mm difference can easily be overcome later by adjustment if the riser has these adjustment facilities. Please do not blame the manufacturers for small discrepancies, they manufacture thousands of risers and many thousands of limbs, and I think it is unreasonable to expect all combinations of risers and limbs to match absolutely perfectly. Also beware when conducting this little test that some bow window cut-outs are not flat. This will cause difficulties in getting a true flat surface to work from.





(c) Pressure button selection. There are many on the market covering a wide price range. The one I would select is one that has a stainless steel body with a Nylon/Teflon type plunger or a Nylon/Teflon type sleeve between the plunger and the body. Be careful when the small locking screws are tightened onto the body after adjustment, do not distort it this could negate the tuning that has been carried out. Set and adjust the button in the bow so that the arrow can just be seen to the left of the string (right handed) when looking, as we did earlier, lining the string up with the centre of the back of the riser.

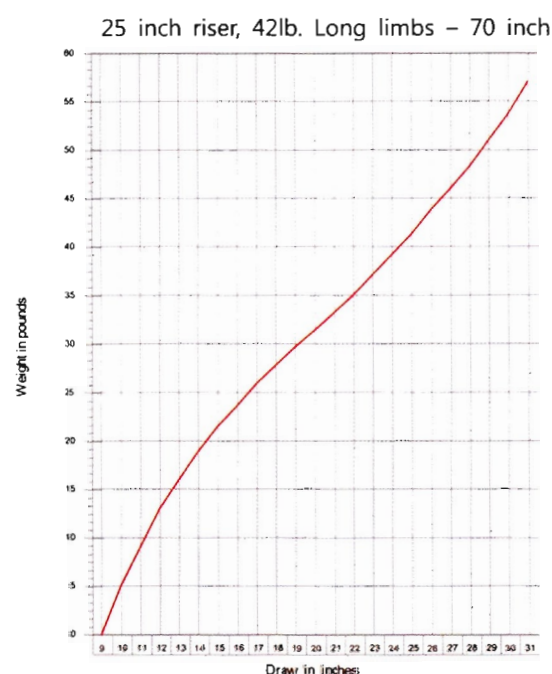
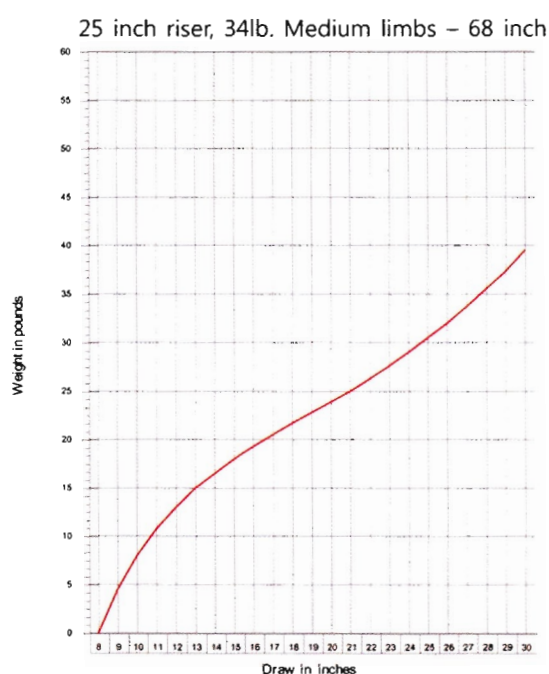
(d) Select the choice of stabilisation, and fit these also to the bow. Most shops do not allow the fitting of a sight until the riser has been selected for purchase. So use a simple sighting aid whilst the bow is being shot before final purchase. If there is too much vibration when the shot is made try changing to a different stabiliser setup or even to a different a type. Beware of purchasing the stabilisation at this point as it may need changing when going through the equipment tuning procedure. Trying each different set of limbs and stabiliser setup can take a long time, do not hurry this as if it is done right the bow will suit your requirement longer.

(e) Choose a sight that appeals to you, setting it up will be covered during the tuning procedure. It is worthwhile considering one that has a worm type adjustment rather than just a slider movement as it is possible for this to move if not sufficiently secured.



(f) Arrows can be selected that are the correct draw length, type, and spine for the bow. The shop can give advice in this area as they have all sorts of data available to them. Get the size of nock to suit the arrows and string diameter on the bow, take the recommended fletching size though this may change when we set the arrow flight when going through the tuning procedure.

Beware that, sometimes when arrows are selected for someone who does not have a draw length the same as the “draw-weight for a given draw-length” printed on the bow a „rule of thumb” may be used. This is usually estimated as a weight of 2 pounds per inch, either to be added or subtracted from the indicated bow weight. This may not be very accurate if several inches are being calculated. For some lighter bows may draw less than 2 pounds per inch and heavier bows may draw more than the 2 pounds per inch. See Draw Force charts below.



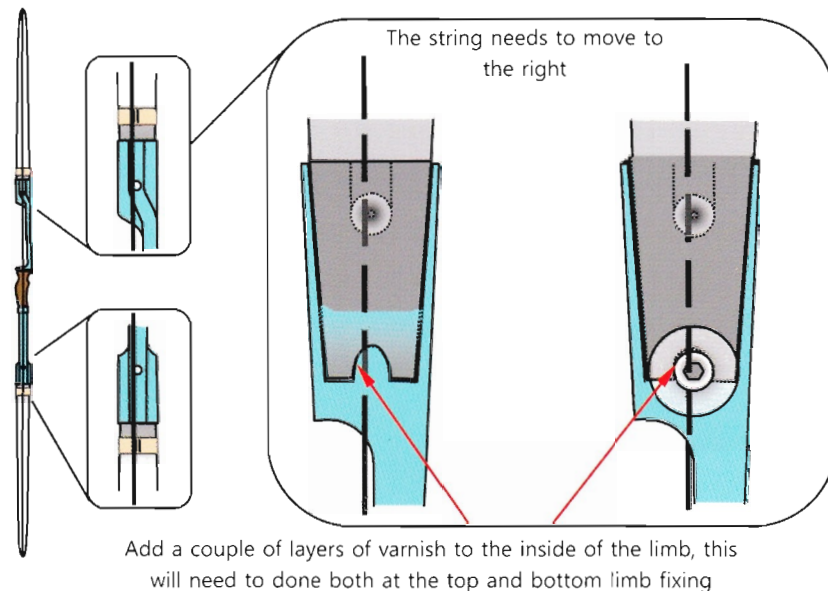
Limb alignment:

Now back to putting the equipment together and setting it up. If there was either too much movement in the limb fixing sockets or the string was not in line with the riser as explained in paragraph (b) then we need to know which way to move the tip of the limb. If the string is too far to the left as measured on the bracing height gauge (that has been laid flat along the bow window cut-out) then the limb tip needs to be moved to the right. The manufacturer may have provided a lateral limb adjustment on the riser, if it has, follow the manufacturer instructions for the limb





adjustment. But, if the riser selected does not have such adjustment there are other ways to get the limbs in line. It cannot be explained here how to correct all models of limbs and fixings so one method will be explained, others can be adapted from this method.



One or two coats of varnish may be added to the inside of the location cut-out of the limb to reduce any movement within the limb socket. If the limb needs to be moved either left or right adding one or two coats of varnish on one side of the location cut-out should suffice to bring the limb in line.

Moving the bottom limb would be similar to the above.

Be aware, if the limbs are too far out of line look for other reasons that may indicate poor limb line-up.

Once this line-up is satisfactory the tiller can be initially set.

Preliminary setting the bow tiller and bracing height:

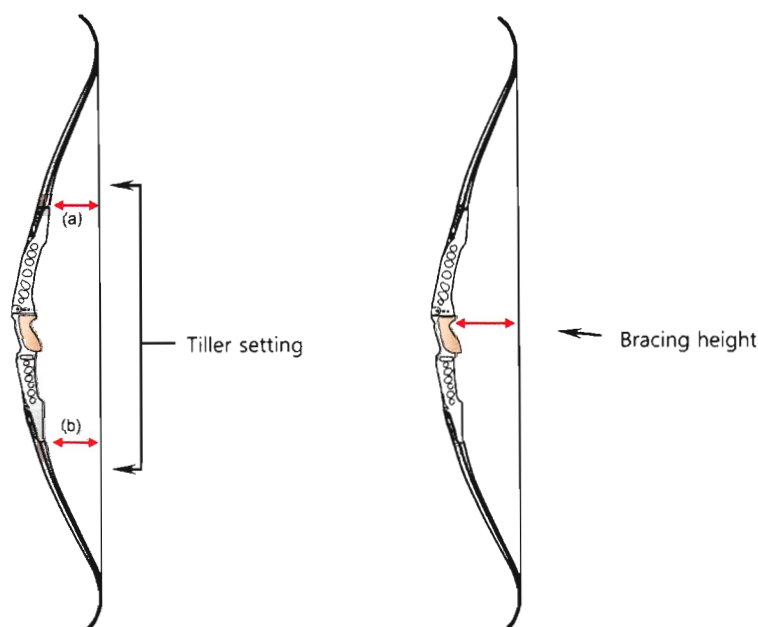
To set the initial tiller adjustment, check the manufacturers recommendation. If this is not available, for the initial set-up, set the distance of (a) 3 to 5 mm greater than the distance of (b).

Check that the correct place is being used to measure the bracing height, some



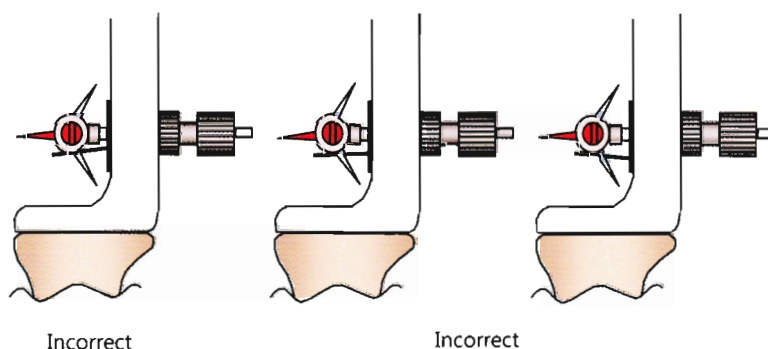
places manufacturers recommend are: the string to back of bow, the string to pressure button or the string to throat of handle.

Manufacturers will give a bracing height range for each given bow with about 25mm tolerance. Set the bracing height to the centre of this tolerance range. The tiller and bracing height will be set to suit your arrows, style of shooting and draw length later.



Setting the height and angle of the arrow rest:

The angle of the arrow rest must be such that the arrow does not slip off the rest either during the draw or while aiming.



If a pressure button is being used that has a screw on tip the arrow should contact the pressure button just below centre for a right handed archer, and just above centre for a left handed archer. This will ensure that the screw on tip does not come loose during use.

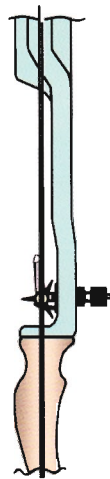




Initial setting of the pressure button:

Once this is completed the Pressure Button can be set. Usually the Buttons come with three springs, fit the medium spring to start with, although this may need to be changed for one of the others as the tuning procedure progresses.

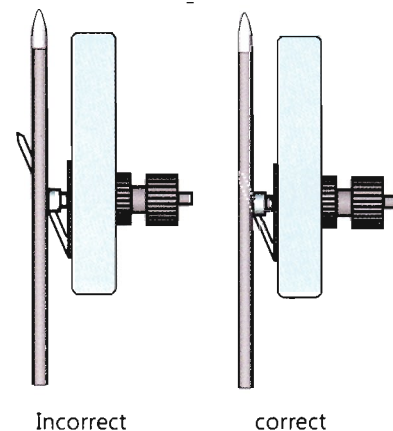
Place an arrow on the string roughly where the nocking point will be (the nocking point will be added later). With the eye, line-up the string down the centre of the bow. Adjust the pressure button so that the arrow point is just outside of the string.



This set-up may change later in the tuning process, as it is dependant on the efficiency of the archer's fingers during the release of the string.

Setting the arrow rest arm:

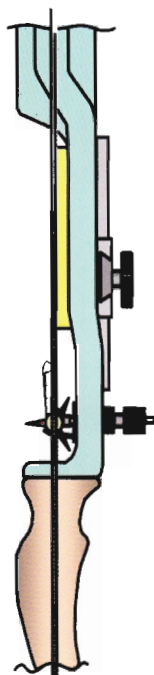
The arrow rest arm should not protrude past the outside of the arrow when viewed from above. If the arrow rest arm does protrude past the arrow the fletchings may foul arm as the arrow is projected from the string.





Aligning up the sight bar:

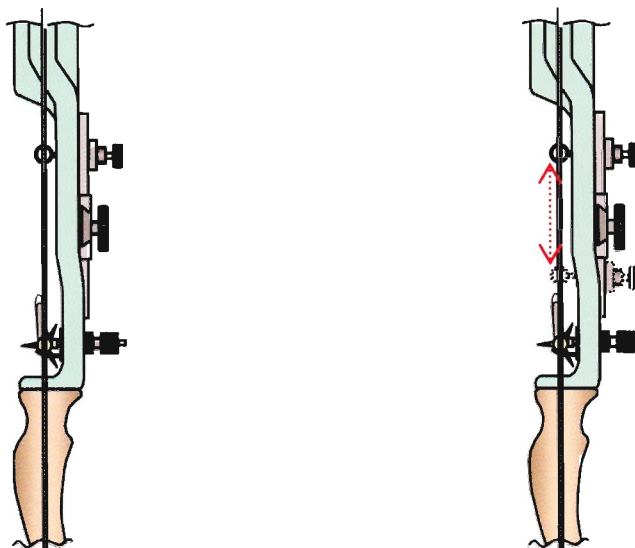
When fixing the sight unit to the riser make sure the sight track is vertically aligned with the string. To complete the fixing place a piece of double sided sticky tape between the sight fixing plate and the riser. This will help to reduce the possibility of the sight coming loose giving false sight marks. Do not use the padded type of double sided sticky tape as this will not permit a good solid fixing. A post-it note tag can be used to ensure the sight track is properly aligned, fold it in half down the middle, and use the sticky section to stick to the sight track. The edge of the post-it note tag can then be used to line up with the string.



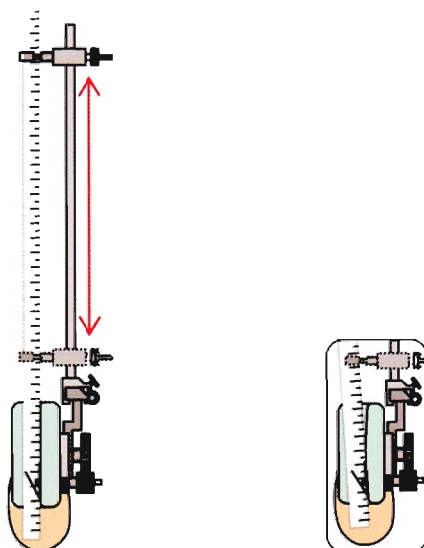
Aligning up the sight:

Fix the sight block to the sight bar and adjust the sight ring so that the centre of the sight ring is directly in line with the string when looking from behind the bow and with the string aligned down the centre of the bow. Make sure the sight ring stays central to the string when the sight block is moved up and down the sight track.





With a straight edge (i.e. rule) laid along the window cut-out of the riser, the sight block can be slid along the sight extension, the sight aperture should stay in line with the rule at all locations along the sight extension. This checking procedure is very important for those archers who need to bring the sight pin closer to the bow to enable getting a sight mark for the longer distances. If the sight track is not in-line then when the sight block is moved out for shorter distances, it would travel either left or right depending which way the sight extension is out of line. This would give the effect of the windage adjustment on the sight block being changed.



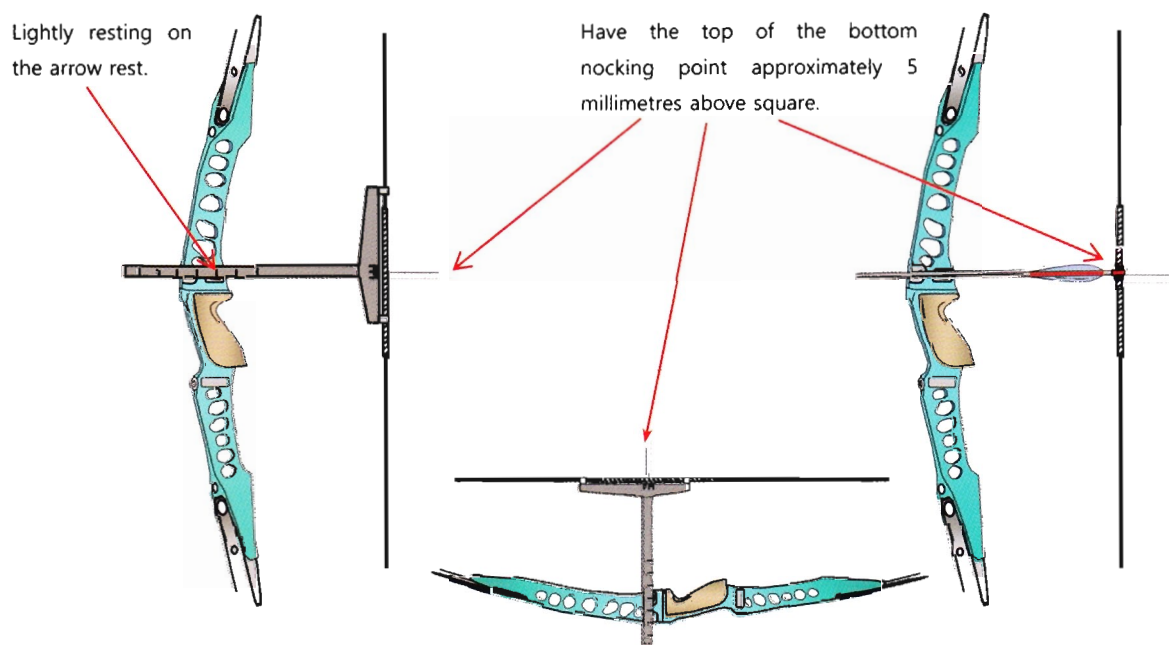
When making these checks be aware of risers that the window does not have a flat surface, or is not parallel with the string travel.



Once the sight aperture is lined up do not move the sight windage left or right until the whole tuning procedure is complete.

Initial setting of the nocking point:

Set a temporary nocking point so that the top of the bottom nocking point is approximately 5 mm above square taking a right angle from the string to the arrow rest. Be sure that the bracing height gauge clips on to the string securely; if it does not then a false reading will result. It may be better to turn the bow horizontally so that the bracing height gauge hangs straight down.



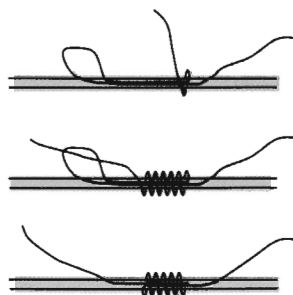
If the bracing height gauge does not clip on the string tightly turn the bow horizontally to ascertain this measurement.





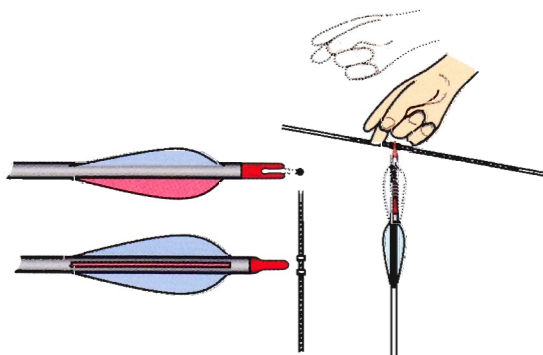
Serving and nocking point:

Serving material or dental floss can be used for making a nocking point. The drawing shows a way of eliminating knots or loose ends.

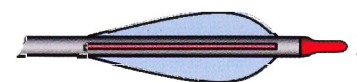
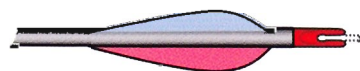


When the nocking point is completed cut off the ends and add a little glue.

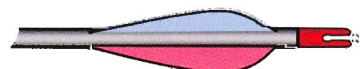
When the nocking point has been completed hold the bow horizontally and place the arrow on the string so that it is hanging straight down. If the nocking point is a good fit the arrow should hold onto the string, and only fall off the string when the string is given a light tap with a finger.



If the nock is too tight on the string then a thinner serving material can be used.



If the nocking point is too loose the area can be over-served with dental floss, or similar, to get the correct fit.



If a draw length check is to be used then set this to your comfortable draw length.



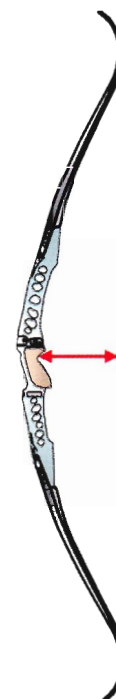


Initial setting the bracing height:

Check that the correct place is being used to measure the bracing height, some places manufacturers recommend are: “the string to back of bow”, “the string to pressure button” or “the string to throat of handle”.

Stand about 10 to 15 meters from a target, and shoot a few arrows just to loosen-up.

Listen to the sound of the bow as the shot is made. There should be just a dull “thump” sound, not a sharp sound or excessive noise. If there is excessive noise: re-string the bow with a lower bracing height and try again. If the noise is still there try raising the bracing height, until you find the setting that gives the quietest sound. This setting should be within the manufacturers recommendation otherwise the efficiency of the bow may be jeopardised. Noise is energy, so the quieter the bow the more efficient it will be. Record this bracing height as it will be used as a reference later.



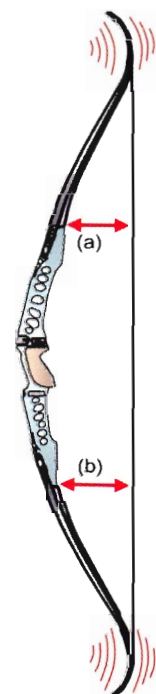
Initial setting the tiller:

Take the sight off the bow, and then at approximately 10mtrs from the target, shoot the bow to see the reaction of the limbs.

If there is a lot of “limb tip flutter” reduce the tiller difference slightly and try again.

If the “flutter” increases, increase the tiller difference.

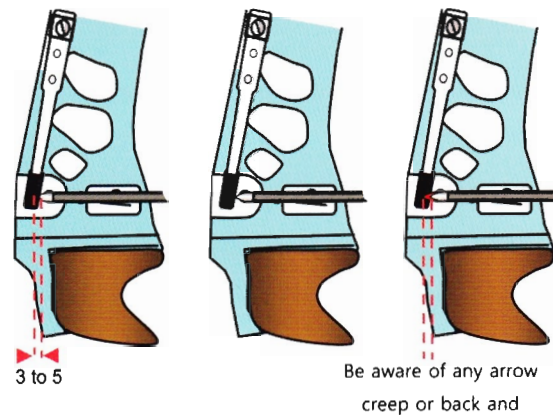
Keep checking and adjusting until the “flutter” has been reduced to its minimum





Setting the draw length check (clicker):

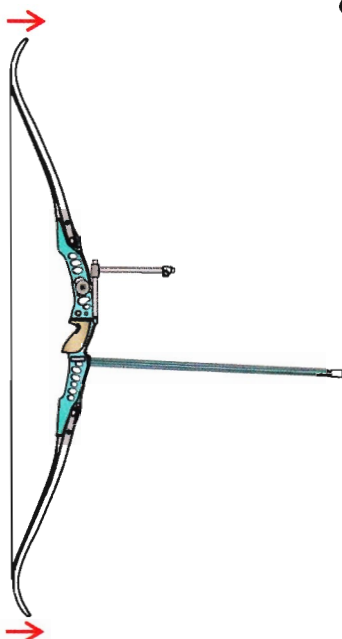
The clicker should be set to accommodate the draw length of the archer, not the length of the arrow the archer is using.



When the archer is at full draw (the archer's most efficient and comfortable bio-mechanical alignment) the draw length check (clicker) can be set. There should be no more than 3 to 5 mm of the arrow point left under the clicker for the archer to extend to activate the clicker. Be aware that while aiming the archer does not relax the extending allowing the arrow to move forward under the clicker.

Some ideas for selecting a stabiliser system:

Adding a long-rod reduces some rotation in the vertical and horizontal plans, but it does not stop any left/right tilting rotation.





Adding a V-bar and side rods helps reduce left/right tilting rotation, and rotation in the horizontal planes. Depending on the positioning of the side rods they can also help reduce rotation in the vertical plane. Depending on the weight distribution used on the stabilising rods adding a short extension between the bow and V-bar moves the centre of gravity further forward and in turn increases the forward rotation.

Adding a stabilising rod to the top of the riser can help reduce the vibration affecting the sight i.e. the sight ring rotating, and help reduce the vibration felt in the hand.



Depending on the individual archer's preference each of the stabilisers, weight, and length etc. will affect the balance of the bow. **Always try a given set-up before making a purchase.**

Selecting a stabilisation set-up that will suit the individual archer:

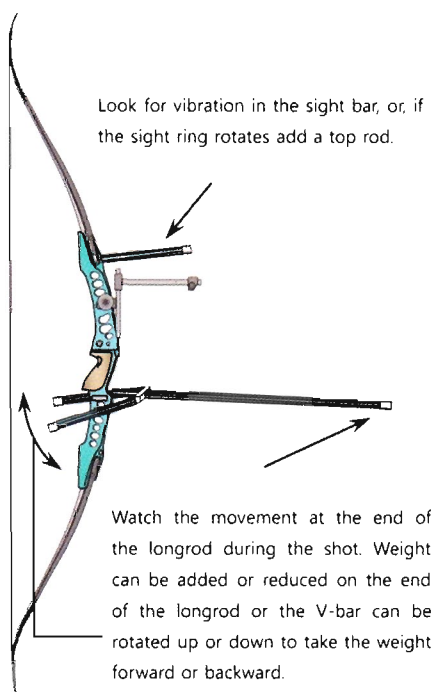
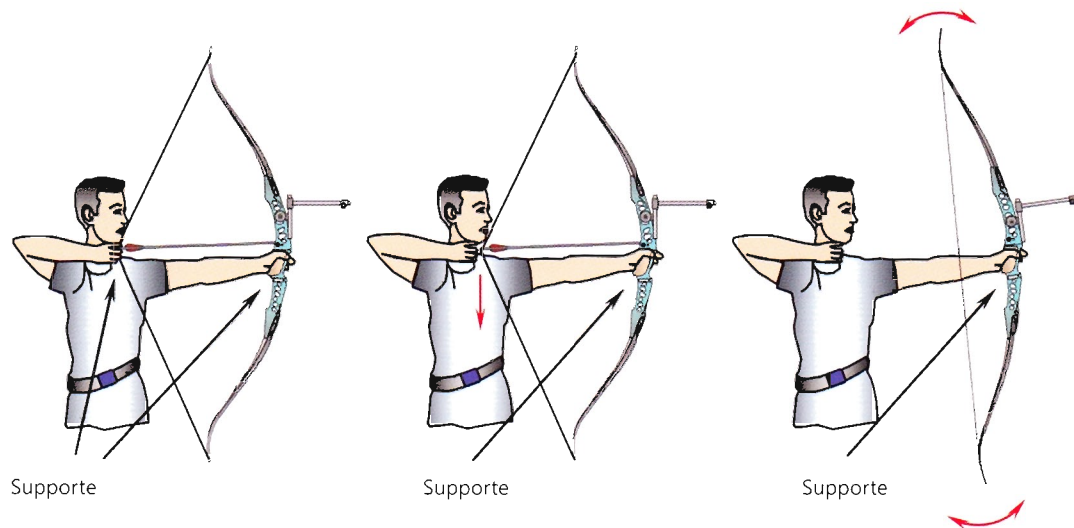
To start with I will assume the archer shoots with an open bow hand and whilst the shot is in progress the hand does not induce any torque into the bow and the bow has no added stabilisation.

When the bow is at full draw the bow is being supported at two places, the pressure point on the riser by the bow hand and the string with the drawing hand. To produce the shot the archer has to let go of the string. All the weight of the bow plus arrow weight is now being supported by the bow hand. There are two things





the back of the bow (the drawing hand string area) wants to do; one is - due to the energy stored in the bow it wants to travel forward to the supported part of the riser. The other thing it wants to do is - drop toward the ground as the support from the drawing hand has been removed. The evidence can be seen by the bow rotating in the direction of the bottom limb kicking forward away from the archer as the shot is made. This can readily be seen by watching the bow reaction during a shot being made by bare-bow archers. There are other factors which can cause a bow to react this way, such as where the pressure point is in relation to the centre of the bow etc. and all are very important. Though for this article I will keep to reducing the reaction of the movement rather than cover all causes of it.



To reduce this rotation weight can be added in front of the supported area. This can be in the form of a long rod. Remember the sight being used also acts as a weight/stabiliser. A way to see if the longrod weight is adequate look at the tip of the long rod as the shot is made just after the arrow has left the bow. If the longrod kicks up it could indicate more weight is required but be careful as this could also indicate the tiller of the limbs require further adjustment, I will cover this later. "V-bars" help reduce sideways rotation and act as a counter balance for the longrod. So if a V-bar is to be used put it on now and set the



system up with it in place. If the longrod kicks up as the shot is produced either weight can be added to the longrod, or the V-bar system can be rotated downward virtually taking the V-bar weight forward. Watching the movement at the end of the longrod during the shot can tell you a lot about the stabiliser set up being used and where you can add or reduce rods or weight. A V-bar extender can help take the weight of the stabiliser system forward, also it can help reduce the vibration being transmitted back into the hand which is evident with some stabiliser systems.

If you experience vibration in the sight or the sight ring rotates whilst shooting try putting a short rod on the top front of the riser, this should help eliminate it. If the sight ring still rotates whilst shooting, the tiller of the bow may require adjustment. Different designs of stabiliser rods have different effects on the reaction of the bow and on the archer shooting the bow, so try different styles and types before purchasing. Many archery shops are only too pleased to let you try out a set before buying.

It would take a full article to write about the full effects of the gravitational pull, inertia control, and vibration absorbing properties of all materials and variations of a stabiliser system; therefore I will keep this section basic. The basic law of inertia is – if it is stationary it does not want to move, and, if it is moving it does not want to stop. So by fitting a top rod to the bow it will give two different reactions. 1) As the shot is made the top rod is stationary and does not want to move it will therefore possibly make the bow rotate backward slightly taking the tip of the longrod upwards. 2) As the rotation stops gravity will have an effect on the weight of the top rod, this will make the bow rotate forward taking the longrod downwards. Adding and subtracting weights from each stabiliser rod to get perfect bow reaction can be rewarding but a long and tedious task.

There are though many things to consider when selecting a stabiliser system. Each differently manufactured bow has different characteristics, this coupled with each persons shooting technique, draw-length and arrow weight makes a stabiliser setup very personal, and only the person shooting the bow can select their own stabiliser system.

When selecting a stabiliser system watch for the following - If a too flexible stabiliser system is used beware that any movement or shake in the bow hand during the shot can start the rods to vibrate, this movement will be transmitted to the



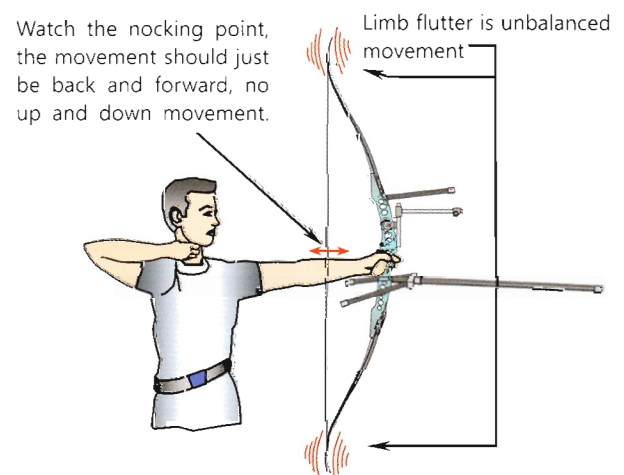


weights. Once the weights start to move or shake the movement will be transmitted back through the rods to the bow, the bow hand will now have difficulty in stopping this movement and holding the sight steady on the point of aim. If a very rigid stabiliser system is used you will find you will be able to hold steadier on the point aim but any vibration of the bow after the shot is made will be transmitted through the bow hand and into the wrist and arm which can be uncomfortable and cause fatigue or injury over long periods of shooting. There are many types of Torque Flight Compensators on the market so if you are experiencing excessive vibration give them a try. One easy and reasonably cheap method of reducing vibration is placing a rubber insulator (Doinker or similar) between the stabiliser rod and the end weight.

If the bow that is being used has a changeable hand grip try different types to see which suits you. During this whole procedure, remember, any unwanted tension in the bow hand or gripping the bow can influence the reaction of the bow during the shot and fitting a stabiliser system can hide many unwanted biasing pressures which can create torque on the bow.

Once you have a reasonable stabilisation set up we need to get the tillering right. The tiller should have been set within the manufacturers recommendations when the bow was originally set up. Now we need to check it is right for the individual archer's technique etc. and that there is no limb imbalance. Evidence of limb imbalance can be seen by the nocking point vibrating up and down after the shot is made. To check

this, have a colleague watch the nocking point movement after the shot has been made. The nocking point should only move in the horizontal plane with no up and down movement. Beware though that the string is not being influenced by any contact with the bracer or any clothes giving a false indication. If you watch carefully you will be able to see the nocking point vibrate backwards and forwards before the string comes to rest, if there is any up and down movement the tiller could need adjusting or, the stabiliser set up may still need attention.





It is usually the tiller of the bow being out of balance that causes the up and down movement of the nocking point. What happens is, as the shot is made and the fingers release the string the limbs return to their home position as fast as they can due to the energy built up in them. If one limb gets to its home position before the other it travels past its home position pulling the string in that direction. The arrow is still attached to the string at this point so the back of the arrow gets a sharp tug in the direction of the limb that got to the home position first. This can cause severe clearance problems or poor grouping in the vertical plane. As the other limb gets to its home position the first limb has lost some of its energy so the second limb now pulls the string in its direction. So the imbalance starts causing limb flutter, with the limbs vibrating back and forth out of sync taking the string and nocking point in the up and down mode.

To reduce this imbalance, try increasing the weight of the bottom limb by turning the adjustment a $\frac{1}{4}$ of a turn on the adjusting location and try again. If there is no improvement try another $\frac{1}{4}$ turn, and so on, if there is no improvement by the time the tiller differential between (a) and (b) is 12 mm try reducing the tiller differential by returning the adjusting screw of the bottom limb to its original position and try adjusting the top limb location. If improvement cannot be achieved other areas that can influence this movement is the stabiliser system, the bow hand position on the grip (high wrist / low wrist), the drawing hand fingers on the string or the release. Each or any of these may need to be worked on to get improvement. Whilst carrying out the above adjustment you will find the nocking point may have to be moved slightly to compensate for any limb adjustment being carried out.

Once a good limb balance has been achieved and the stabiliser system is set to a satisfactory level, record the settings and continue with the tuning procedures.

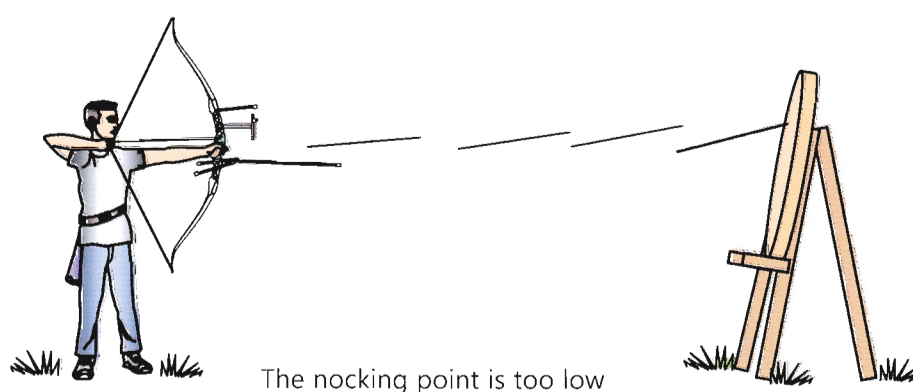
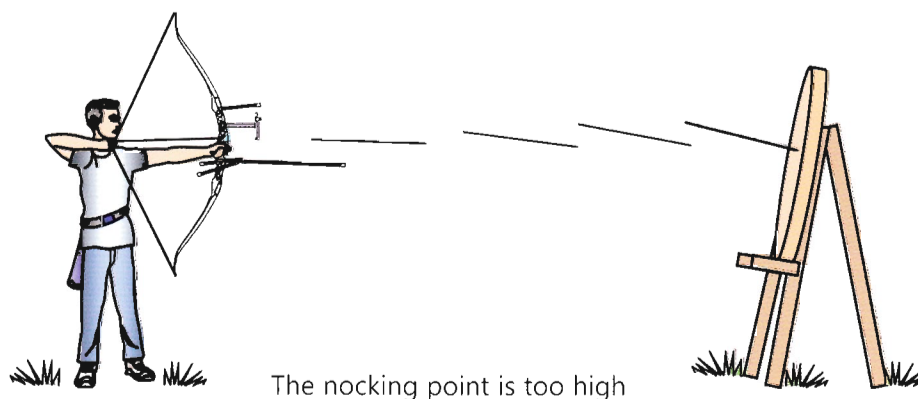
Go through your warm-up procedure prior to the next phase.





Nocking point set-up:

To set the nocking point height stand about 7 meters from the target, and shoot an arrow making sure that whilst at full draw the arrow is in a level plain. A good way to do this is to have a friend watch and line up the arrow, whilst you are at full draw, with a distant fence or line of bricks in a wall. Shoot the arrow and when it is in the target look to see if the arrow is still on the same plain as it was before being shot. If the nock is high then this indicates a high nocking point, and if the nock is low this indicates a low nocking point. Shoot several arrows to get an overall picture before changing the nocking point position. Beware of the type of target being used as this may influence the way the arrow enters the target and the angle the arrow comes to rest.



There is no need at this point to try fletched and unfletched arrows to get a more accurate nocking point location; the pressure button has not been set therefore a false indication can be portrayed.



Arrow flight paper tuning test:

The next stage of adjustment is to shoot through a piece of paper that is held tight by a frame. The ideal is A3 size but an A4 size will suffice.

Place the paper frame at shoulder height and about 1 to 1½ metres in front of the target, this allows plenty of room to retrieve your arrows without moving the paper frame.

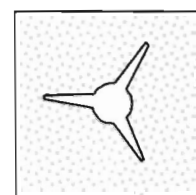
Stand about 2 to 3 metres from the paper frame, the bending of the arrow during the initial stages of flight will have some effect on the shape of the tear in the paper, by standing a little closer, or further away from the paper the results can be easily analysed.

A useful way of using all of the paper and selecting where the arrow hole should be is to set the sight on a 20 metre mark and aim at the central top edge of the paper. You will see where the hole appears on this first shot (it will probably be about 3 to 4 cm down from where you aimed) and from here on you can pick your aiming point to maximise paper use.

Shoot an arrow through the paper and observe the hole, start the adjustments by reducing the error which is most evident and keep shooting and adjusting until a reasonable result is achieved. This could be from almost a “bullet” hole to a tear about 1 to 1½ cm long. Remember this will not be the final tuning procedure so perfection at this stage is not fully necessary.

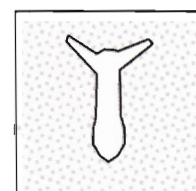
This is an excellent result.

This is a good result if you achieve a hole such as this then bypass this section and go onto the ‘Bare shaft planing test’.



The nocking point is too high or there is a clearance problem.

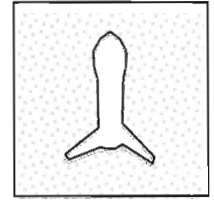
This tear indicates a high nocking point or a clearance problem, such as the fletchings fouling the arrow rest. Try lowering the nocking point about 1 mm, shoot another arrow, and observe the resulting tear. Continue until you get the best result.





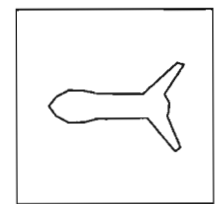
The nocking point is too low.

This tear indicates a low nocking point, Raise the nocking point about 1 mm, shoot another arrow and observe the resulting tear. Continue until you get the best result.



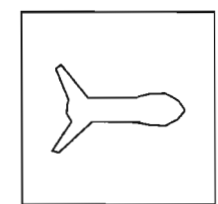
The spring pressure is too great or the arrow is too “stiff”.

This explanation is for a right handed archer. This tear indicates the spring tension in the pressure button is too strong and needs weakening, or the arrow is too stiff. Try loosening the spring tension screw on the pressure button a half of a turn and then shoot another arrow and observe the tear, this may need to be done several times. It may be necessary to replace the spring in the pressure button with a weaker one to achieve the desired result. If a good result is not forthcoming try increasing the pile weight of the arrow or increasing the draw weight of the bow, if this does not improve the situation the arrows may be too stiff and it will be necessary to try a set with a weaker spine rating. If you are a left handed archer and get this tear follow the instructions of “The spring tension is insufficient or the arrow is too weak”, as shown below.



The spring tension is insufficient or the arrow is too “weak”.

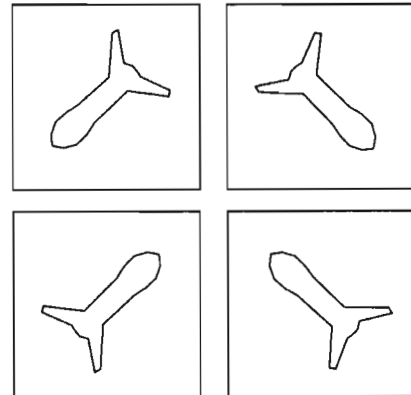
This explanation is for a right handed archer. This tear indicates the spring tension in the pressure button is insufficient and needs to be strengthened, or the arrow spine is too weak. Try increasing the spring tension by tightening the spring adjusting screw on the end of the pressure button by a half of a turn and then shoot another arrow and observe the tear, this may need to be done several times. It may be necessary to replace the spring with a stronger one to achieve the desired result. If a good result is not forthcoming try reducing the pile weight of the arrow or reducing the draw weight of the bow, if this does not improve the situation the arrows may be too weak and it will be necessary to try a set with a stiffer spine rating. *If you are a left -handed archer and get this tear follow the instructions of “The spring tension is too great or the arrow is too stiff”, as shown above.*





If any of these tears are observed then multiple corrections are needed.

A tear similar to any of these indicates a multiple of situations that require correction. Follow the above procedures to obtain a good result starting with the correction of the nocking point height, when you have eliminated the vertical tear then carry out the necessary adjustments to correct the horizontal tear.



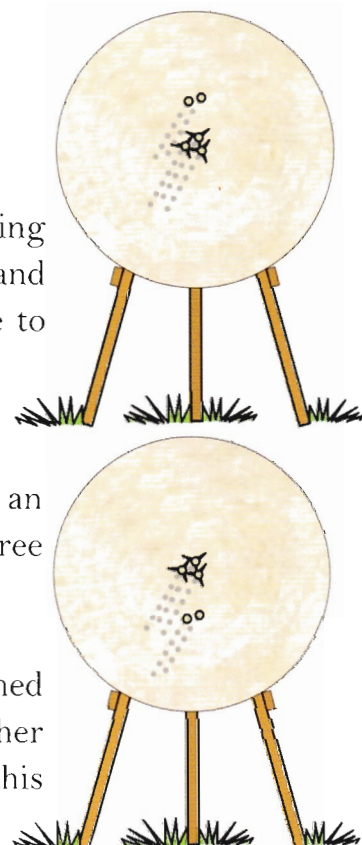
When you have obtained acceptable results try moving further away from the paper frame and shooting more arrows. Remember when shooting off the fingers and at different distances the bending of the arrow during the initial stages of its flight (archer paradox) will produce different tears than when shooting close to the paper frame. The maximum distance for this test should be no more than about 5 metres after this distance other elements come into effect which will be covered during the continuing tuning procedures. This paper test setup is only a preliminary step in the tuning procedure and finer tuning procedures need to be followed to ensure good grouping and arrow flight.

Bare shaft planing test.

At this stage it is acceptable to try the bare shaft planing test. This test will verify the nocking point height and give a good indication that the pressure button is set close to the optimum for the match of arrows and bow being used.

Place a target at approximately 15 to 20 metres, choose an aiming spot and shoot three fletched arrows, then shoot three identical shots with unfletched arrows.

If the unfletched arrows impact above the group of fletched arrows, move the nocking point up 1 mm and shoot another set of fletched and unfletched arrows. Keep doing exercise this



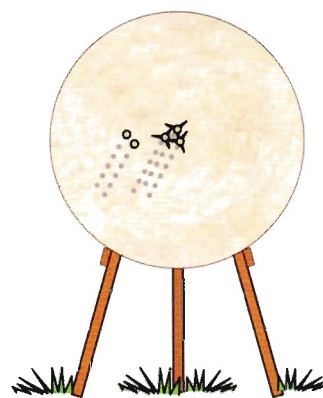


until the fletched and unfletched arrows impact the same height in the target.

If the unfletched arrows impact below the group of fletched arrows, move the nocking point down 1 mm and shoot another set of fletched and unfletched arrows. Keep doing this exercise until the fletched and unfletched arrows impact the same height in the target.

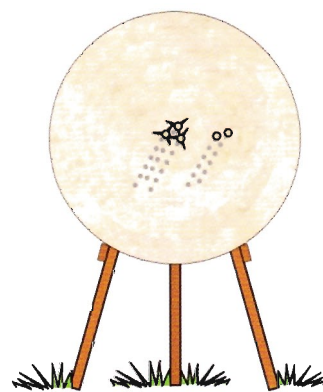
This explanation is for a right handed archer. If the unfletched arrows impact left of the fletched arrows either increase the bow draw weight or increase the arrow point weight. If you cannot get the fletched and unfletched arrows to group together try using arrows that have a weaker spine rating.

It may be acceptable to adjust the pressure button spring tension a little but not too much, maybe a maximum of only a $\frac{1}{4}$ or $\frac{1}{2}$ a turn of the adjusting screw – adjusting the pressure of this spring will affect both the fletched and unfletched arrows and may negate the previous hard work of tuning this bow.



This explanation is for a right handed archer. If the unfletched arrows impact right of the fletched arrows either decrease the bow draw weight or decrease the arrow point weight. If you cannot get the fletched and unfletched arrows to group together try using arrows that have a stiffer spine rating.

It may be acceptable to adjust the pressure button spring tension a little but not too much, maybe a maximum of only a $\frac{1}{4}$ or $\frac{1}{2}$ a turn of the adjusting screw – adjusting the pressure of this spring will affect both the fletched and unfletched arrows and may negate the previous hard work of tuning this bow.





The arrows without fletchings hit to the right:

If the arrows without feathers hit on the right of the arrows without fletchings the spine of the arrow is weak, and the adjustment procedure should be as follows.

Step 1: The spring pressure of the cushion plunger should be increased. The archer should not be too concerned if this adjustment does not rectify the situation as there are many other remedies that can be tried. If the unfletched arrow keeps hitting to the right, the spring of the cushion plunger should be changed for the strong one and the exercise repeated.

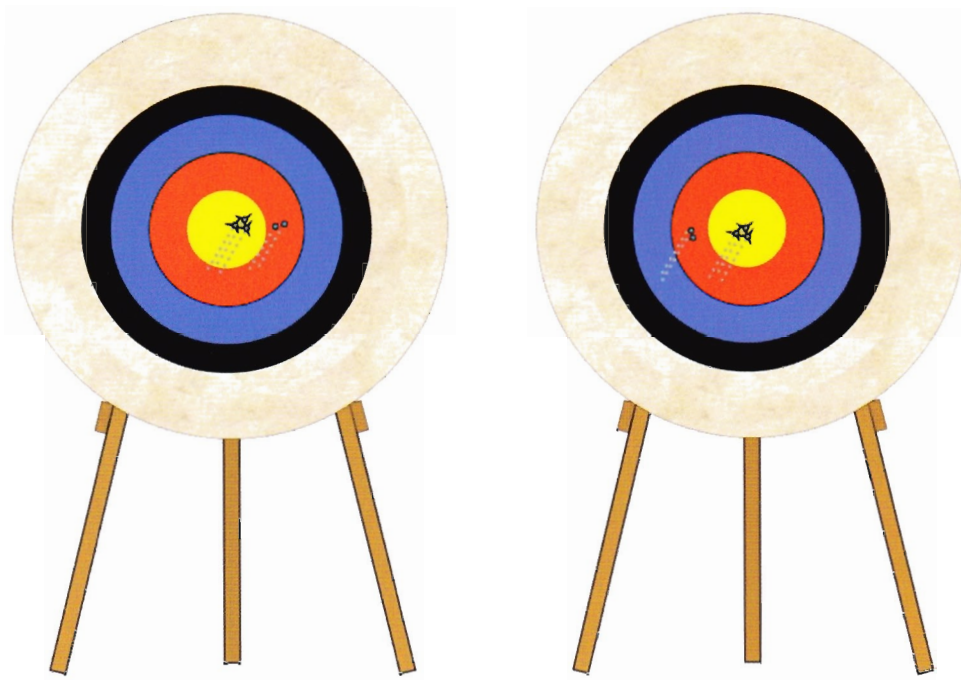
Step 2: Although the archer tunes the cushion plunger to the proper intensity, the arrows without fletchings may still hit on the right of the target, if this happens the arrows should be cut a little shorter. When the arrow becomes shorter, the spine of the arrow becomes stiffer, so the arrows without fletchings will move toward the arrows with fletchings.

Step 3: If the arrows keep hitting on the right, the arrow point weight should be reduced. This will help the arrows without fletchings move toward the arrows with fletchings or even hit the same group.

Step 4: The draw weight of the bow can be decreased.

If the arrows without fletchings keep hitting to the right on the target, the archer must change to arrows with a stiffer spine rating as the arrow being used is too weak. The reason the archer tunes following this order is because when using the heavy arrow point more options are available when going through the tuning process.





The arrows without fletchings hit to the left:

If the arrows without fletchings hit to the left of the arrows with fletchings the spine of the arrow is too stiff.

Step 1: The spring pressure of the cushion plunger should be decreased. If the pressure of the spring is made too weak, the arrows will not group consistently. The spring in the cushion plunger should be changed to the weak one and then the tuning procedure should be repeated.

Step 2: The archer should use a longer arrow.

Step 3: The arrow point should be changed heavier one.

Step 4: The draw weight of the bow can be decreased.

Even though the archer tunes using this process, if the arrows without fletchings keep hitting to the left of the arrows that have fletchings, the spine of the arrow is too strong and the archer must change the arrows to those with a weaker spine rating



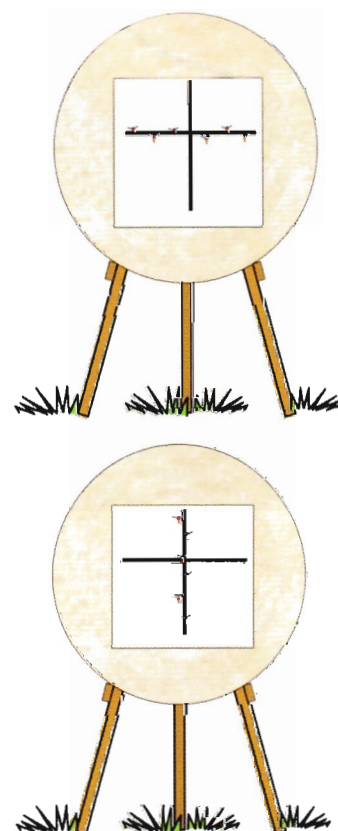
Short distance fine tuning:

This procedure should help to achieve good grouping at short distances. Normally, small tuning problems show up at close range because the arrow has maximum vibration at short distance. This test assists in identifying any flight problems that may exist and makes it possible to make finer adjustments than with the previous tuning procedures.

Put a cross, with a thick black fibre pen, on a piece of plain paper which is about a half metre square, the back of a 60 cm target face is ideal. Have one line horizontal the other vertical, each line going right across the paper. This is pinned to a target so that the centre of the cross is about shoulder height. Stand about 15 metres from the target, set the sight to the right height for this range, and shoot an arrow at the horizontal line. If the arrow hits high or low adjust the sight up or down so that the arrow impacts at line height, **do not adjust the sight left or right at this time.**

Some archers line the string up with the riser when they shoot; others prefer to line the string up with the sight pin to ensure true alignment of the shot each time. Which ever method is used it is essential to be consistent with the string alignment when each shot made

Shoot a set of 4 or 6 arrows along the horizontal line and see how close they impact to the line. If they impact generally above the line or impact generally below the line the sight may be moved up or down to suit. If they are spread up and down across the line try raising the nocking point a $\frac{1}{2}$ mm and shoot another set to see if there is an improvement, i.e. the general width of the arrow line gets narrower. If there is not an improvement try lowering the nocking point a $\frac{1}{2}$ mm. Continue adjusting until the best result is achieved. Remember the competence level of the archer here is very important, do not expect a better result than the archer can reasonably achieve.





When a satisfactory result is achieved shoot a set of arrows at the vertical line, do not aim at the same spot on the line as you may get some arrow damage, aim to have the arrows impact about 5 cm apart. If the main point of impact of the arrows is not on the line, **do not move the sight** this should still be lined up correctly as set during the initial set-up.

If the main point of impact of the arrows is to the left of the line:

This explanation is for a right handed archer. Reduce the spring tension in the pressure button by adjusting the pressure of the button by an eighth of a turn and shoot another set of arrows, keep shooting and adjusting until an acceptable result is achieved. A minor adjustment of the pressure button position (the tip of the button in toward the bow) may be necessary. If an acceptable result cannot be achieved it may be necessary to increase the arrow pile weight or try a set of arrows with a weaker spine rating.

If the main point of impact of the arrows is to the right of the line:

This explanation is for a right handed archer. Increase the spring tension in the pressure button by adjusting the pressure of the button by an eighth of a turn and shoot another set of arrows, keep shooting and adjusting until an acceptable result is achieved. A minor adjustment of the pressure button position (the tip of the button outward from the bow) may be necessary. If an acceptable result cannot be achieved it may be necessary to reduce the arrow pile weight or try a set of arrows with a stiffer spine rating.

Once a reasonable result has been achieved with the above record all of the settings then go through the variable distance method of tuning.

The variable distance tuning, (walk-back method):

This method is essential for Field archers to check as the target distances, angles shot, and courses using all the points of the compass can be very challenging if the equipment is not set to accommodate such events.

There seems to be a lot of confusion and controversy over what to adjust on given results for this method of tuning. If the equipment is not already set to a reasonable level of tune before this method is conducted then some results can portray an erroneous requirement for an adjustment to be made. Before any

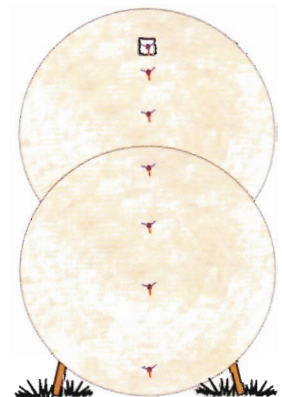


portray an erroneous requirement for an adjustment to be made. Before any adjustments are made record all of the settings, so that should it be necessary, they can be returned to with confidence.

This variable distance tuning tests should only be carried out on a very calm day or in an indoor facility, as any side wind may cause erroneous results causing adjustments to be made that are not necessary.

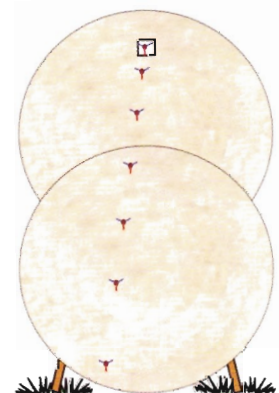
Whilst conducting this tuning procedure the ability of the archer must be taken into account. To get a straight line down the target at distances up to about 50 metres the archer has to be very competent. It may be realistic to shoot three or four arrows from each distance then mark the centre of the group with a target pin, small disc of card or similar. Then after shooting all the distances look at the line indicated by the centre of the group markers.

Set up a target and pin on a piece of card about 7.5 cm square 20 cm from the top. Then place marks on the ground from 20 to 50 metres in 5 metre increments from the target. If necessary a second target can be placed in front of and leaning on the target which is on the stand. This will allow the archer to shoot from a greater distance producing a more accurate result. Remember to secure the second target.



The archer should set the sight on their 20 metre sight mark; **the sight should not be moved during this tuning procedure.** Stand on the 20 metre position marked out on the ground and shoot an arrow at the piece of card on the target, move back to the 25 metre position and shoot another arrow, move back to the 30 metre position and shoot an arrow.

Continue moving back and shooting until the line of arrows reach the bottom of the target, and then observe the pattern of arrows in the target. If it is a straight line down the centre of the target it is a good result. If the line of arrows leans either left or right the pressure button needs moving slightly.

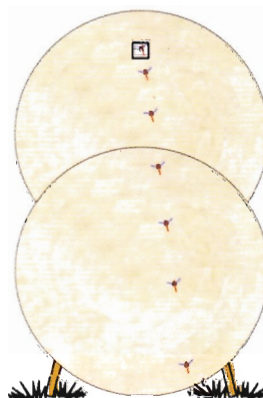




This explanation is for a right handed archer. The pressure button requires to be moved to the right by an eighth of a turn then try the walk back procedure again. Continue this procedure until a good result is achieved. If a good result cannot be achieved the arrow pile weight may need to be increased or try a set of arrows with a weaker spine rating. Or, minor adjustments can be made to reduce the draw weight of the bow.

This explanation is for a left handed archer. The pressure button requires to be moved to the right by an eighth of a turn then try the walk back procedure again. Continue this procedure until a good result is achieved. If a good result cannot be achieved the arrow pile weight may need to be reduced or try a set of arrows with a stiffer spine rating. Or, minor adjustments can be made to increase the draw weight of the bow.

This explanation is for a right handed archer. The pressure button requires to be moved to the left by an eighth of a turn then try the walk back procedure again. Continue this procedure until a good result is achieved. If a good result cannot be achieved the arrow pile weight may need to be reduced or try a set of arrows with a stiffer spine rating. Or, minor adjustments can be made to increase the draw weight of the bow.



This explanation is for a left handed archer. The pressure button requires to be moved to the left by an eighth of a turn then try the walk back procedure again. Continue this procedure until a good result is achieved. If a good result cannot be achieved the arrow pile weight may need to be increased or try a set of arrows with a weaker spine rating. Or, minor adjustments can be made to reduce the draw weight of the bow.

Some documentation shows this procedure as having a line of arrows in a curved line down the right or left of the target. This result is almost impossible to get due to the laws of arrow flight. If you get a curved line of arrows down the target then the tuning procedure needs to be reviewed from the beginning. When testing this procedure, and shooting a badly tuned bow, the maximum curvature in the line of arrows down the target only deviated from the centreline by 4 centimetres, and this was only between 20 and 30 metres shooting distance. After this distance the line deviated in a straight line down at an angle either to the left or right depending on how badly tuned I made the bow, or chose arrows that were not matched to the bow.



Always record the settings of your equipment after each tuning session so that should the desired result not be achieved you can return to your previous settings.

By tuning the bow without moving the sight ring away from the centre position it will be found that, as long as the arrows and fletchings have been correctly selected and matched to the speed and performance of the bow, the sight windage adjustment should stay the same when shooting different distances.

Fine tuning:

Try to do this section on a calm day, because, as yet we have not selected the correct fletchings for the arrows for true steerage. Also the archers shooting ability must be taken into account when conducting this section of bow tuning. Set out a target using a 122 cm face at a distance of 55 to 60 metres, or a distance that is comfortable for the archer where the group will be gold to 'red' size. Set the sight to match the distance being shot, remember the sight windage should still be the same as it was during the original set up and should not have yet been moved. Shoot a set of six arrows to see where the group pattern is, if it is high or low adjust the sight to get centre of the group level with the centre of the 'gold'. Do not move the sight left or right we will do this by adjusting the pressure button spring.

If the group is left of the gold:

T*his explanation is for right handed archers.* Reduce the pressure button spring pressure by turning the adjusting screw on the end of the button $\frac{1}{8}$ of a turn and try shooting the six arrows again. If the group is still left turn the adjusting screw another $\frac{1}{8}$ of a turn and try shooting the group again. Because the level of tuning at this stage should be reasonably close it should not be necessary to adjust this screw more than one full turn during this procedure. If it does become necessary the arrow point weight may need to be increased or arrows with a weaker spine rating may need to be considered.

This explanation is for left handed archers. Increase the pressure button spring pressure by turning the adjusting screw on the end of the button $\frac{1}{8}$ of a turn and try shooting the six arrows again. If the group is still to the left turn the adjusting screw another $\frac{1}{8}$ of a turn and try shooting the group again. If the group cannot be brought into the centre of the target by turning the adjusting screw less than one full turn the arrow point weight may need to be decreased or arrows with a stiffer spine rating may need to be considered.





If the group is right of the gold:

This explanation is for right handed archers. Increase the pressure button spring pressure by turning the adjusting screw on the end of the button $\frac{1}{8}$ of a turn and try shooting the six arrows again. If the group is still to the right turn the adjusting screw another $\frac{1}{8}$ of a turn and try shooting the group again. If the group cannot be brought into the centre of the target by turning the adjusting screw less than one full turn the arrow point weight may need to be decreased or arrows with a stiffer spine rating may need to be considered.

This explanation is for left-handed archers. Reduce the pressure button spring pressure by turning the adjusting screw on the end of the button $\frac{1}{8}$ of a turn and try shooting the six arrows again. If the group is still right turn the adjusting screw another $\frac{1}{8}$ of a turn and try shooting the group again. If the group cannot be brought into the centre of the target by turning the adjusting screw less than one full turn the arrow point weight may need to be decreased or arrows with a stiffer spine rating may need to be considered.

Fine tuning can be achieved by measuring the distance between of the centre of the group and the centre of the 'gold' and adjusting the pressure button spring pressure a $\frac{1}{16}$ of a turn and shooting the six arrows again and re-measuring the distance. If the group of arrows is lower then return the screw to its original position and turn the screw a $\frac{1}{16}$ in the other direction. If the group has impacted higher in the target turn the adjusting screw another $\frac{1}{16}$ of a turn and try again, keep shooting, measuring, and adjusting until the group starts to drop. When this happens return the adjusting screw to the position where the highest group impact was achieved.

During this fine tuning the group size may get a little tighter, it should not get larger. If it does get larger it could be due to arrow clearance or fletching selection, which is the next stage of tuning. Once the optimum level of tuning has been reached carrying out the above procedure the next stage can be started.

Fletching selection:

Poor steerage during arrow flight is usually due to the fletchings on the arrows being incorrect for the shaft size and speed of the arrow. To find a fletching size to suit a particular arrow size, length and weight fletch several groups of arrows with different size of fletchings. All the arrows must be the same just the fletching should be different, and a group should be three or four arrows. So if you have 12 arrows these should be made into three or four groups. Choose a day when



there is a slight breeze from either left or right, set out a target at a comfortable distance for the archer to regularly hit within the blue ring of a 122 cm face, leave the sight as it was in the original set up i.e. in the central position in line with the string and shoot the 12 arrows. You will find the centre of each of the groups will be in a different place, record the impact locations and the centre of each group, and do this three or four times to ensure a true record is obtained. Let us assume the wind is coming from the left - If the group of four arrows in the target is to the left of the centre then the fletchings are too large, if the group is to the right the fletchings are too small. If you have one group of arrows landing in the centre of the target this is a good indication that the fletchings on this group of arrows is close to the requirement. Discard the fletchings on the two groups of arrows that were furthest from the centre of the target and re-fletch these arrows with a size of fletching to bring the group nearer the centre of the target. This procedure can be carried out over several days in different strength winds to find which fletching suits your arrows and speed of bow. Due to many factors in the flight of the arrow it will be impossible to find a fletching to give perfect arrow steerage in all strengths and directions of wind but it will be possible to get very close to the correct requirement.

A question which is frequently asked is - should fletchings be fitted so that they give a spin to the arrow. This is really up to the individual archer. The arrow takes up a natural slow spin which is initiated by the reaction of the bow; the initial oscillations of the arrow which are evident during the first moments of flight have a direct bearing in this spin. The direction of spin is in opposite directions for left and right handed archers and it is important to ensure that any forced spinning of the arrow by off-setting the fletchings or the use of spin-wing type fletchings match the natural spin of the arrow. This is necessary to optimise the gyroscopic effect of a spinning arrow. Looking from the archer's position (the back of the arrow) as the arrow leaves the bow - for right handed archers the arrow spins in a clockwise direction and for left-handed archers the arrow spins in an anti-clock-wise direction. An arrow that has virtually no spin will be open to any minor turbulence it encounters during its flight to the target, but it will respond quicker to any side wind pressures allowing the fletchings to steer the arrow more readily. A spinning arrow will have some built in gyroscopic effect and will stay on its course through minor turbulence but will resist the sideways pressure on the fletchings reducing the effectiveness of the steerage.





Remember, always record any changes made whilst tuning equipment, if the result is not what you require you can always return to the original settings.

Long distance grouping:

There are several reasons why arrows will not group, especially at long distances. Just two of these reasons are poor arrow clearance when leaving the bow and excessive drag on the arrow when it is in flight. These were covered earlier so any clearance problems should be minor and only minute adjustment will be necessary. So I will assume any drag is minimal and that the arrow grouping is of a reasonable standard.

Set out a target that is no further than the longest distance you shoot at tournaments but at a distance that you would expect your group to spread no larger than the five zone scoring ring, this may be closer than your longest distance. If you have twelve arrows all the same shoot all twelve from the selected distance, though take a break after each three. It may be wise to have some sighting arrows to ensure the group impact is at gold height. If you have only eight arrows the same then use all eight, any number less than this may not give a true reading. All arrows should be numbered as this will be required to identify any arrows that are not compatible with the majority.

Shoot all the arrows selected for this session and shoot them with the best form you can, as said earlier, be sure to take a break after each set of three. Take a tape measure with you to the target and some paper to record the result. We will start by measuring the vertical plane first, so, measure the distance from the highest arrow in the target to the lowest arrow and record the measurement. Make a note of the numbers on the two arrows highest in the target, also, the two arrows lowest in the target. At this stage do not worry about the width of the group unless it is totally unacceptable, maybe the target is too far for the standard of archer shooting or some other problems are affecting the arrow flight like the string fouling some loose clothing etc., if this is the case corrective action must be taken or erroneous results will be displayed.

Once the group size has been measured, return to the shooting line and move the nocking point up a $\frac{1}{2}$ mm. Once this has been done shoot the arrows again and measure the group size from top to bottom and make a note of the two highest and two lowest arrows. If the arrows have the same numbers that went high and low



last time look at them for any irregularities like an odd fletching that is not exactly correct, the nock is not in line or a bent shaft etc. If nothing can be found that is wrong with the arrow shoot it again and then if the same arrow still goes high or low discard it for the rest of this procedure, a full analysis of the arrow can be carried out later. If the height of the group is smaller than the previous group then move the nocking point up another $\frac{1}{2}$ mm and shoot the arrows again. If the height of the group was larger than the previous group move the nocking point back down to its original position plus another $\frac{1}{2}$ mm. keep shooting and measuring the group height until the best performance is achieved. If the nocking point becomes excessively 'high' or low it may indicate that the tillering still needs attention. As a rough guide, I would say that if the lower side of the nock is less than 3mm above a level line drawn at a right angle from the string to the arrow rest when it is fitted in the nock location, or higher than 8mm from level, then other areas may need to be worked on. Some ideas worth looking at would be tillering, fingers on the string, the release, oversize facing on the tab, fletchings fouling the arrow rest or pressure button, loose clothing fouling the string path or the string fouling the bracer etc., but all these possible problems should have been eliminated during the earlier part of the tuning procedure.

Once the best group size from top to bottom has been achieved we now turn to getting the width of the group reduced to its minimum size. Shoot the arrows as before but this time measure the group size for width and making note of the two arrows which have gone furthest left and the two arrows that went furthest right. The sight should not have been moved left or right at all during these tuning procedures as we are still trying to achieve a perfect in-line set-up.





If the group impacts slightly to the left of centre:

This explanation is for right handed archers. Decrease the spring pressure in the pressure button by $\frac{1}{8}$ th of a turn.

This explanation is for left-handed archers. Increase the spring pressure in the pressure button by $\frac{1}{8}$ th of a turn.

If the group impacts slightly right of centre:

This explanation is for right handed archers. Increase the spring pressure in the pressure button by $\frac{1}{8}$ th of a turn.

This explanation is for left-handed archers. Decrease the spring pressure in the pressure button by $\frac{1}{8}$ th of a turn then shoot the arrows again.

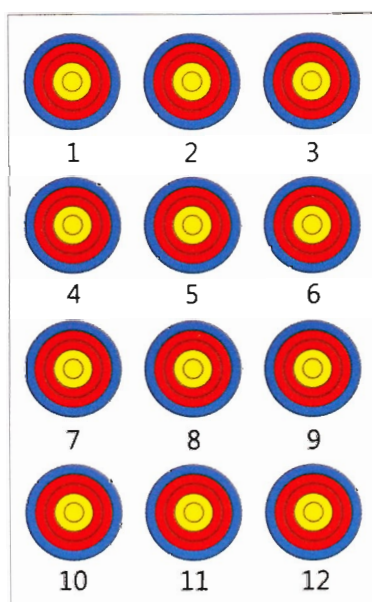
Look for any irregularities with any arrow that consistently flies outside of the group pattern, if nothing can be found discard the arrow for later analysis. Shoot the arrows again and measure the group, if the group has reduced in size try turning the spring adjusting screw another $\frac{1}{8}$ th of a turn in the same direction and try shooting the group again. If the group got larger then returns the adjusting screw to its original position and then turn it a further $\frac{1}{8}$ th of a turn in the same direction. Keep doing this until the best result is achieved. I would not expect to adjust the spring pressure more than a $\frac{1}{2}$ of a half full turn. If more than this is required it may be necessary to return to the tuning procedures explained earlier to ensure that the optimum tuning level was achieved at that stage. Always record any adjustments or changes made to your equipment whilst tuning so that you can return to the original settings if the desired result is not achieved. Never try to conduct both of the above explained procedures together, one adjustment has a direct bearing on the other, and false results may be displayed. When the best lateral grouping has been achieved return to checking the vertical grouping as they may have changed slightly when adjusting for lateral grouping. The above seems a lot of work and a tedious task, it is, but it is necessary if the full potential of your equipment is to be realised.

Once this state has been reached and you are happy with the result then the next phase can be started.



Dynamic arrow selection 1:

For this I recommend shooting from a distance of 45 to 60 metres on an 80cm target face, use the full set of 12 or 8 arrows as was used in the above mentioned procedure. The distance should be such that the archer should be able to group from the 6 ring inward. Also required for this procedure is a sheet of A4 paper with twelve targets drawn on it each numbered from 1 to 12, see picture below.



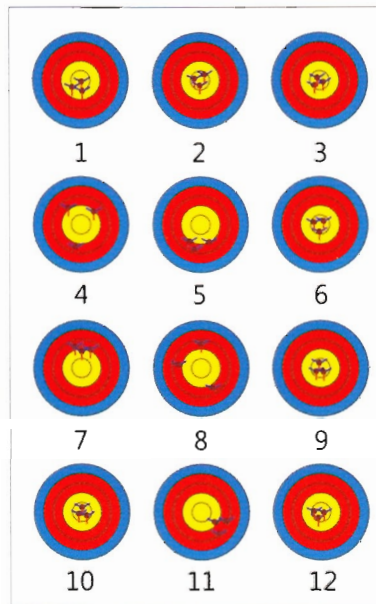
Shoot the arrows in any order but ensure the archer has a break after shooting three arrows, or a false reading may be analysed. When all arrows have been shot, record on the sheet of A4 paper where each arrow has landed, i.e. put a small cross on target 1 where arrow number one landed and a small cross on target two where arrow number two landed and so on. Shoot the arrows several times more and record each arrow as before, you will soon see a pattern forming where the maximum point of impact is recorded for each arrow. Once these patterns start to form you can start to group the arrows accordingly, i.e. all the arrows grouping round the centre can be one group, all the arrows grouping just off centre but in the same place on the target can be another group and so on. Any arrow that does not have a reasonable group pattern should be thoroughly inspected for any irregularities, if none can be found then the nock may be turned 120 degrees making another fletching the „cock fletching then conduct the procedure again. This procedure can be spread over several days but always use a new sheet of A4 with the small targets on for every separate session. If a new sheet of A4 is not used a false





reading of group size and location will be given as weather conditions can change sight marks and arrow flight. With this procedure it is possible to get several arrows to impact in the target in the same location, use these arrows for tournaments. The arrows that do not group with the main body can be used either for practice or if they are really bad they should be discarded.

The page of roundels, after this test, should look something like the lecture below. The arrows that should be selected for tournament use are numbers 2, 3, 6, 9, 10, and 12. The other arrows may be used for practicing your form but do not use them for any scoring purposes as the results shown will not be a true indication of your skill.



Dynamic arrow selection 2:

Shoot at a comfortable distance where you expect to group from the '5' ring inwards. Shoot an end of sighters and adjust the sight so that the maximum point of impact is the centre of the gold.

Shoot all the arrows you have in your set, either 6 arrows an end, or 12 arrows an end, and record those you were satisfied with and the location of the impact. Does this several times, when you are satisfied with the data you have recorded, select, as a set, the arrows that were most consistently grouping in the centre of the target. These selected arrows can be used for tournament, the arrows that do not group with the main body can be used either for practice or if they are really bad they should be discarded.



The two procedures described above can take a lot of time to get right, but it is worth doing. Remember, if during a FITA one arrow strikes the target one scoring zone out because of poor flight or poor matching etc. one point will be lost every time that arrow is shot, and it may be nothing to do with the way it was shot. Because of this the archer will lose 36 points. If the arrow goes two rings out due to poor flight or matching then 72 points will be lost. How many times have we said “if only I had another 10 points”?

Once all the aforementioned procedures, have been conducted then it is time to start practising and getting to know your own equipment and how much to move the sight to get maximum benefit when any sight correction is necessary.

Getting to know your sight:

The archer should start this session from any distance that is comfortable to them, but to start with they should be able to shoot groups from the 6/7 ring inward.

Adjust the sight so that the grouping is around the middle of the target then move the sight down one division of the sight scale, this will make the arrows land high in the target, shoot the arrows again and record the maximum point of impact. If during a tournament the arrows impact high as just recorded then the archer will know exactly how much to move the sight to get the arrows to hit the centre of the target. Do this experiment moving the sight up, down, in and out one or even two divisions at all shooting distances. Remember these adjustments as they will be invaluable during a tournament.

For Field archers there is another area that is essential if the archer's scoring potential is to be realised. For this I will explain referring to the FITA faces and distances. However, other rounds and distances can be simulated from this explanation. Start on a reasonably flat piece of ground with the 80cm face pinned to a target; lay a measuring tape on the ground with the zero at the target and going away from the target up to 60 metres. Go to the 35 metre mark and shoot a few arrows to get a good sight mark, record this as a permanent sight mark. Move back to 40 metres, do not move the sight, shoot three arrows, and see where they land. They will strike lower down the target face, note the distance from the centre of the





target to the centre of the group of arrows and record this for later casting to memory. Adjust the sight to get the arrows to group in the middle of the target and record this as a permanent sight mark. Then move back another 5 metres and repeat the procedure, keep repeating this procedure at 5 metre increments until you reach the 60 metre mark, once there do the same but now moving toward the target until you reach the 35 metre mark again.

Once all the distances for the 80 cm face have been covered replace the face with a 60 cm face and do the same from 20 to 45 metres and back down to 20 metres. When this is completed change the face to the 40 cm face and do the same from 15 to 30 metres and back down to 15 metres, then the same with a 20 cm face covering the distances from 10 to 20 metres then back down to 10 metres. Whilst doing this make sure the permanent sight marks are recorded and the deviation measurements are committed to memory. Remember, it is illegal in a FITA round to carry any form of memorabilia other than sight marks. Once the sight marks and deviation measurements for flat ground have been recorded it is then advisable to do the same on slopes, this should be conducted up, down and across slopes. The arrow flight-paths across flat ground, uphill and downhill are all different. All these measurements will help, if during a tournament the arrow hits high or low you will be able to estimate exactly how much to move the sight to get the next arrow to hit the centre of the target. It will not be a guessed adjustment it will be exact.

The more time taken in getting this right and remembering the deviation measurements the better the scores will be, and the more enjoyment you will have when you estimate a slope correctly and hit the middle with the first shot.



Training to be confident in the wind:

The situations to consider in windy conditions:

The positional change of the arrows hitting the target:

The location where the arrows hit the target differs depending on the intensity and direction of the wind. Even though the wind blows with the same intensity and direction, each archer's position of aiming off will differ. Some of the reasons are; the power and speed of the bow, the size and weight of the arrow, and psychological factor of each archer. However, it would be impossible to calculate it mathematically. Moreover, although the wind of the same intensity may blow, the archer should choose their position of the aiming off after analyzing the situation naturally because many conditions like the width of the archery field, positions of trees or buildings differ all the time.

The change of the arrow flight:

The arrow flight can be quite different during windy conditions. To add to this, archers sometimes feel very sensitive before or during a competition, and are doubtful of their own aiming off technique and feel uneasy. However, archers should not think that it is only their arrows that are affected by the wind, or that the direction of the arrow flight is exceptional during windy conditions. Having confidence about shooting in the wind, coupled with the direction and the balance of accurate shooting and follow through etc. will be very helpful for getting good arrow grouping. Sometimes, despite of the fact that the archer makes an error whilst shooting, the arrow might hit the centre of the target because of the windy condition. Therefore, the archer should not shy away from the wind; it is more likely to be a good friend if the archer trains hard during windy conditions.





When the archers clothes flutter during windy conditions:

When the wind blows the archers clothes can flutter if they are not tight fitting. The bow arm sleeve, or chest area are areas which can cause a major problem, when the wind blows these areas can touch the string and influence on the arrow flight. Also, in extreme windy conditions a loose fitting uniform flutters which can make a sound and even cause the body to shake, therefore the archer should be careful of the uniform selection.

The change of the centre of the body:

If the wind blows strongly the body leans into the wind resisting its power, because of this lean the centre line of the body is moved to one side, or is not stable if the wind direction is constantly changing. Consequently, the centre of the body is not stable so it is important that the stance is accurately set at the time of set-up, otherwise many actions like aiming, or extending etc. become very difficult to achieve correctly.

The direction of the bow arm:

When the wind does not blow, the bow arm and the centre of the bow grip harmonize with the centre of the target quite naturally. However, if the wind starts blowing, the bow arm becomes tense and biased toward the opposite direction from which the wind blows, and the power of the bow arm pushing toward the target arm becomes less. During these windy conditions the bow arm at the time of shooting could be to the centre, or left, or right, of the target, and sometimes the archer even releases whilst it is moving. This movement has a lot of effect on where the arrows land in the target. The bow arm which becomes tense toward the direction of the wind will be less stable and move much more depending on the changing state of the wind, so the balance of holding will tend to collapse. Sometimes, many archers use a balance and rhythm method which is different from their normal routine, when this happens the archer will more than likely be out of balance and make an error. Also, the archer concentrates only on the score and trying to get the arrows to hit at the centre of the target causing the bow arm to move about wildly rather than have the steady form of their natural stance.



Changing the extending time:

Some time's archers seem to speed up the extending time when changing from the qualifying round to the elimination round. If the wind begins blowing, the extending time becomes longer quite naturally and it is difficult to shoot keeping the timing the same as when the archer practices, so many problems can occur. One of the most important things is that the archer should practice having a fast extending time, but only after mastering the ability of producing a stable extending time.

Changing the balance of extending:

If the archer can pull the arrow out from under the clicker at exactly the time they need to, the left and right balance of the archer is formed accurately. But, if the bow arm and body alignment is not correct, the holding time gets longer which will affect the extending balance. This is because the archer pulls out the arrow from under the clicker by using a different method in order to shoot quickly. Therefore, the balance of power and the direction of the extending will tend to collapse. Even though the extending time may be a little longer during windy condition, the archer must make every effort to keep the balance at this time correct.

The reduction of the physical stamina:

Comparing to the normal times, if the wind blows, the holding time gets to be longer and fatigue of the all muscles begins to set in due to resisting the body movement caused by this wind. Because of this the archer's physical stamina will deteriorate and the archer becomes tired which will affect their powers of mental concentration.

The complication of the decision about the aiming off:

When the wind blows, at first, archers become apprehensive about, to where, they should aim off. It is different for the archer who remembers all the peculiarities and has experience about the wind along with the direction and intensity of that particular archery field. The wind often makes the archer feel very apprehensive at every new competition, because the archer has to aim off with little knowledge of the peculiarities of the wind at this new venue. Sometimes, the arrows might hit the place where the archer aimed off or the arrows





Sometimes, the arrows might hit the place where the archer aimed off or the arrows might fly toward much more off line than expected. And sometimes even though the archer aims off using the same aiming point, several arrows may hit randomly around the target. The archer loses confidence in their judgment and continues the competition without confidence because of these problems. During practice sessions in wind the archer should develop the habit which estimates correctly the point where to aim off and confidently aims there. Then during the competition the archer should believe in their own judgment of the conditions, and aims off determinedly and confidently

Uneasiness feeling about the wind:

There are archers who become uneasy whenever the wind suddenly starts to blow. These archers probably have experiences of failure or lose confidence in their own ability. They believe they may make errors because of the wind and the wind might ruin the competition, but other archers may make errors due to the wind as well. Think that the wind is the goddess of the good fortune and is beneficial to you all the time. Enjoy shooting in the wind during practicing sessions, and if you can do this, the uneasiness feeling during competition will not arise but will be a thing of the past.

Changing the team tactics during a team match:

When the wind blows during a team match, some archers forget what each of them has to do and become worried whether one of them will make a mistake due to the wind. Also, the archers may give each other advice about how far to aim off from the centre of the target based on their own shooting. But if the previous archer made an error the information given would be wrong which would cause the following archer to make a similar mistake. However, these thoughts and actions might ruin their own concentration and force them to make an error. It is beneficial for the archers to observe the arrow flight of other archers and make their own judgment about how far they should aim off from the centre of the target, if they do this it can be a great help in executing a good shot. However, even though it is a team event, each archer should concentrate on their own shooting, if they can do this it will lead to a successful team contest. It is advisable that the coach is the only person to give any advice directly to the archers at this time.



Measuring the archer's ability to adapt the wind:

It will be essential that the coach recognizes the archer's ability, method and habit to adapt to aiming off from the centre of the target in windy conditions before progressing to specialised training of aiming off.

The technique of aiming off from the centre of the target:

Sometimes when aiming off from the centre of the target the archer feels uneasy and makes many errors. To train for this the archer should move the sight pin a few turns either up or down, or in or out, in advance of shooting but still aim at the centre of the target, the arrows will not hit in the centre of the target. Once the archer identifies where the arrows land with the sight in this position they can aim off in the opposite direction by a similar distance, and the arrows should hit at the centre of the target. If the archer calculates the measurement by changing the direction of the shot, the coach can identify if the archer has any problems and can then implement a training routine to remedy the situation.

Questions the coach asks the archer when aiming off from the centre of the target:

- To what extent do you “aim off”?
- Should you “aim off” for these conditions? If not, why not?
- What direction and aiming point would give you most confidence to hit the centre?
- What is the direction of the wind that you dislike most?
- What is the direction of extending at the time of “aiming off”?
- What is the direction of power of the bow arm at the time of shooting?
- What is the method you use to observe the wind at the time of “aiming off”?
- How much is the deviation of distance between the place you aimed and the place the arrow landed?
- Where in the target did the archer expect the arrow to hit by “aiming off”?





Measuring the archer's ability to judge the direction and strength of the wind:

During windy conditions the coach asks the archer where they would aim off, and then asks the archer to shoot an arrow. Comparing where the arrow landed in the target the archer confirms whether their judgment and the position of the arrow in the target are the same. This can be done several times until the archer's estimation of where to aim off and the arrow landing in the targets is the same. When measuring the intensity and direction of the wind by this method, the coach can identify how much deviation and the judgmental ability the archer has to get the arrow to land in the centre of the target every time.

The observing changes of the extending time:

When the extending time increases as a result of the wind, the coach observes the archer checking possible problems such as - the direction and balance of the force of the extending, and the change of the posture, by identifying the problem it can be remedied in advance. With this knowledge the archer, and coach, can prepare for windy conditions through adaptations to their training routine. When the archer shoots quickly because of the windy condition it is likely that they will introduce many errors, this makes the archer uneasy. Therefore, the coach should anticipate and identify this condition in advance, and produce a training program to enhance the necessary skills required of the archer.

Evaluating the psychology of the archer:

The coach needs to know in detail the psychological state an archer when shooting normally, and any psychological change when the archer has to "aim off" during wind conditions. This can be done by consultation or by questionnaires. Some archers may find it difficult to speak about this condition or their method of dealing with it because of their pride. However, it is imperative that the coach discovers everything about the archer's method of "aiming off" and this will become a great help in preparing for the next competition.



A method of training to help shooting in the wind:

Archery competitions have gone through the double FITA Round and the Grand FITA Round etc. and many changes have taken place, and currently the Olympic Round is the choice of major tournaments. During the past double FITA round there was time for archers to observe the wind and adapt to it. However, in the present Olympic Round Team event, the archer shoots only 8 arrows and in the individual contest the archer shoots 12 arrows, and the wind or rain becomes a decisive factor for victory and defeat. Therefore, in extreme weather conditions, most archers become worried about their performance during such a competition. Archers should change this thought. This is because no matter how strong the wind blows the conditions are the same for all competitors. Most archers who worry about the wind usually fail in actual competition. If they had trained sufficiently in preparing for the wind, they would rather wait for the wind. Only adapting the archer's training routine for shooting in the wind outside of competition will make the archer confident of shooting in the wind during a competition. An archer who fails during windy conditions should discuss this with their coach and together discover the cause for the failure and find a remedy for the problem. As the wind is natural and not artificially made it is difficult to anticipate the direction, power, or angle of the wind in advance. Consequently, a thorough and composite training programme, to encompass all weather situations, should be designed and rigidly adhered to.





Methods of training for physical power:

An exercise of repeatedly drawing the bow for a given set:

During windy conditions the extending time can be longer than when shooting in calm weather conditions. Due to this, the main muscles that are used to draw the bow become tired quite rapidly and the balance and extending power etc. collapses and mistakes begin to be introduced. Therefore, a training routine for drawing the bow, including the extending time, should be conducted by slightly lengthening the time of the shot to a little longer than when shooting in normal conditions.

Drawing	Recess	Drawing	Recess	Drawing	Recess	Drawing	Recess	...
7	2	7	2	7	2	7	2	...
Seconds	Seconds	Seconds	Seconds	Seconds	Seconds	Seconds	Seconds	...

Figure 1

The archer draws for 7 seconds, then returns to the state of set-up for 2 seconds and repeats the process continuously as shown in figure 1. If the archer can continue this exercise for 8 or 9 times, the archer's physical power is sufficient. For this exercise to be effective it will be necessary for this routing to be practiced 3 to 5 sets a week.

The drawing of a bow and holding at full draw in excess of the time for a normal shot:

The archer draws the bow, as far as they can, using their normal and proper stance, then holds at full draw for as long as the stance stays correct. The archer will practice this routing for 3 to 5 sets three times per week. During these sessions, the archer should maintain drawing the bow further than their normal arrow length but maintaining the balance of extending and the direction of the power, these training sessions should be recorded on the archer's normal training record card.



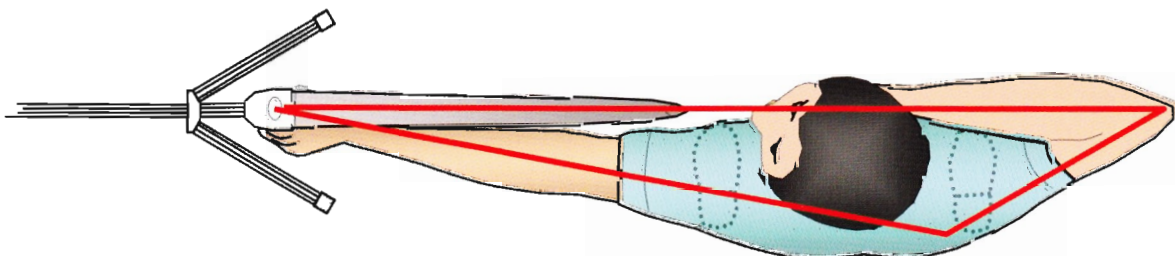
Training for the various abilities to aim off:

Since it is difficult to predict the direction and intensity of the wind, the archer should cultivate the ability to aim their sight at all points around the target face with confidence. So to train for this the archer shoots the bow after moving sight pin in advance of shooting and calculates the position to aim off to get the arrow hit the centre of the target. In this way, the archer receives training by sighting in many directions and they do not feel uneasy when the sight pin is not on the centre of the target face, this also trains the archer to keep an accurate direction of power. Even when it is not windy, sighting and aiming at different locations around the target face can be conducted.



Training a sense of unity and direction of extending when “aiming off”:

When aiming off, even though the archer's arrows hit the centre of the target, the direction of the extending should be placed toward the “aiming off” position. The direction of force should also be toward the “aiming off” location, not to the centre of the target; also the archer's mind should be concentrating on the aiming off position, not the centre of the target.





The aiming off and follow through:

Many archers extend whilst aiming off during windy conditions, and quite often the bow arm shakes and the sense of direction of the power can be lost. Consequently, the bow arm moves right and left, when releasing, the archer then tries to control the direction of the arrow by forcing the bow arm to the direction they want the arrow to fly. This undesired movement can ruin the archers contest, and the rhythm of competition is destroyed. The directional force of the bow arm at the point of the release is very important when the wind blows. During normal training sessions, although the wind blows, the archer should regularly train to maintain the accurate direction of force of the bow arm.

The adaptation of changing the extending time

In general, most archers tend to shoot the bow quickly during windy conditions and it is the ideal method to shoot the bow when the wind does not blow, but all archers already know this method. The reason why it is important to adapt to the wind, and practice for this situation, is that the archer should be prepared for the worst conditions at all times. If there is only 10 seconds left on the clock and the archer still has two arrows to shoot, there is no chance to shoot both arrows. Even if there is no wind during training sessions, the archer should practice so that the balance and direction of extending cannot be destroyed, the archer should even intentionally lengthen the extending time from time to time. And the archer may practice shooting the bow very quickly during a practice session. During a team event, if the previous archer takes a little too much time, the next archer must shoot quite quickly. The extent of the archer's ability should be very wide, and the archer should conduct several training sessions of variable timing in preparation for such occasions.



Maintaining the balance of extending:

During windy conditions the archer's balance during the extending period varies quite a lot compared with shooting on days when there is little wind. The reason is, when it is windy the arms shake and the extending time increases, so the archer gets to hold longer while aiming. In particular, the archer should not extend by curling the drawing fingers or changing the force of the balance to get the clicker to activate. Even if the time of extending lengthens, the balance of extending should be mastered so that it does not collapse.

✂ If there is a change in the height of the bow shoulder in relation to the arrow's height, or any movement of the string on the chest are observed, it is helpful to identify the problems and design a remedial action plan.

The cultivating the ability to judge the aiming off location for different wind strengths and conditions:

When it is windy during the practice time, it is a common practice for archers to aim at the centre of the target and then move their sight to compensate for the deviation caused by the wind. This is not a good practice; at this time it would be better for the archer to “aim off” while shooting to get the arrow to hit the centre of the target. Before shooting the archer should evaluate the condition of the wind and estimate where they should aim off to hit the centre of the target, with practice the archer's judgment should be quite accurate. During normal practice sessions, the archer should be made aware of the importance to cultivate the ability to judge how much to “aim off” for the differing wind strengths and conditions, and they should strive to cultivate this ability.

The observation and information gathering about wind conditions of a sports ground before taking part in a competition:

Many archers and coaches are interested to gain information about the wind direction and intensity in the sports ground where the next competition is to be held. And, the coaches see the flags at the shooting





line or observe other archers' arrow flight during the practice time. The good coach will collect a lot of information from many people about the site before the competition begins. There are many differences depending upon the season and the layout of the sport ground. For some prestigious competitions, such as the Olympic Games, the stands are constructed a few months before the competitions. After building these new structures, the direction and intensity of the wind may differ. Sometimes the direction of the wind changes; this will be most noticeable during a seasonal change. With regard to a major competition such as the Olympics the coach should observe the wind and weather characteristics about one month before the competition and choose a similar site on which to practice. At this time, the archer needs to practice shooting in both directions which will have the effect of the wind blowing from different directions, this will give a lot of benefit as the wind might change unexpectedly from time to time at a tournament. It is wise to observe all items like the flags and trees that can measure, or indicate, wind direction or conditions, and then choose which gives the most reliable information and refer to it.

What to practice during an “open” practice time:

- Determine the position of the aiming off from the centre of the target.
- Measuring the intensity and direction of the wind classified by time.
- Observe the arrow flight of other archers and consider any anomalies.
- Check the differences of the intensity of the flag which is in the archer's own practice field and the material of the flag.
- Consult with fellow team members and the coach about the intensity of the wind.
- Make comparisons between the wind conditions at the auxiliary practice ground and the sports competition ground.
- Make an observation of the wind conditions on the competition field that will be used for the finals.
- During the open practice time, the archer should observe the wind condition rather than concentrate too much on the arrows.
- Refer to the other archers' arrow flight during the competition.
- When the wind is blowing, it is good practice to refer to other archers' arrow flight. This can be very useful especially when the weather vane changes direction or the fluttering of the flags changes intensity. It can also be very



useful during the team event, the archer who shoots first should decide, after considering this information, how far off centre they should aim so that the arrow lands in the centre of the target. If an archer stands on the shooting line then tries to calculate where to aim, their mind will introduce many conflicts and their judgmental ability becomes unclear. If the wind changes in intensity or direction, the archer's judgment would change.

- Advice from a fellow archer or team coach during the team event:

During a practice session for a team competition, the coach or archers should not give advice about the wind or where to aim off. However, archers may give advice to each other at the time of the team competition but the judgment between the archers or between them and the coach might differ from time to time. Therefore, they should not give advice to each other even at practice time, but the coach should advise about the state of the wind and point out any objects that indicate the strength or direction of the wind. If the practice through the training sessions went well there is a good chance that the coach and the archer's thinking will be the same. If the archer's thinking is different, the judgment conflicts and the rhythm of competition will be destroyed.

- When the wind blows at a team event, the archers must be careful of the shooting order:

The shooting order of when the wind blows and when the wind does not blow is very critical, during normal practice sessions the most effectively shooting order should be decided, and it is better to practice the order in advance of the competition. The order of shooting can differ depending on the characteristics of the three archers. The coach should refer to each archer's psychological condition, the time of extending, adapting ability, and control of the wind conditions etc. before deciding on the team order.

- The image training:

If the wind blows, the archer becomes uneasy psychologically because the arrow flight is not in a straight line with the target. Therefore, it is better to conduct image training during the practice session drawing the image that although the arrow flies off line with the target, the arrow still hits the centre of the target.

- The uniform flutters in the wind:

The archer should check that the uniform does not flutter in the wind causing the string to touch the collar or sleeve of the upper garment. Sometimes, there might be a problem during the competition because the uniform flutters making a sound which could affect the archer's concentration, also different





materials make different sounds in the wind. The archer should prevent this situation and practice wearing the uniform in advance of the competition. This is particularly important for archers who live in a hot country and who normally wears short-sleeved uniforms. If there is a competition in another country where the weather is colder the archer may put on the long-sleeved uniform. This might cause the bow arm to be hit by the string at the time of shooting, moreover if the uniform flutters in the wind, it will get worse. So the sleeves and the shoulder part of the uniform where there is a possibility that the string might hit, should be fixed out of the way of the string with a pin.

- The tuning of the equipment:

When the wind blows, the position of the aiming off differs depending on the tuning of the equipment. The weight and length of the arrow point and the size and shape of the fletchings etc. affect the group size of the arrows in the target, also the weight of the bow and stabilizer setup etc. all affect the stability of the bow in windy conditions. In particular, the spring pressure of the cushion plunger should be set correctly which will help counteract any direction the wind may come from.

- The preparation, adjustment, and practice at a competition when the wind blows:

When the wind is blowing, the archers' posture often deteriorates to a point where they are not shooting correctly. It could be due to the atmosphere of the competition that the body forgets the feeling it should have. The archer might think that there are many methods to overcome this situation, but the archer does not need to think of a complicated remedy. The archers needs to, and should, reaffirm their own good feeling by shooting at a short distance before and after the competition. This will help the archer produce a good form unconsciously during the competition. The archer must observe any movement of the wind vane and consciously control the extending time and aim off in the correct direction and distance so that the arrow lands in the centre of the target. The most important thing is the archer should make a friend of the wind, and have confidence that the wind will help them all the time.



Coach kim Hyung Tak

ARCHERY SCHOOL



With Coach Kim



FITA coaching manual video was made in the Coach KIM training center.



































































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