



CHAPTER\_7

# PHYSICAL TRAINING

Physical training for archery should largely be sport specific. General weight training by itself does not do much for archery strength, other than for general flexibility and conditioning. Training should be matched to the sporting movement patterns and energy systems in use and be individualized for each athlete. Even though archery is basically a static sport and does not require high levels of aerobic fitness, it does require high levels of concentration over extended periods. This will be benefited by an efficient cardiovascular system and a well developed weight training program, with specific focus on the body's power zone.



# *PHYSICAL TRAINING*

## 1 – Warm Up For Archery

Warm up and stretches for archery, be it for training or competition, should always be carried out before commencing any shooting.

The objective of the warm up and stretching is to increase the body core temperature through the active movement of the major muscle groups. This will allow the muscles to function most effectively and further prepares the cardiovascular and muscular systems for the upcoming physical activity. It will also aid in the prevention of muscle injury and at the same time assist in preparing the archer physically and mentally for the task ahead.

The general warm up can consist of activities such as jogging for 2 to 3 minutes, rowing machine, stationary bicycle, skipping, calisthenics and the like.

Even though general warm up does improve physiological preparation for the event, by itself it does not increase specific flexibility needed for archery and must therefore be complimented by archery specific joint and muscle stretches.

## 2 – Stretches for Archery

As part of a total body warm-up, it is important to ensure that the muscles are warm before they are stretched. A warm muscle will stretch and contract more



effectively and minimize risk of injury. The muscle fiber coating (collagen) will inhibit the stretch if the muscle isn't warm. Relaxation throughout the body will make stretching easier and therefore, more comfortable. Remember, stretches should never be painful.

Stretching will promote flexibility in specific muscles, joints and nerves and will assist in performing specific archery skills in a more effective and efficient manner.

### Therefore, stretching assists to

- increase flexibility and freedom of movement
- enable full development of opposing muscle groups
- reduce muscle tension
- improve blood circulation through the muscles
- reduce the risk of muscle and tendon injuries
- improve performance
- prepare the body, both physically and mentally, for the task to be performed

## 1. How to Stretch

There are three major methods of stretching:

**Ballistic** - These stretches use some momentum, for example leg swings. You have far less control during this type of stretch and therefore a potential risk of injury. Ballistic stretching is probably most relevant to sports such as gymnastics

and is generally not appropriate for archery.

**Static** - This is probably the most common, mainly because it benefits from being both effective and safe. It involves the gradual stretching of a muscle to a position where it is held for 10 - 30 seconds - **DO NOT BOUNCE**. The muscle should not be taken beyond the point of mild discomfort.

**P.N.F** - Proprioceptive Neuromuscular Facilitation

PNF refers to stretching techniques in which a muscle or muscle groups are passively stretched, then contract isometrically against resistance while in the stretched position, after which it is passively stretched again through the resulting increased range of motion. It is important to note that the stretched muscle should be rested and relaxed for at least 20 seconds before performing another PNF technique.

It is recommended that a physiotherapist be consulted for a musculoskeletal screening to evaluate each individual archer to determine their individual needs and to provide an individualized warm up and stretching program.



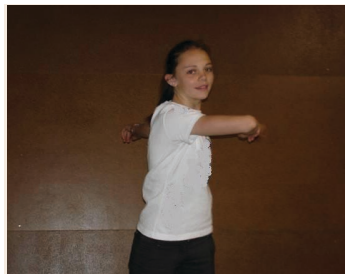


## 2. Core Stretches for Archers



### Shoulder Circles

- Lift your shoulder blade up and rotate it back in a circle.
- Repeat × 10 each side.
- Reverse the direction and repeat × 10 each side.



### Body Twists

- Keep your feet still and rotate your upper body.
- Swing your arms right around your body, aim for a large range of movement.
- Repeat × 15 swings to each side.



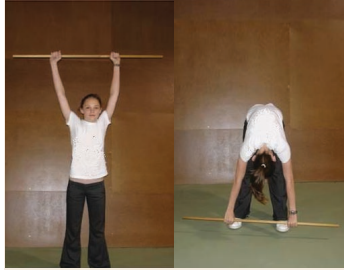
### Shake Legs

- Stand on one leg.
- Give the other leg a good shake, in a circular motion for about 5~10 seconds.
- Feel that your hip, knee and ankle loosen up.



### Stick - Rotations

- Place the stick across your shoulders.
- Keep your feet anchored and rotate through your upper body.
- Repeat × 20 to each side.



### Stick - bend and stretch

- Hold the stick at shoulder width.
- Reach upwards overhead as high as you can.
- Then reach down to your toes.
- Repeat × 15



### Stick - side bends

- Hold the stick at shoulder width above your head.
- Try not to bend forward at the waist as you bend to each side.
- Repeat × 10 each side.



### Pectorals Stretch

- Anchor your hand on a wall with your fingers facing behind you.
- Turn your body away from the wall.
- Hold for 30 seconds.
- Repeat × 3 each side.
- Try anchoring your hand at different heights for a variety of stretch positions.



### Triceps Stretch

- Reach behind your head and down your back.
- Use your other hand to push downwards on your elbow, to increase the stretch.
- Hold for 30 seconds.
- Repeat × 3 each side.



## Upper back and Armpit Stretch

- Stand about 1 meter from the wall.
- Anchor your hands on the wall and bend forwards at the waist.
- Bring your upper body through your arm, the stretch is in your upper back and ampits.
- Hold for 30 seconds × 15 swings to each side.



## Calf Stretch

- Keep the back knee straight and heel down.
- Lunge forward.
- Hold for 30 seconds, × 3 on each side.
- For a variation, lunge forward with a bent knee, keeping the heel down.



## Quadriceps Stretch

- Bring your ankle up to your backside.
- Keep your knees together.
- Stand tall through the hips.
- Hold for 30 seconds.
- Repeat × 3 on each side.



## Hip Flexor Stretch

- With one knee on the ground, lunge forward.
- The stretch is in the front of you groin.
- Hold for 30 seconds.
- Repeat × 3 each side.





### Gluteals Stretch

- Lie on your back with one heel across the opposite knee.
- Link your hands around your thigh and bring your thigh to your chest.
- Feel the stretch in your backside.
- Hold for 30 seconds × 3



### Upper back stretch

- Use a curved surface e.g. swiss ball, rolled towel or two tennis balls taped together.
- Lie over the curve and reach overhead with both arms.
- Hold for 6~8 deep breaths.
- Stretch shown is using a thoracic stretching rack.



### Nerve stretch

- Loop a long rope or strap over your shoulder, stand on it to anchor.
- Extend your arm horizontally and bend your wrist backwards.
- Increase the stretch by side bending your head to the other side.
- Hold the stretch for only 2 seconds, but repeat × 20



## Forearm Massage

- Press your thumb firmly into your forearm - finding tight areas.
- Maintain the pressure as you flex your wrist up and down.
- Repeat × 20 each side.



## Forearm Stretches

- Straight elbow.
- Pull your wrist back - palm up, for 10 seconds.
- Pull your wrist down and hold for 10 seconds.
- Repeat both sides × 5



\* References: This stretch program was designed by Danealle Lilley, Physiotherapist, AIS.

### 3\_Weight Training for improving Power-Zone

Generally, archers and coaches do not like weight training very much, as they are concerned about an increase in muscle mass, which could inhibit good structure and impact on the shooting.

Power-Zone training mainly focuses on the “trunk of the body”, which consists of the abdominals, hips, hamstrings and the back of the body. It is aimed at developing and strengthening the “core of the body” or the “power-zone”. The strength produced by the power-zone can be likened to the waves created when throwing a stone in the middle of a mirror smooth lake. The ripples or waves will affect the entire surface of the lake and likewise, the strength generated in the power-zone will radiate to all parts of the body.

It is recommended that a qualified Strength and Conditioning Coach evaluates each individual archer to ascertain their current condition to determine an individual program, which may well include an overload program, to strengthen specific muscles or muscle groups.

The exercises below should be carried out based on the endurance training principle of high repetitions and light weights. One should be able to perform 3 sets of 12-20 repetitions per set. If able to perform less than 12 reps, decrease the load or if able to perform more than 20 reps, increase the load. All exercises should preferably be carried out under the supervision of a qualified Strength and Conditioning coach.



## Recommended Exercises to Strengthen Power Zone

- |                                 |   |
|---------------------------------|---|
| • Bench press                   | - Outer and Inner Pectorals and Triceps |
| • Barbell squat                 | - Thighs and Trunk                      |
| • Sit-ups                       | - Abdominals                            |
| • Back hyper extension          | - Lower Back and Hamstrings             |
| • Barbell good morning exercise | - Lower Back and Abdominals             |
| • Leg curls                     | - Hamstrings                            |
| • Leg extensions                | - Lower Thighs                          |

## 4\_KSL Specific Physical Training method (SPT)

This method, also known as SPT, has been Specifically developed by my self to increase endurance, power/strength and flexibility through archery specific exercises using the archery equipment.

### There are four types of SPT

- A. Endurance
- B. Power/Strength
- C. Flexibility
- D. Structure

**Please note that all SPT** exercises must be carried out with proper shooting structure. These exercises can be carried out with or without a coach, although it is helpful to have this done under the supervision of a coach, as the coach can

check to ensure that proper technique and body posture is being maintained during the various exercises.

**A. Endurance** - The bow is drawn in the normal manner, but without an arrow and the draw is to be held for 30 seconds to 1 minute. This should be repeated 10 times with 2 -3 minutes rest intervals. The bow must be kept still and the position maintained. Aiming should be incorporated otherwise the bow will move all over the place when fatigue starts to set in.

Note: When the archer can hold for more than 45seconds some rubber bands can be introduced, slipped over the limbs to increase draw weight, but not more than about 2-3lbs. Alternatively a heavier draw weight bow can be used.

**B. Power/Strength** - From the set position, draw to get to the holding position. Holding must include transfer and loading, like in a normal shot. Hold from 3-5 seconds and let down only as far as the set position, then straight away draw back to the anchor position again and repeat. Do this between 5 to 12 times for 3-5 sets depending on current strength. Rest period between sets to be between 3 - 5 minutes.

During the exercise, the coach must check to ensure that proper alignment and form is being maintained.

**C. Flexibility** - This exercise is done with an arrow in the bow and for safety, close up in front of a target. Draw the bow in the normal manner and attain the normal holding phase, followed by a ten second continuous expansion at normal expansion speed. The objective is to draw up to about 1 -1.5cm past the clicker without any changes in posture.





**D. Structure** - This exercise will assist in getting the feel of the correct structure. The string is pulled behind the neck, see pictures below. This exercise accomplishes two main things; it will bring the front shoulder in and the rear shoulder back, giving the archer the feeling where the shoulders should be.



## 5\_Cardiovascular Training

Archery is basically a static sport and should not require high levels of aerobic fitness. However, strange as it may seem, a certain amount of physical fitness is required just to stand still. Archery also requires high levels of concentration over extended periods. This will be greatly benefited by an efficient cardiovascular system and a well developed weight training program.

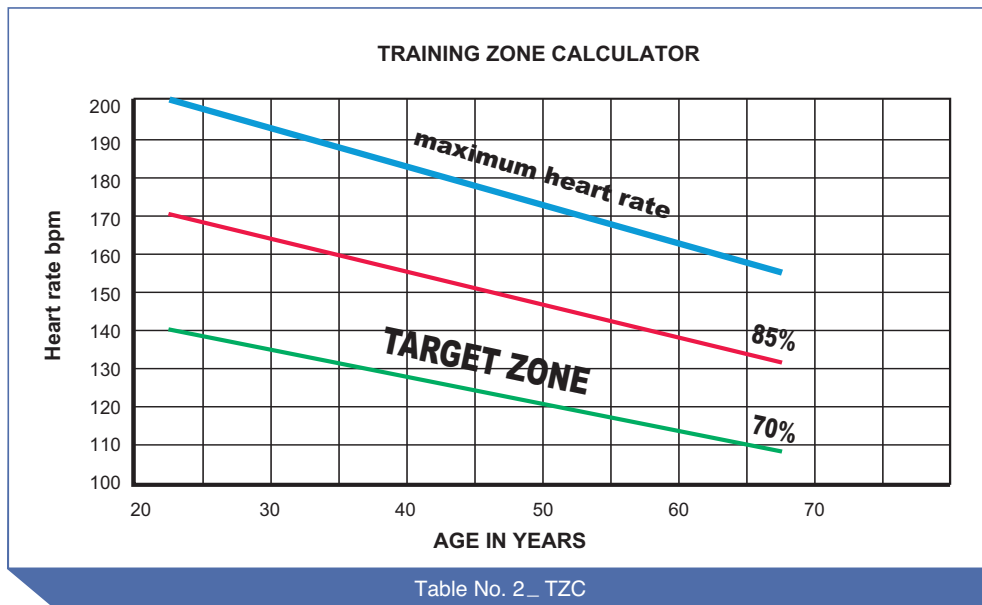
The choice of aerobic training methods is very wide and should be chosen to suit each individual archer best. Jogging, swimming, cycling, cross-country running, rowing, cross-country skiing, skipping rope, to name a few, are all suitable exercises.

Aerobic training should be carried out at least 3x per week for approximately 30 minutes to provide aerobic benefits.

For cardiovascular training effect to occur, you should be working in the Target Zone, which is 70-85% of your maximum heart rate. (Maximum is the fastest your heart can beat and still efficiently pump blood to your body).

To determine your target zone, you subtract your age from 220 and multiply that number by 70 -85%. For instance, your age is 25 then,  $220 - 25 = 195 \times 70 - 85\% =$  A Target Zone Heart Rate of 136 -165 BPM. See chart below for various ages.

There are relatively inexpensive strap-on heart rate monitors on the market to check the heart rate while exercising.





## Consult Your Doctor

Before you begin any cardiovascular training program include a physical check up and obtain clearance from your doctor for the exercise program you are about to embark on.

A simple way to establish current fitness of the athlete is to use the standard Beep Test. This test will establish the archer's VO2Max, which is the amount of oxygen that the athlete can consume per unit of body mass. Once this has been determined a cardiovascular training program can be developed, tailored to the archer's current fitness.

## 6 – Archery Total Physical Training Program

Below is a typical Korean training program

Items	Contents	Reps/Week	Remarks
Power	Weight Training	2 - 3	Winter 3 sessions/wk Season 2 sessions/wk
Endurance (Whole body)	Cross-country 2 Track run	1 -2 6	W 2 sessions/wk;S 1/wk 2-3 km, Wed 8km
Flexibility	Stretching Swimming	6 1-2	Winter 2/wk Season 1/wk
Agility	Gymnastic Aerobic dancing Ball games	1 6 1-2	Winter 2/wk Season 1/wk
Specific Physical Training of technique	SPT	3	Training with Bow(A,B,C types

Table No. 3 –Korean Training Program