Technical Material

Archery Technical Material – of Contents

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EQUIPMENT SELECTION

Bows

Select bows carefully. The bow weight, or draw weight can never be too light for initial sessions. Once the archer learns proper technique, and has developed some archery muscles, he/she can graduate to a bow with the proper weight for the type of shooting he/she wishes to do. Below is a chart that suggests the bow weight to use at the archer's draw length.

Bow weight for beginner archers:	
Children 6 - 8	- about 10 lbs
Children 8 - 12	- about 12 lbs
Boys 12 to 14 years	- 15 to 16 lbs
Girls 12 to 14 years	- 12 to 16 lbs
Boys 15 to 17 years	- 16/18 to 18/22
Girls 15 to 18 years	- 15/18 lbs
Men	- 16/18 to 20/24
Women	- 16/20 lbs

Note: Due to these low weights small children will not be able to shoot long distances. Even if they could, shooting at long distances is not appropriate at the beginner level.

Recurve bow weights are measured at draw lengths of 28" to the back of the bow (26 $^{1}/_{4}$" from the nocking point on the string to the pivot point of the bow grip, plus 1 $^{3}/_{4}$", for the width of the window). To estimate the actual weight at any other draw length, add or subtract two lbs per inch of draw above or below the marked weight

Example: A bow marked 24 lbs at 28" would be 28 lbs at 30", and 20 lbs at 26".

The length of the recurve bow is measured from tip to tip along the bow, when the bow is unstrung. Most manufacturers make recurve bows 62" to 70" long. When teaching archers, it is better to use a bow that is too long, rather than too short. Short bows are difficult to pull at longer draw lengths, and the angle of the string at full draw may pinch the archer's fingers making it difficult to release properly. As well, shooting a bow that is too short may damage the bow.

Arrow Length	Bow Length	
	wood	fiberglass
18 – 20"	Not under 52"	Not under 42"
21 – 23"	Not under 56"	Not under 48"
24 – 25"	Not under 60"	Not under 54"
26 – 27"	Not under 66"	Not under 62"
28 – 29"	Not under 68"	Not under 64"
29 – 30"	Not under 70"	Not under 66"

For wheelchair archers a long bow may cause problems with ground clearance, and clearance between the string and wheel at full draw. This can be remedied by lowering the axle on adjustable chairs, or increasing the thickness of the seat cushion. A wheelchair archer will place the lower limb tip of the bow on the ground between his/her arrows and the front wheel. A bow tip protector is recommended to prevent damage.

Ambidextrous bows

A few companies manufacture bows that can be used by either right or left-handed people. These bows are highly recommended for group instruction. Most bows of this type have 2 sight windows and can be used by left or right-handed archers by turning them over. These bows work very well for the archer learning basic form. They are not recommended for competition. When shooting the bow right handed simply ensure that the bow window is on the left side of the bow, and vice versa for the left.

Arrows

Arrows are made of a variety of materials: wood, fiberglass, aluminum, and carbon or a carbon/aluminum combination. Wood arrows are not recommended, because they break without warning, provoking serious injuries and they are difficult to repair. Fiberglass arrows are more expensive and stronger than wooden ones. These are not recommended at the beginner level because they are too heavy for light bows. Aluminum arrows are the most popular and are very versatile.

They are very closely matched and can be purchased in many sizes and weights. This type of arrow requires some maintenance, especially straightening. To reduce the amount of maintenance we recommend shafts in XX75 or better alloy.

Carbon arrows are very carefully matched. They are light, and cannot be bent so they do not require straightening, and less maintenance is required. However, they can shatter and cannot be repaired. Their price is now so competitive, often they are cheaper than aluminum arrows.

Try to match each archer's set of arrows. Each archer should have a set of three arrows. Each set should be marked or crested for easy identification. Each arrow in the set is the same length, size and composition.

The major technical criteria are: weight, spine and length. Weight is determined in grains and is the total weight of the arrow complete and ready for use. Arrows that are lighter fly faster. The weight of the arrow can be affected by using a nock or point that is different from the others or re-fletching some arrows with thicker or larger size feathers. However, most factory made arrows are closely enough matched for a beginner group to perform well. Due to the low weight of the bows at the beginner level, light arrows such as carbon arrows are recommended.

Spine is a measure of the static amount of bend in thousandths of an inch when placed between two supports and depressed at its middle with a two pound weight. The arrow bends as soon as it is released, and the spine of the arrow determines the time it takes for the arrow to straighten out during its flight. An arrow that is not stiff enough bends too much and takes too long to straighten out. Conversely, an arrow that is too stiff does not bend enough and may hit the bow as it goes by the bow handle. It is important that each arrow in a set has the same spine so that each arrow in the set flies the same. Generally, it is better to shoot arrows that are a bit too stiff rather than too weak. All arrows are marked to indicate their weight and spine.

Length is measured in inches from the bottom of the slot in the nock to where the shaft is cut, and should be within two mm or less for a matched set. A greater difference affects the aiming process, the draw length, the weight, and the point of balance of the arrow. Also the set is no longer matched, and will not group. Arrows that are too long are satisfactory. It is not safe to shoot arrows that are too short.

Bow strings

Bowstrings for this level are most often made of Dacron. Some inexpensive bows come with a braided string that is tied at one end and a loop at the other. These strings should be replaced with Dacron strings whenever possible. Dacron strings come in a variety of colors, and lasts a very long time. Usually beginner level bows are not designed to be used with other string material. When ordering new strings from a local dealer, look on the bottom limb and if it has an A.M.O. (American Manufacturers Organization) number.

Give the dealer that number and he will know how long to make the new string. If there is no A.M.O. number, then measure the length of the bow while it is unstrung and give that length. Eight strand strings generally fit very well to beginner level bows. Recurve strings are usually three inches less than the bow's A.M.O. length. Compound string length is usually written on the lower limb.

Arrow rests

The use of an arrow rest is important as it reduces the area of the bow the arrow touches, creating the least amount of friction when the arrow begins to move as it is released. Arrow rests made from wire are expensive. Rests made from plastic are recommended because they are more indulgent to fishtailing than wire ones. The arrow rest should be glued onto the window directly above the pivot point of the handle, and should be aligned squarely, perpendicular to the string. It is also recommended to put a bit of glue around the arrow rest.

Sights

Simply, a sight is a main sight bar with an adjustable elevation bar (vertical), a side windage adjustment (horizontal), and a pin. Sights are not required for the initial sessions, though they may be used. The archer may become obsessed with correcting bad shots by moving the sight, instead of concentrating on shooting form.

There are many simple inexpensive sights available. It is possible to make an inexpensive sight with a 1.2 x 13 cm strip of 3 to 5 mm cork sheet, felt, or weather stripping, glued to the back of the bow. Use a pin with a large coloured head as an adjustable bar (dot). This works quite well, but can move very easily. When attaching the sight to the bow, ensure the sight is vertical. Make sure the arrow does not hit the sight when released. If the sight is screwed into the bow, it should be screwed into a part of the handle that does not flex during use. Do not make holes into the fiberglass. When drilling in a composite bow, make sure the holes have the proper size. A hole slightly smaller than the screw is best, allowing the wood screw to bite better.

Arms guards

An arm guard should be stiff enough to remain flat on the arm, or over clothing. A better quality arm guard has a stiffener sewn into the guard to ensure flatness. To fit properly the arm guard should have two straps. The model with three straps can be used by beginners but will eventually bulge at the elbow, creating more problems than it solves. This type covers the arm beyond the elbow where beginners sometime get hit by the string. The cross band, elastic strap arm guard can bulge with wear, causing string clearance problems. Arm guards can be used on either the right or left arm as required.

Safety pins

Pins or some tape can be used to keep loose clothing from the path of the bowstring.

Finger protection (finger tabs)

The purpose of a tab is to protect the fingers and to ensure a smooth uniform surface to effect a clean release. A little talcum powder ensures a smooth no stick surface, and prolongs the life of the tab. Finger tabs are not used for initial instruction. This device is introduced as soon as the archer feels a finger irritation. Without this device the beginner will be

more comfortable. Not wearing a tab allows for better string finger positioning.

However, later the archer will achieve a cleaner release with a tab. Finger tabs are preferable to shooting gloves as they present fewer fitting problems. The tab allows the archer to feel the string and the arrow. This helps control in the early stages. Have about 20% left-handed tabs available. The inexpensive double-sided plastic tab serves quite well at the beginner level. This type of tab can be used for either right or left-handed shooters and comes in small, medium and large sizes. The size of the hole should be such that the tab catches behind the second knuckle and resists being pulled off by pressure from the outward end of the tab. The tab should be big enough to cover the drawing arm fingers when bent to engage the string. Any surplus slows the string on release and cause arrow flight problems.

The use of a mechanical release is necessary for quadriplegics. Use a mechanical release attached to the wrist and has jaws to grip the string. In cases where hand agility is restrained, it will be necessary to modify the activation of the trigger. For example, it could release when touching the front of the chin.

Quivers

There are two types of quivers suitable for group instruction: the belt or side quiver, and the ground quiver. Shoulder and pocket quivers are sometimes used, but they are not suited to the beginner level. Belt quivers can be made to act as either right or left-hand by reversing the hook. They are suitable for indoor and outdoor shooting. Ground quivers come in two different types: indoor and outdoor.

The indoor types have a flat base that does not mark the floor and is heavy enough to support the arrows. The outdoor type has a metal spike on the bottom so it can be driven into the ground to prevent the wind from tipping it over. Some ground quivers also serve as bow supports and have two curved prongs at the top to rest the bow. Floor quivers should be placed about 30 cm ahead of the right foot when at the shooting position on the line for right-hand archers; left-hand archers use the left foot.

There are five disadvantages to using a ground quiver:

- coming back from the buttress to the shooting line, archers must carry their arrows in their hands; this is sometimes unsafe
- they must be moved when moving the shooting line
- it increases the space per archer on the shooting line
- two are required: one for indoor and one for outdoor shooting
- they must be placed in exactly the same place each session to facilitate uniformity of the nocking procedure during the shooting process.

Provided that a quiver comfortably holds six arrows, it is large enough. The extra size sometimes offered in catalogues has no advantage at this level.

The wheelchair archer can:

- use a ground quiver
- hang the quiver on the armchair
- keep the arrows between his/her legs, with the points on the footrests
- put arrows against the side of the chair

Bow sling

Introduce the bow sling during a bow hand exercise, not during the first few practice sessions. We recommend the following types:

- Lace: fixed around the wrist, and passing through the fingers and in front of the riser
- Two finger type: fixed around the

thumb, and either the forefinger or middle finger

We do not recommend the bow sling be affixed to the riser because the bow moves so much that very often the archer will stretch his fingers, or grab the bow. When using a sling with wheelchair archers, it is necessary to place protection on the wheel to protect it if the bow falls. The use of a bow sling is necessary with quadriplegics. For them the bow sling may need to be modified because it has to retain the bow in the vertical plane. It should be light, as otherwise the bow slips vertically and falls to the ground.

RANGE ETIQUETTE

While any shooting is in progress, the archer should always be aware of the rights and feelings of the rest of the group. Archers come in all types, and while some like to act up on the line, others take their shooting very seriously. Consideration should be given to those who might be upset by offhand behavior.

Here are some things you should watch:

- don't talk on the line or distract other archers during the shooting of the end
- when you have finished shooting, step back from the shooting line to give the other archers a chance to complete their ends
- do not comment about someone else's shooting during an end
- have an encouraging remark to pass, rather than a sarcastic one
- do not make unkind remarks about your own shooting as this may upset or distract someone
- if you have problems, step back and signal the coach - don't bother your fellow archers
- leave the other archers' arrows in the target unless asked to remove them
- respect the other arrows in the target while you are drawing your own
- if asked for advice, don't take it upon yourself to do the job of an official who is qualified to do this work
- pay attention and cooperate with club officials carrying out their duties
- never touch equipment belonging to someone else without their prior consent
- be sincere when taking the score; always be fair
- attend meetings and air your views there, do not gripe on the range and upset others
- make yourself available for some duties, such as taking in targets, collecting score sheets, etc.
- be a good sport and remember it's not the winning that counts, but the participation
- absolutely no alcohol should be consumed on the range. Anyone under the influence of alcohol must be refused permission to shoot.

SETTING UP A CLASS

Establish the following information:

- the age range of the archers
- the length of the program
- the number of sessions scheduled
- location, dates and length of sessions
- equipment required by the archers
- facility equipment required
- insurance/liability considerations

Class size

The size of the class depends on the number of instructors. One instructor can safely handle 2 to 3 beginning archers.

Knowing the archers

Maintaining simple records helps manage the archers. A directory is useful for the administration of the program. Set up a database with addresses of your participants.

Equipment chart

It may help with the assignment of club equipment to chart each archer's needs. Include data on the bow and arrows, eye dominance, and problems you are working on.

Medical information card

Develop an archer medical information card for your athletes. Ask parents to fill these out at the beginning of the program. Review this information so you are familiar with potential problems. This information must be kept confidential.

Pre-practice checklist

- secure the shooting range by posting signs and ensuring exit doors cannot be opened from the outside.
- check buttresses and targets
- ensure that teaching equipment is ready
- shooting equipment is ready
- repair tackle box is available
- first aid kit is available

Shooting side choice (eye dominance)

Method One: Extend both arms in front with the hands turned up and the palms away. Cross both hands so the V between the thumbs and forefingers form a small opening. With both eyes open, align this opening with some object in front. Keeping hands steady, close the left eye. If the object is still visible, the right eye is the dominant eye. To confirm this, the archer slowly brings his/her hands back towards the face. The hole is in front of the dominant eye.

Sometimes this method does not work because the archer cannot close one eye. The following might be more effective. Provide a piece of cardboard, approximately 15 cm sq. with a small hole in the center, 1.5 to 2 cm in diameter. Hold this at arm's length and with both eyes open, align the opening with an object in front. Slowly draw the cardboard back to the face until it touches the nose. The opening is in front of the dominant eye.

Method Two: Stand about one meter from the archer. Have him/her form an opening in the crossed hands like in method one. Have the archer look at you through the hole. The eye you see is the dominant eye.

Method Three: Extend one arm and with both eyes open. Point at an object with a finger. Close the left eye. If the object stays in line with the finger, the right eye is dominant. Reverse procedure and close right eye to prove the left eye is not dominant.

In summary, if the right eye is the dominant eye, the arrow is drawn with the right hand, and the bow held in the left hand. The reverse is true if the left eye is dominant.

Determining draw length

Use an elastic string over the string bracing the bow, and a very long arrow. The archer pulls the string to full draw, without moving the bow shoulder up and the head forward. While at full draw, mark the arrow shaft at the back of the bow handle. The archer's draw length is the distance from the mark put on the arrow shaft to the bottom of the nock groove.

Determining arrow length

To determine the arrow length for an archer, simply add at least 2 inches to the draw length. Bow length and bow weight can then be selected.

THE DEMONSTRATION ORGANIZATION and PRESENTATION

People learn by observation, examples, knowledge by observation, advice emphasized by mimicking, trial and error, and repetition. Observation is an effective method of learning, and is the one used first. Demonstration allows the archer to observe. However, demonstrate exactly what to do. Use the same equipment as the archers, and respect the archery safety regulations. Observation implies both seeing and hearing. For it to be effective, the archers must be able to see what is being demonstrated and hear what is being said.

Prior knowledge

Let the archers express their knowledge about the skill being emphasized during the practice session. Allow questions before a demonstration. Do not be surprised at the knowledge the beginners have. Beginner archers have perceptions of the sport or even prior experience.

Giving the archer the opportunity to express his/her perceptions has advantages:

- if incorrect the opportunity to correct them, to better express your ideas, and teach with greater efficiency
- if incomplete, fill in the missing blanks
- archers participate, giving them motivation and avoiding the monotony of a single speaker
- you may hear certain comments that present the exercise more effectively
- if they are correct, same advantages as above and the work has already been done by others

No method is perfect. This one is no exception. Some archers may monopolize the conversation too often and/or talk for too long. Limit comments to the subjects discussed. Use this educational tool because the dynamics of analysis and exchange outweigh the difficulties.

Teaching aids

The attention of beginner archers is often distracted by the release of the demonstrator's arrow. Furthermore, some archers often judge credibility based on where the arrow hits the target. We suggest you demonstrate:

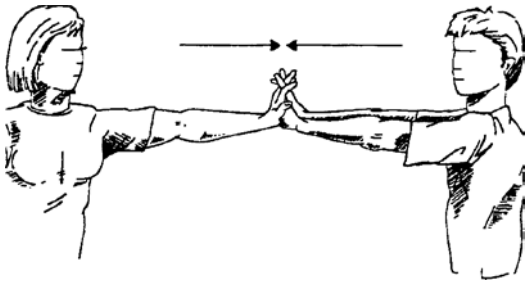
- by either shooting without target faces, into an empty butt, or directly into a net
- by either choosing not to shoot any arrows, using dry-shot mechanisms, or a rubber band
- by looking at the archers during the demonstration to see if they are observing the essential points
- by hiding some parts of the demonstrator's body not involved in the key point of the demonstration

Since teaching aids help archers better understand future performance, it is important that they be as similar as possible to those used during practice. Moreover, these aids can not differ too greatly from the actual shooting context so

that too much time is not wasted on progressively reconstructing it. Consistent with this idea, let's take the exercise on repulsion effort as an example. To understand the string leg's participation we could create the following situations by using three different teaching aids. Even if they are very similar they can be perceived differently by the archer, since:

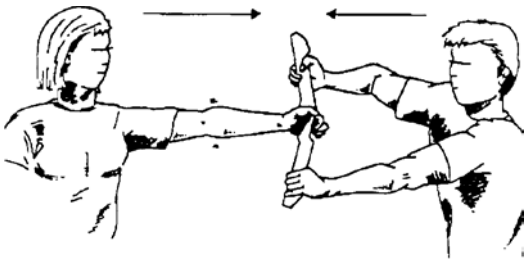
- The archer is being pushed by an individual, forcing the archer to counter with his/her string leg. Demonstrate how this applies to archery.

human assistance only
"I have to resist when pushed"

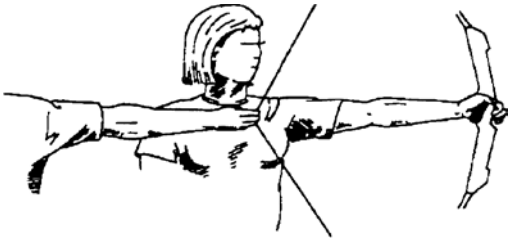


- An individual pushes on the archer's bow forcing the archer to resist with his/her string leg. Demonstrate that the string leg would act in a similar fashion if the bow was being used.

human and riser assistance
"I have to resist when my riser pushes me"



When the archer's bow is drawn, the bow pushes against the archer, forcing the archer to counter with his/her string leg.



human and bow assistance

"when my bow is drawn, I have to resist"

Notice how different teaching aids can help perceive situations differently.

Effective archer arrangement

For safety reasons, prohibit archers from walking beyond the shooting line when someone is in the process of shooting. However, we break this rule during demonstrations because the "3/4 front" view is the best observation angle. This is why demonstrations are done at short distances from the target, 3m to 10m, to eliminate the risk to the archers in the 3/4 front view and to give the instructor the opportunity to shoot while watching if they are paying attention to the essential point of the exercise.

Instructions (during a demonstration)

Instructions are essential to the learning process and group activities:

- speak loudly to be heard by everyone, and use understandable language
- use the same wording as in the technical material, so the archers can consult it later to become familiar with this terminology
- only provide relevant instructions, avoid those not related to the archers' needs
- the most productive instructions go with expressive gesture.
- when the archer can feel the action, and note the results, he/she is more motivated to implement the advice to correct errors.
- from the first practice session, learn each archer's name

If the demonstration is performed by someone else, be in a position to point out main areas of interest, or those deserving special attention, without blocking the archers' view.

If you perform the demonstration, instructions are given before, during and after the demonstration.

Feedback and observation

Observation is required before any feedback is given. Observation is one of the most fundamental instructing skills for archery.

If faults in execution occur, feedback must be used to teach the proper execution of the skill by making the archer understand how he/she should perform versus how he/she is performing the skill now. How the archer is performing is not as important as how it should be performed.

OBSERVATION PLAN

Using our knowledge of the skill and its key elements we can define observation by answering the following questions:

What? How? From where? How much?

Observe what?
Observe the key elements of the skill being performed.

Observe how? Which observation strategies?

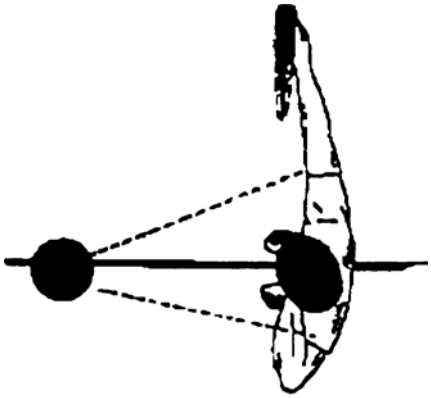
Go from the general to the specific. First paying attention to the entire sequence, observe:

- overall execution
- repetition of preliminary movements and positions
- likelihood these preliminary movements and positioning produce the proper alignment of forces
- the ease, nature, and precision of the forces generating movements
- the alignment of forces, and their likelihood of producing efficient release and propulsion
- visual and physical follow-through during release
- body movements during release, being a continuance of the force generating movements (full draw efforts) reveals information on these efforts

Only afterwards can observation of detail be of interest.

Observe from where?
Where to observe depends on what is being observed. In relation to the archer, position yourself:

- a minimum of 3m for overall observations
- at approximately 2m to observe the basis or the various sequence stages
- at no more than a meter for detail analysis



Instructor faces the archer on the shooting line

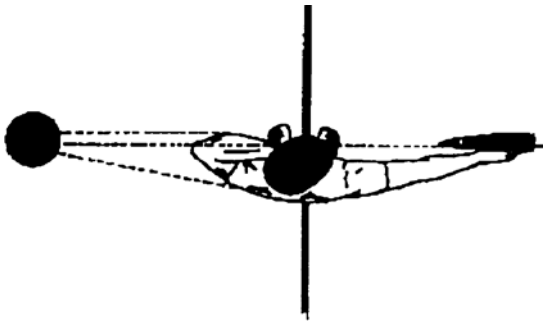
Allows for two skills to be observed:

- setting-up and maintaining alignment of forces during draw and at full draw
- follow-through

The key elements are:

- consistency of the draw (no creeping)
- string forearm alignment with the arrow in the horizontal plane
- shoulder alignment during draw, and the preservation of alignment at full draw and release
- consistency in height variance between the arrow shoulder and the arrow at full draw
- head stability, especially during the last few centimeters of drawing, at full draw, and during release
- keeping the bow arm horizontal during release
- stance at full draw and release
- backward motion of the bow arm during release and to its final position
- amplitude of the bow arm forward motion and its front final position
- bow fingers movement during release.

instructor is 2–3m behind the archer in the shooting plane, looking from above the arrow's horizontal plane trajectory



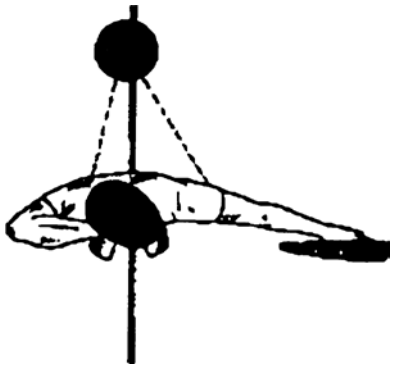
Allows two skills to be observed:

- setting-up and maintaining alignment forces during draw, full draw, and follow-through
- preserving erect stance.

The key elements are:

- string elbow movements;
- string forearm alignment with the arrow, in the shooting plane
- head stability, especially during the last few centimeters of drawing, but also at full draw and release
- erect stance and bow cant in the shooting plane, and the preservation of them at full draw and release
- backward motion of the string arm during release and its final position
- string fingers movement during release

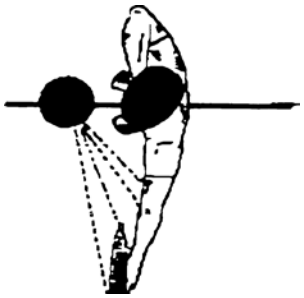
instructor stands on the shooting line behind the archer



Allows setting-up and maintaining alignment of forces during draw, at full draw, and follow-through, to be observed. The key elements are:

- consistency of the draw, no creeping of the arrow point at full draw
- string forearm alignment with the arrow, in the horizontal plane
- shoulder alignment during draw and the preservation of this alignment at full draw and release
- consistency in height variance between the bow shoulder and the arrow at full draw
- head stability, especially during the last few centimeters of drawing, but also at full draw and release
- stable or vertical bow arm movements during release
- erect stance in the shooting plane and the preservation of this erect stance at full draw and release
- backward motion of the string arm during release and its final position
- bow arm's forward motion during release and its final position

instructor stands beside the archer, watching the bow arm



Allows two skills to be observed:

- quality of bow arm flow
- unobstructed string displacement

The key elements are:

- consistent distance between the bow shoulder and arrow at full draw
- stability or lateral bow arm movements during release
- bow fingers movements during release
- preservation of an "unlocked" bow elbow
- string clearance
- bow arm forward motion during release
- bow arm final position

instructor squats at the archer's feet, watching from below

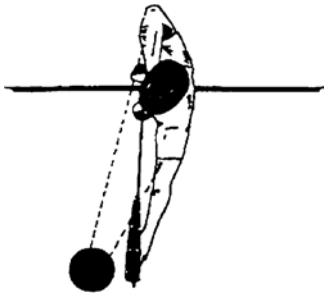
Allows the maintaining alignment of forces during draw, at full draw, and follow-through to be observed.

The key elements are:

- string forearm alignment with the arrow
- consistent distance between the bow shoulder and the arrow at full draw
- stability or lateral bow arm movements during release

- backward motion axis, or string hand finger spread during release
- preservation of an “unlocked” bow elbow
- string displacement
- bow arm’s forward motion during release and its final position

instructor faces the archer
at a short distance from the arrow



Allows two skills to be observed:
- quality of visual continuity
- preservation of alignment forces during draw, at full draw and follow-through

The key elements are:
- consistent distance between the bow shoulder and arrow at full draw
- shoulder alignment orientation when drawing, and the preservation of this orientation at full draw and release
- head stability, at full draw and release
- backward motion axis or string hand finger, spread during release, and its final position
- facial movements, especially during release

How many observations?
The number of shots to be observed before giving feedback depends on the circumstances.

Two examples are:
- If the execution is dangerous for the archer, other archers, or the equipment, an immediate intervention is advised, usually taking the form of a let down order. The significance of this order must be known to all beginners before they shoot their first arrow
- If a skill is not being well executed observe the next arrow. If the same type of execution is performed comment with simple key words, and then continue observing. If the execution is still faulty, you must intervene.

PHYSICALLY CHALLENGED ARCHERS

A real effort should be made to introduce challenged people to archery, an activity that allows them achievements on an equal basis with others. Each one of these individuals has a right to enjoy the sport and as an instructor, you should do your best to help them.

Archery, as a recreational and competitive activity, offers an excellent opportunity for physically challenged and able-bodied to participate on an equal basis. Effective shooting can be experienced by those with physical limits in their lower limbs and, with the arrival of compound bows, by those with physical limits in upper body function as well. There is a variety of specialized equipment available to assist the physically challenged archer.

Learn about the limitations by talking directly with the challenged archer, or their guardian. In almost all cases, the novice will best be able to tell the details of their particular challenges. If not, consult a person in the medical profession.

Arm yourself with helpful hints and tips and when problems arise, and be prepared to offer suggestions. The instructional material on instructing the physically challenged focuses mainly on wheelchair archers. They comprise the majority of physically challenged archers.

However, be aware there are more physical limitations than being in a wheelchair. In most cases, there are no reasons to exclude them.

Here are some tips:

- lower limb amputees may present you with challenges regarding stance stability, even if they regularly use a prosthesis. If the stability problem is extreme, you may wish to suggest the use of a wheelchair, regular chair or a stool for shooting;
- upper limb amputees obviously have difficulty with the draw or even holding the bow. A special device such as a mouth-held release or elbow brace can be fabricated to assist in this situation;
- back or shoulder problems may require an archer to use a lower bow weight or a compound bow with a release;
- certain illnesses (e.g. diabetes. MS. CF) may contribute to fatigue. Be aware of this and adjust training schedules as necessary for these archers;
- psychological or physiological tics, or spastic muscle activity creates a whole new set of problems in that they are generally unpredictable. In extreme cases, when safety is compromised, these individuals may not be able to participate;
- body dimensions may require alteration of the basic shooting form. An example is an archer with long forearms; he/she may not be able to comfortably pull to full draw with elbow at shoulder height. The elbow may have to be raised slightly;
- blind archers shoot with audio sighting systems which require minor alterations to the buttress
- with deaf archers, the best suggestion is to learn sign language. If this is not possible, be sure to face them and enunciate words clearly to assist them in lip-reading, and be prepared to have writing paper and pen handy.

It takes an extraordinary amount of energy and concentration for the deaf to read lips, so it is a courtesy to learn to sign and a necessity to have paper handy. Assign a shooting buddy to tap them on the shoulder when it’s safe to shoot or to stop shooting. Also, include flags with the timing of the ends so they know when to start or stop shooting.

The wheelchair archer

There are unique challenges to archers who shoot from a wheelchair, such as string clearance, bow clearance, sitting and chair positioning.

String clearance

The armrest on the bow side should be removed during shooting. If clearance is still a problem there are a number of ways to resolve the problem including: increasing the thickness of the cushion; narrowing the chair; lowering the axles or cambering the wheels. Often the archers themselves are used to making their own adjustments, if not, a local wheelchair dealer can assist in making any of these adjustments to the chair.

Bow clearance

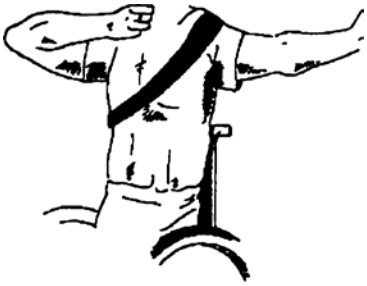
Use a shorter recurve bow, or a compound bow if necessary to achieve proper draw length.

Sitting position

An area that requires attention is maintaining a consistent sitting position in the chair. Sitting balance varies considerably with wheelchair users. Those with very poor balance will benefit from a chest or lap strap to gain the extra support required for drawing the bow.

The seat cushion should be fairly firm with a non-slip cover such as corduroy or suede, rather than nylon. The chair back should be as high as possible without restricting comfortable movement of the shoulders. Usually it stops just below the shoulder blades. It is important that the archer finds a comfortable position that offers good support because to shoot consistently he/she must be positioned exactly the same for each arrow shot.

chest strapped archer



You can assist the archers to find some points of reference and teach them to check their position often against those references. The archers will have a tendency to lean back away from the target to compensate for a lack of balance as they draw the bow. You should watch for this, particularly as the archer becomes tired. This fault may also cause further problems with string clearance at the chest and the wheelchair.

Position the chair on the line at a 90 degree angle to the target (sight along the axle) and adjust the chair to improve alignment, and string clearance of the chest and arm. This is a trial and error effort that needs to be tested periodically until the archer has developed consistent form. Check the level of the chair on the field. Once the chair is well positioned, the archer can remain on the line while another archer collects his/her arrows.

ARROW FAULTS

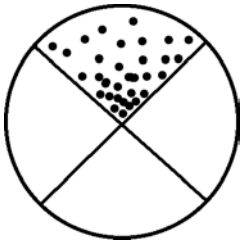
This unit is designed to be used in conjunction with the case studies used in instructing workshops.

In order to raise the score of an archer, one must be able to analyze the arrow patterns on the target and make correct judgements as to what has caused them. One must be aware of recurring misses or the movement of a single arrow out of the group. In some instances, these movements may occur at a particular distance, or as the result of certain weather conditions which have a bearing on the function of the archer or equipment.

When a problem becomes evident, the total form must be analyzed to decide what action should be taken to correct the situation. Correct performance must be reinforced rather than dwelling on incorrect form. Often the area of the body where the symptoms of the errors are noted is not where the cause originates. In order to properly correct problems, one must be able to distinguish between the symptom and the cause of the problem.

ARROW PATTERNS

High Arrows



Causes

- bow is held too low on the grip which stresses the lower limb, building up extra limb stress, lifting the arrow on release
- wrist is broken more than usual, applying pressure lower on bow grip, increasing lower limb stress

Correction

- ensure that bow grip is always consistent and in the same position on bow
- Use reference locations as a check.

Cause

- raising the bow hand at the moment of release

Correction

- a good follow through must be maintained. At the moment of release all tension must remain the same as it was before the release.

Cause

- bow arm or shoulder is extended more than normal which increases draw length and may also cause left shots

Correction

- allow the bow arm to seat itself in the shoulder socket. Apply only enough pressure toward the target to keep the bow arm straight.

Cause

- pinching down on the arrow may raise it off the rest or cause a bend in the arrow that, on release, flips the arrow up off the rest. Pulling more with the bottom fingers loads the lower limb.

Correction

- feel an even and consistent pressure on the fingers of the drawing hand during and after the draw
- if elbow of drawing arm is held too high, this could

put extra pressure on the bottom finger

Cause
- flicking fingers down on release.
- allowing fingers to open one at a time with the lower one last rather than all at the same time

Correction
- use only the proper back muscles to draw and hold the bow. Ensure that the hand is relaxed. Release should be accomplished by simply relaxing he fingers of the drawing hand

Cause
- lifting the nose off the bow string or tipping the head backwards

Correction
- The anchor must always be consistent and with nose slightly touching the string for recurve archers. The use of a kisser button or peep sight may help.

Cause
- mouth open has the same effect as lowering the anchor if lower jaw is used as anchor point

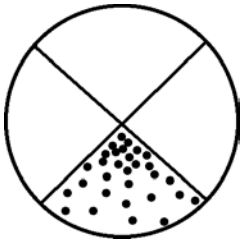
Correction
- Always keep the teeth together.

Cause
- anchor too low or too far back

Correction
- Spend enough time during practice to learn the exact location of the anchor and then maintain that position.

Equipment Concerns
- nocking point moves down from its correct location, causing increase in size of groups and “porpoising” of the arrow in flight
- new string may have a lower brace height or fewer strands
- check for broken strands in an old string
- if the arrow rest is too low, arrows may strike the bow shelf
- arrow rest installed at an angle
- nocks off line on shelf, pointing up at the back

Low Arrows



Cause
- gripping the bow tightly when a loose grip with a sling is normally used

Correction
- Spend more time during practice sessions to work on keeping the fingers of the bow hand are open and relaxed.

Cause
- bow arm bent which shortens the draw length

Correction
- maintain enough tension in the bow arm to hold it straight and pointing towards the target

Cause
- no follow through – collapse on release
- bow arm drops
- drawing hand moves forward on release
- creeping
- dead release

Correction
- All of the above are caused by insufficient back tension during the

shot. The archer must be taught how to maintain tension throughout the shot, as well as concentrating and aiming.

Cause
- low elbow of drawing arm

Correction
- Ensure that elbow is in a line with the arrow or slightly higher. It is easier to use the back muscles with a high elbow.

Cause
- tension in knuckles of drawing hand with the hand cupped

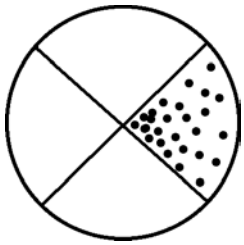
Correction
- The drawing hand must be kept completely flat by relaxing all the muscles of the hand except the tips of the fingers.
- The arm should be straight from the elbow to the second joint of the fingers.

Cause
- inconsistent head position, especially chin too low

Correction
- Head angle should be carefully learned during practice. Use of kisser button may help.

Equipment Concerns
- nocking point has moved up the string
- arrow rest is worn causing arrows to drop off
- new string has a brace height higher than normal
- interference from clothing or arm guard
- rigid or sticky tab or glove
- nocks off line on shaft, pointing down at the back
- hand gripping the bow handle

Right Arrows



Cause
- The bow hand is too far to the left causing clockwise (positive) torque in the bow.

Correction
- Establish reference points on bow hand to accurately position the hand for each shot.

Cause
- canting the top limb to the right

Correction
- Hold the bow vertically. Use the level as a training aid.
- Check to be sure that changes of head angle are not causing bow cant.

Cause
- head angle changing during shooting

Correction
- Check body alignment and head position. Reinforce alignment during practice sessions.

Cause
- plucking or allowing the drawing hand to move away from the face sideways

Correction
- Ensure that tension is maintained in the back at the moment of release.

Cause
- string alignment too far to the left of the bow

Correction
- Move the anchor slightly to the right or turn your head to put string alignment in proper location on the bow.

Cause
- bow arm moves to the right at moment of release

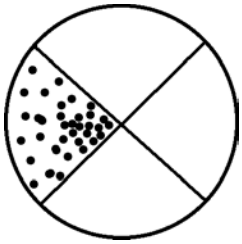
Correction
- Continue concentrating and aiming during and after the shot.

Cause
- anchor too far to the left on the face

Correction
- The instructor and archer must be aware of the correct anchor.
- The archer must have enough reference points to enable him to anchor in exactly the same location each time.
- Practice sessions should be used to work on the anchor. Watch for changes in string alignment.

Equipment Concerns
- nock off line with shaft, pointing right at the back
- worn arrow rest
- arrow spine too soft
- improper cushion plunger adjustment or loose locking screw which will allow plunger to move in
- twisted recurve or limbs out of alignment
- sight mounted at an angle causing right or left shots depending on the distance being shot
- low brace height

Left Arrows



Cause
- bow hand too far to the right of bow grip

Correction
- Establish reference points on the bow hand to accurately position the hand the same for each shot.

Cause
- canting the top limb of the bow to the left

Correction
- Hold bow vertically. Use the level as a training aid. Be aware of changes of the head angle that could cause bow canting.

Cause
- head angle changing during shooting

Correction

Check body alignment and head position. Reinforce this during practice sessions.

Cause
- anchor is further to the right than normal

Correction
- The instructor and archer must be aware of the correct anchor.
- The archer must have enough reference points to enable him to anchor in exactly the same location each time.
- Practice sessions should be used to work on the anchor.
- Watch for changes in string alignment.

Cause • string alignment too far to the right

Correction • Move the anchor to the left or turn head slightly to put the string alignment in proper location on bow.

Cause • leaning body backward

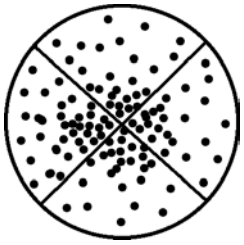
Correction • Stand up straight. Imagine the head as being pushed up to the ceiling.

Cause • string striking bow arm or clothing

Correction
- Ensure that the shoulder is down and the back elbow is turned under.
- Wear tight clothing or use a chest protector.
- Use a more open stance to get better clearance.
- Bow hand may be too far to right on handle.

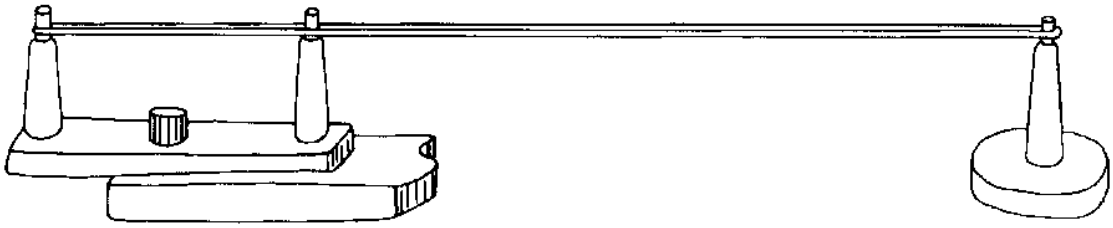
Equipment Concerns
- nock off line with shaft, pointing left at the back
- arrows falling off worn arrow rest
- arrow spine too stiff
- cushion plunger improperly adjusted or loose locking screw which will allow plunger to move out
- recurve twisted or limbs out of alignment
- sight mounted at an angle causes left or right arrows, depending on the distance being shot

Arrows Scattered



When the error is inconsistent and several types of faults are made, there will be a scattered pattern on the target. This usually indicates that the archer needs more basic instruction because he/she lacks uniformity in his/her sequence. A poorly tuned bow will often produce a scattered pattern on the target. Usually, this condition is also accompanied by poor form, but can be the result of several factors incorrectly adjusted causing the equipment to be overly sensitive, magnifying the smallest error on the part of the archer. The equipment should be completely retuned and should not be used in the present condition.

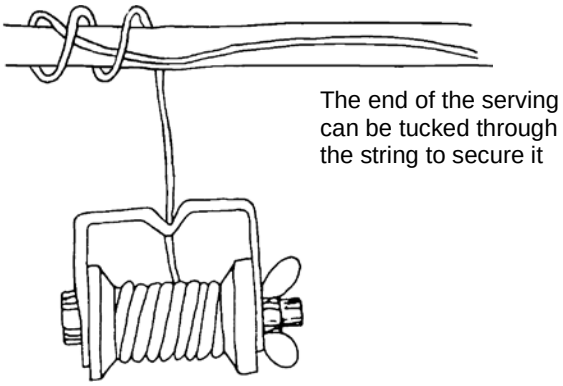
Bow String Maintenance



A simple portable wooden string jig can be clamped onto a table or work bench.

Slip the end loops of the string on the jig so the string is tight.

To make a center serving, start the serving at the bottom end of the serving. Move the server to the left side, split the strands and push the serving thread through. Serve about 10 wraps by hand to ensure that the serving will remain secure

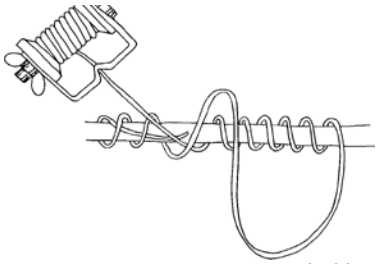


The end of the serving can be tucked through the string to secure it

Keep the serving snug and neat by hand
Serve back at least 10 turns to secure serving

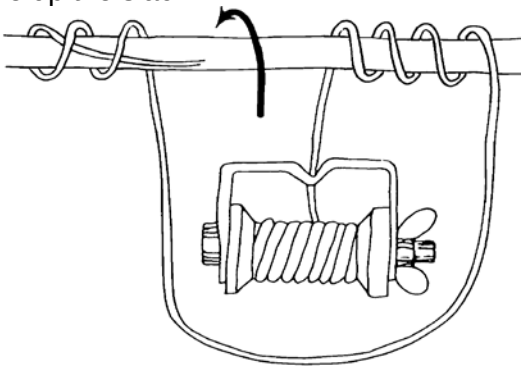
Start spinning the server over the strands; remember to wind in a clockwise direction. Serve about 12cm or 5in.

The following diagrams show how to finish the serving. Hold onto the bottom loop with your four fingers to give yourself room to wrap the server back on the string.



Wind back about 10 turns

Then, start wrapping the bottom loop to tighten and wrap the serving on the left hand side. The loops on the right side will unwrap as the left side wraps. When this is done, pull the string with the server to take up the slack.



A pencil works well to keep pressure on the loop so it won't tangle