THE FUNDAMENTALS OF RIFLE MARKSMANSHIP

By Gary Anderson, DCM Emeritus

***Marksmanship Fundamentals** describe "best practice" ways to hold a rifle, align it on the target and fire accurate shots with it. This photo shows the start of the 2023 CMP National Three-Position Air Rifle Championship Precision Final. The fundamentals are lessons these finalists have learned well.*

*This **On the Mark** article on "The Fundamentals of Rifle Marksmanship," is adapted from Chapter 7 in the author's book **Vintage Military Rifle Shooting**.* The original book applied the fundamentals, "Stability, Alignment and Control," to target shooting with As-Issued Military Rifles. This article applies those same "Marksmanship Fundamentals" to the disciplines of Air Rifle Standing, Three-Position Air Rifle and Smallbore Rifle Position.*

"Marksmanship" is the act of skillfully holding, aiming, and firing shots with projectile arms that consistently hit distant, difficult targets. Whether you are a Shooting coach or athlete, and whether you are new to the sport or are experienced and advancing, you need to understand what the fundamentals of rifle marksmanship are. In the sport of Shooting, "Marksmanship Fundamentals" are the foundational principles that define 1) how to hold a rifle, 2) how to align it with a target and 3) how to fire the shot so that it hits the center of the target.

Marksmanship Fundamentals describe what the most knowledgeable athletes and coaches know today as "best practices." They not only describe ways to hold, aim, and fire a rifle, but they describe the best ways to do this. Learning and understanding what these best practice fundamentals are makes it possible to apply them to the development of rifle athletes. Knowing the fundamentals makes teaching new shooters more effective. Knowing the fundamentals gives coaches and athletes the tools they need to analyze and improve the performances of intermediate and advanced athletes.

** **VMR – The CMP Guide to Target Shooting with Vintage Military Rifles**, by Gary Anderson, was published by the CMP in 2020. Copies can be purchased through the CMP E-Store.*

There is an old saying among shooting coaches that "*marksmanship fundamentals are simply sight alignment and trigger control.*" That statement was widely repeated as gospel by old-time coaches, but it is deceptively inadequate because it fails to recognize how firing accurate shots at targets involves a whole complex of static and dynamic skills. There are actually three phases to Marksmanship Fundamentals:

1. The rifle must be held in a legal firing position that produces maximum **RIFLE STABILITY**.
2. The rifle must be aimed and held so that there is precise **RIFLE-TARGET ALIGNMENT**.
3. The firing of each shot must be the successful result of a dynamic, coordinated process of **SHOT CONTROL**.

The steps of **STABILITY**, **ALIGNMENT** and **CONTROL** each have component elements that must be understood, mastered, and performed. Those elements of performance are identified in the chart (right) and will be analyzed in this article.

FUNDAMENTALS OF RIFLE MARKSMANSHIP
(STABILITY-ALIGNMENT-CONTROL)

1. Rifle Stability (Static Controls)
   - a. Position Structure
   - b. Use of Support Elements
   - c. Rifle and Clothing Adjustment
   - d. Muscle Relaxation & Control
   - e. Balance

2. Rifle-Target Alignment
   - a. Position Preparation
   - b. Aiming (Sight Alignment & Sight Picture)
   - c. Breath Control
   - d. NPA Alignment

3. Shot Control (Dynamic Controls)
   - a. Visual/Mental Control (3 steps: aiming-center & hold-shot call)
   - b. Trigger Control (4 steps: initial pressure-center sight picture-final pressure-shot call and follow-through
   - c. Analysis & Feedback

RIFLE STABILITY

Nothing has greater impact on rifle shooting scores than rifle stability. If the "hold" is steadier, scores will be higher. One of the first objectives of any rifle shooter must be to establish stable firing positions. There are five critical factors involved in developing kneeling, prone and standing positions that produce great holds:

POSITION STRUCTURE. Air rifle and smallbore rifle position shooting is done in three firing positions, kneeling, prone and standing. There are a wide variety of legal positions, but leading athletes and coaches have reached general agreement that the most stable positions are structured according to what are now regarded as model positions. Excellent instructional resources are available that describe those ideal positions. The CMP Junior Rifle Camps do a great job of helping rising athletes master those classical positions. An excellent way to learn about model positions is to attend national-level competitions where you can photograph and study the positions used by the best athletes. Be sure to understand the keys to structuring good firing positions: 1) how all three positions are built around correct left elbow locations, 2) how in standing, turning the body 90 degrees and placing the left elbow and hip directly under the rifle enables correct balance, 3) how in kneeling and standing, configuring the body to eliminate muscle strain and achieve optimal balance enhances stability and 4)) how in every position, keeping the rifle (and sights) high enough to establish proper head positions is a difference-maker.

USE OF SUPPORT ELEMENTS. Rifle stability is enhanced when two primary support elements, 1) bone support and 2) sling support, are properly used in building sound kneeling and prone positions. Bone support means configuring a position to support the body-rifle system with bones and not with muscles.

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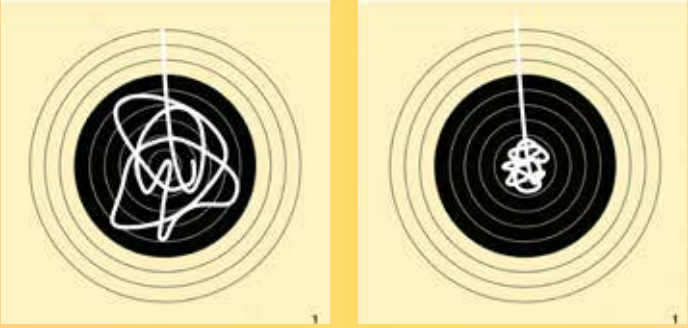
A SHOOTER'S HOLD

"Hold" is the term used to describe how stable a firing position is. "Hold" defines how much an athlete's front sight moves in relation to the target while aiming. One way to visualize hold is to imagine that a laser beam is pointing at the target while the athlete is aiming. The trace of that laser beam becomes a graphic representation of the athlete's hold. The smaller the arc of movement defined by that laser beam the better the hold.



Laser traces showing the holds of a new shooter (left) and a highly trained athlete (right).

The kneeling position is a unique example of the complex challenges involved in configuring the bones of the legs and arms to allow the body to relax and balance over the kneeling roll. Standing offers an obvious example of bone support. The best standing positions keep the left forearm vertical and use the bones of the forearm to serve as an inert brace that supports the rifle on the athlete's side or hip.

In the kneeling and prone positions, a combination of bone and sling support is needed to stabilize the rifle. A key is the left arm support triangle, which consists of the upper arm, lower arm, and sling. That support triangle must be kept vertical while holding the rifle in prone and kneeling. Proper sling support means having enough sling tension to allow the left arm to be completely relaxed while holding the rifle. Conversely, slings cannot be so tight that they distort the position.

These are the standing positions used by the eight finalists in the 2023 CMP National Three-Position Championship. Notice how similar their positions are. This is because there is an ideal standing position structure that most successful athletes have adopted as their position.

RIFLE AND CLOTHING ADJUSTMENT. The correct approach to adjusting rifles and clothing is to fit the rifle to the position, never to fit the position to the rifle. Today's precision air and smallbore rifles have an almost infinite variety of adjustments. Athletes can change butt-plates, cheek-pieces, sight heights, trigger locations, and hand or palm rest depths. A basic principle in making rifle adjustments is to first determine where the body parts that contact the rifle (*aiming eye, cheek, shoulder, hands*) are located in a firing position and then to adjust the rifle so that it fits within those locations. A key is fixing the head position and then adjusting the sights and rifle so that the sights are directly in front of the aiming eye.

Another important aspect of establishing a stable position, and then adding support elements to the position, concerns shooting jackets and trousers that precision air rifle and smallbore rifle athletes are permitted to wear. The clothing now available potentially adds a great deal of stability to the standing and kneeling positions, but this clothing must be fitted to the athlete's body and positions in order to realize this benefit. The leading clothing manufacturers and distributors have developed excellent protocols for fitting rifle jackets and trousers so that they add support to athletes' positions.

The concept of fitting the rifle to an athlete's positions is not as adaptable for Sporter Air Rifle competitors, but this principle still applies. Sporter air rifles that are now legal have adjustable butt-plates and cheek-pieces, plus the new Crosman Challenger air rifles offer forearm risers that

adds some desired rifle/sight height (*maximum 100mm from center of bore*).

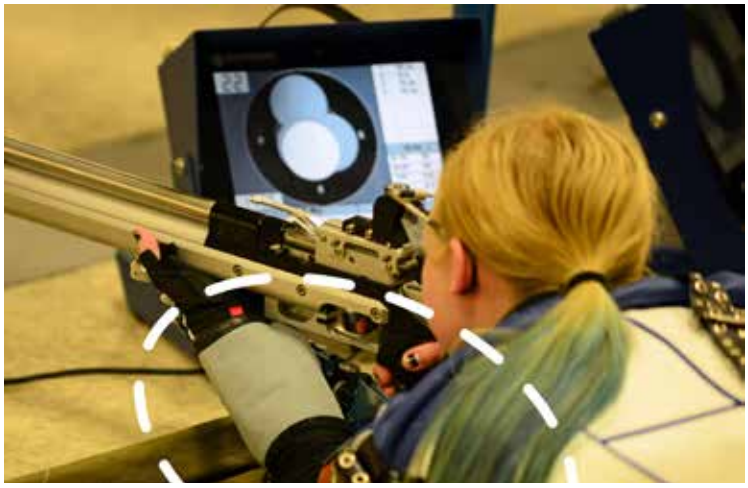
MUSCLE RELAXATION AND CONTROL. Even with so much emphasis on relaxation, muscles are still involved in holding the rifle and athlete in position. This muscular effort can contribute to position stability. The key is to minimize the muscle effort used to maintain a position by stressing muscle relaxation in preparing the positions. A primary key to stability in any position is completely relaxing the left arm and shoulder as it supports the rifle. In kneeling and prone, the sling, not the arm muscles must do the work of supporting the rifle and upper body. In standing, the left arm must be relaxed down against the side of the body; the arm muscles must do no lifting. In kneeling, the torso position must make relaxing those muscles a priority. In standing, the muscles in the legs and feet play an active role in keeping the body-rifle system balanced over the feet. Muscle tension in the legs must be light but controlled, while keeping the knees straight and maintaining body balance over the feet.

BALANCE. Balance is the fifth critical factor in achieving rifle stability. Balance does not really play a role in prone, but in kneeling, balancing the body-rifle system over the right and left heels is a key to achieving torso relaxation. In standing, aligning the position so that there is a straight line of support from the rifle, down through the left elbow and left hip, to a mid-point on the feet is a key to stability. Top athletes typically shift the weight of the body-rifle system slightly forward onto the balls of the feet. It is no coincidence that the best standing shooters in the world check their precise balance as part of their pre-shot routines for every shot.

RIFLE – TARGET ALIGNMENT

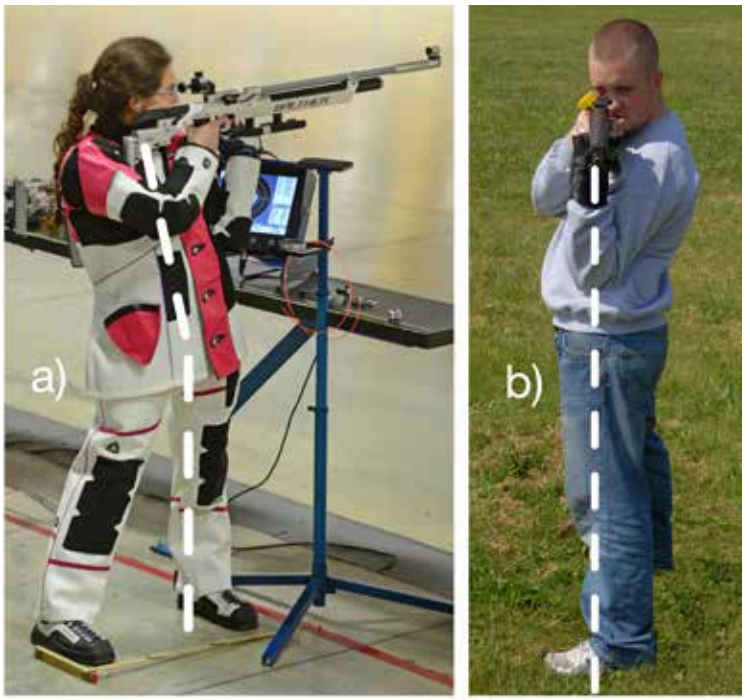
After establishing a stable firing position, it must be precisely aligned with the center of the target before a shot can be fired. Achieving **Rifle-Target Alignment** is a dynamic function that demands precision and consistency. Precision is demanded because rifle targets are extremely small—hitting the 50m ten-ring requires aligning the rifle's point of impact on a circle slightly smaller than a dime that is more than half a football field away. Consistency is demanded because the actions necessary to align the rifle on those diminutive targets must be repeated many times--there are usually 60 record shots in each air or smallbore rifle event. Rifle-Target Alignment involves a) position preparation, b) aiming, c) breath control and d) NPA alignment.

POSITION PREPARATION. Position Preparation starts with loading the rifle and continues until precise aiming and the actual firing of the shot begins. When position preparation is done effectively and consistently, the result will be better holds. Advanced athletes break this process down into a series of steps that make up what is called a Pre-Shot Routine. Learning to identify and follow a Pre-Shot Routine is an important way for athletes to improve their scores.



In prone and kneeling, the left arm support triangle must be kept vertical.

STANDING POSITION BALANCE



Standing position balance is achieved by a) bending the upper body slightly to the right to counterbalance the weight of the rifle and b) by shifting the weight of the body-rifle system so it balances over the feet.

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Position preparation starts with an athlete's loading technique and how that leads to consistent placement of the butt-plate (1), left elbow (2) and head (3) as the position is prepared for each shot.

• **Loading Technique**. Athletes must decide whether they will keep the rifle in their shoulder, take it down, or place it on a rifle rest to load each shot. Most athletes have mastered loading from the shoulder, especially for prone and kneeling. This can ensure position consistency if the loading movements do not distort the position. Particularly in standing, setting the rifle on a rifle stand for brief rests between shots is a common practice.

• **Butt-Place Location**. Placing or keeping the butt-plate in the same location in the shoulder is a key to position preparation consistency. The best standing position athletes pay close attention to placing the butt-plate in the same location for each shot.

• **Left Elbow Location**. The same goes for the left elbow location, particularly in standing. If the elbow position changes, the position's balance changes, and balance changes affect rifle stability. The left elbow needs to be in the same precise location under the rifle before proceeding with the firing of each shot.

• **Head Position**. Another vital point in an athlete's pre-shot checks is making sure the head rests in exactly the same location on the cheek-piece for each shot. Changing the head position also changes position balance and affects hold stability.

• **Relaxation and Balance Checks**. A final step before starting to aim is pausing to check whether the position is properly relaxed and balanced. After those final checks, the athlete can turn their head and start to aim.

AIMING. Aiming is a visual process that allows the athlete to see whether and how well the rifle is aligned on the target. Aiming is a dynamic process because after seeing where the rifle is pointed, the athlete must move the rifle or adjust the firing position in order to achieve as perfect a sight picture as possible. Modern front and rear sights available on precision and sporter class rifles make precise aiming possible with an aiming error that is considerably smaller than the ten ring on these targets. The limitation here, of course, is that rifle firing positions do not produce absolutely stable holds. A task of the aiming process therefore becomes centering those larger or smaller movements of the front sight over the aiming bull. The process of aiming involves a) sight alignment, b) sight picture, and c) visual focus.

• **Sight Alignment**. Sight alignment means seeing the front sight in the center of the rear sight aperture. To do that, the athlete's head position must place the aiming eye in line with the rear sight aperture. Problems in doing this are signs of a cheek-piece or head position that needs adjustment. For most smallbore and air rifle athletes, achieving sight alignment is done intuitively and without conscious effort.

• **Sight Picture**. Sight picture is what the athlete sees when the aligned sights are pointed as the target. The objective of aiming then is to see a series of concentric circles where the aiming bull on the target is centered in the front sight ring, which is in turn centered in the rear sight aperture.

• **Visual Focus**. Rifle athletes should be able to see a clear sight picture where both the front sight ring and the aiming bull are sharp. The 1.0-1.2mm rear sight apertures that are common on air and smallbore rifles provide sufficient depth of focus to make this possible. A key performance fundamental is not only being able to see a clear sight picture but being able to achieve visual and mental focus on sight picture movements.

BREATH CONTROL. Breath control means breathing or stopping breathing at the right times during the firing of each shot (*see diagram on pg. 12*). Normal breathing before and after each shot ensures that the body has an

Many of today's best standing position athletes pause, often with their eyes closed, to check how their positions are relaxed and balanced before they turn to look through their sights and start to aim.

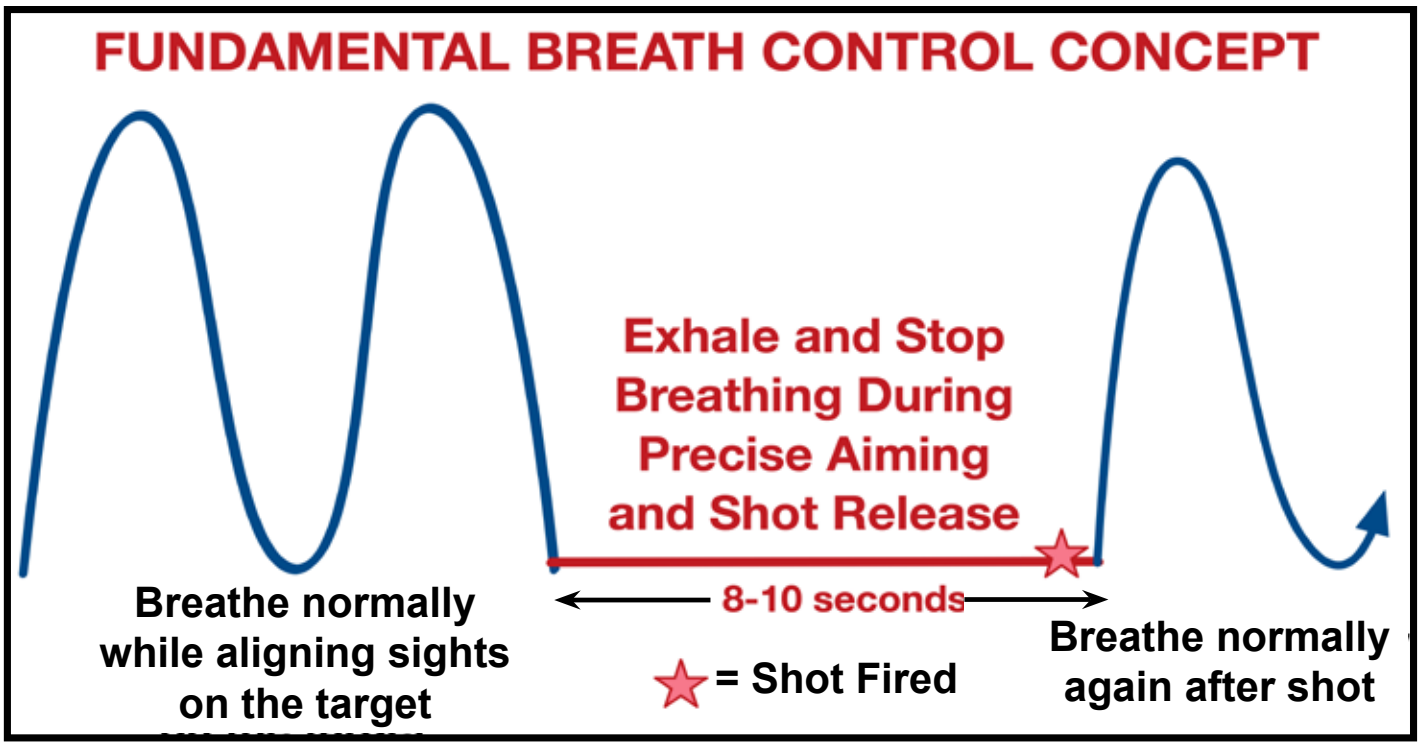
adequate supply of oxygen. Normal breathing with regular inhale-exhale cycles should be done while shouldering the rifle and aligning the sights on the target during the position preparation and initial aiming phases of firing the shot. When the front sight ring is on the target, and the athlete is ready to start the firing of the shot, the athlete takes one more breath, exhales and stops breathing until the shot is fired. The time when breathing is stopped normally lasts no more than 8-10 seconds.

Many advanced shooters use their breathing to reduce tension and enhance relaxation. Concentrating on taking a few deep breaths can relieve stress. Using inhale-exhale cycles as a cue for getting certain muscles "*to let go*" and relax can become a useful part of position preparation.

NPA ALIGNMENT. The position's NPA is its "natural point of aim." The NPA is where the sights naturally want to point when a well-prepared position is aligned on the target. NPA alignment is an advanced concept. Beginners may have an "area of aim" but their positions will not be sufficiently stabilized to have a true NPA. In NPA alignment, when the front sight tends to align off of the aiming bull, the

SIGHT PICTURE

Sight picture includes the rear aperture, front sight, front sight ring and aiming bull on the target.



athlete makes a slight shift of the body, usually by pushing the front sight through the bull and allowing it to settle back on the bull. This technique can be especially critical in prone and kneeling where well-centered NPAs yield better recoil and shot placement consistency.

SHOT CONTROL

Shot Control is the third phase of Marksmanship Fundamentals. Shot Control is the coordinated, dynamic actions of visual control and trigger control that produces the actual firing of the shot. Shot Control is concluded by two after-the-shot actions, follow-through and an analysis-feedback process that prepares the athlete for the next shot.

VISUAL/MENTAL CONTROL. In the final phase of aiming, during this eight to ten second period when actually trying to fire the shot, the athlete must refine or perfect the sight picture. In prone, this means trying to get a perfect sight picture. In standing, and perhaps in kneeling, this means getting the hold movements centered. This is the high concentration phase of applying Marksmanship Fundamentals. Visual and mental focus must be on the sight picture.

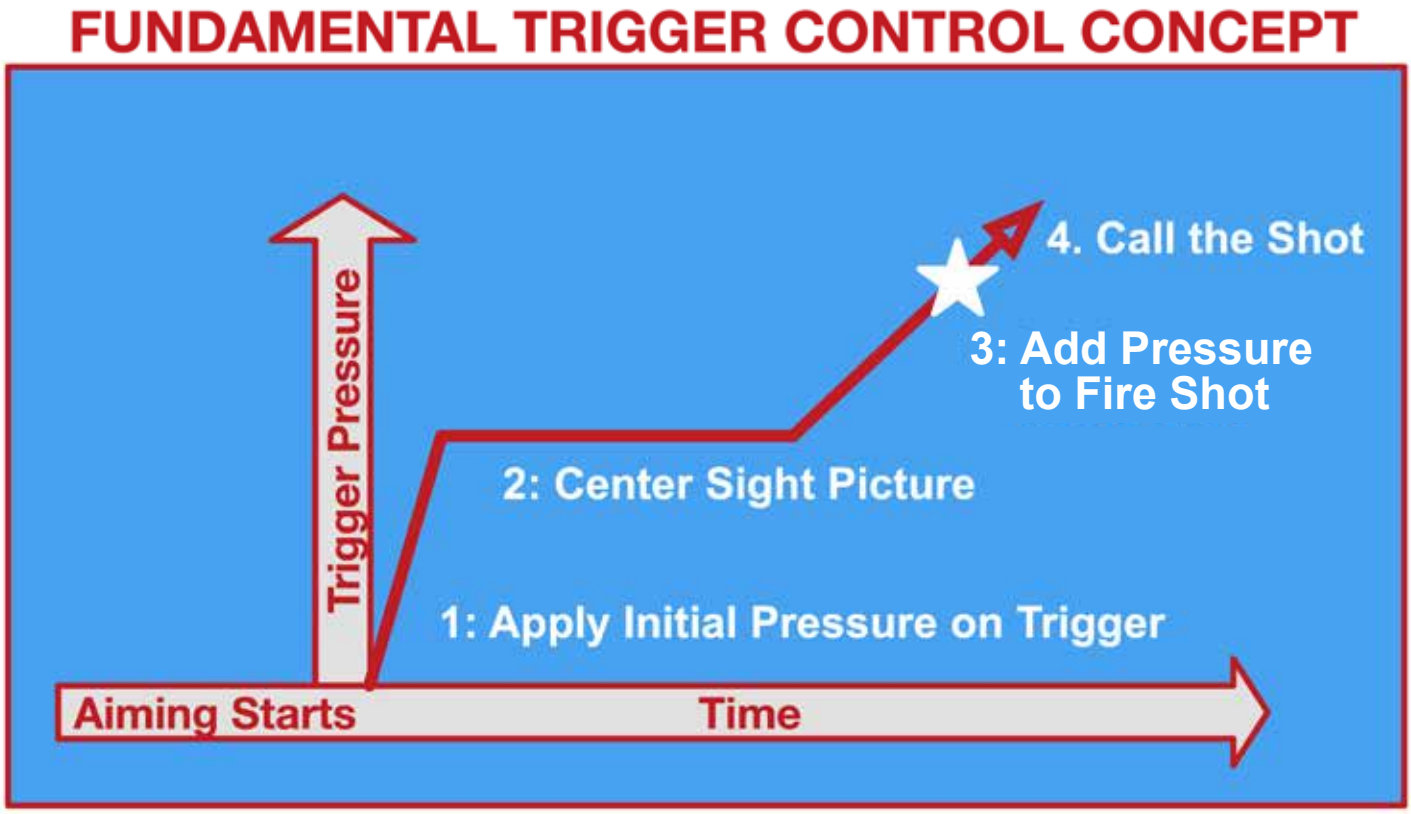
Visual/Mental Control means that the athlete's mental demand must be to see sight picture movements centered and to see those oscillations become smaller. The efforts the nervous system and muscles make to respond to this demand yield smaller holds and higher scores after repeating these demands thousands of times in training.

TRIGGER CONTROL. At the same time that the athlete is focusing intense concentration on what the sight picture is doing, the athlete must also be applying pressure on the trigger in order to fire the shot. Trigger control is a four-step process which can be refined into a variety of individual techniques.

• **Step 1 – First Stage Pressure**. The first phase of trigger control occurs at the same time that breathing stops and the aligned sights are brought onto the target. This is when the index finger must move from the trigger guard onto the trigger to apply initial pressure on the trigger. If the trigger is a two-stage trigger, this means taking up the first stage and applying light pressure on the second stage. With single stage triggers, the index finger should apply half to two-thirds of the pressure required to release the shot.

• **Step 2 – Centering Sight Picture Movements**. This is the heart of the Visual/Mental Control effort when the sight picture is perfected.

• **Step 3 – Final Trigger Pressure**. When the sight picture is at its best, final pressure must be applied to the trigger to fire the shot. This pressure may be applied gradually, or more quickly in an aggressive trigger release or in steps in a more refined trigger release. A key is that this pressure must be absolutely smooth so that the sight picture is not disturbed.



• **Step 4 – Shot Call and Follow-Through**. This is the conclusion of the shot control process. At the instant the shot is fired, and recoil begins, the athlete must make a mental snapshot of the sight picture and correlate that to a precise location on the target where the shot should hit if the rifle is properly zeroed. Beginners will only be able to say whether the shot was good, high, low, left or right. Advanced athletes should be able to project precise shot locations within a particular scoring ring. Learning to call shots is a critical function because this ensures that the athlete continues to aim and hold the rifle stable until the pellet or bullet is out of the barrel and recoil has started. Air rifles, in particular, have a relatively long shot development time so it is possible to cause an off-call shot by changing a pressure on the rifle while the projectile is still in the barrel. Advanced athletes will also learn to pay attention to the shot's recoil pattern and what that says about consistent position preparation.

ANALYSIS AND FEEDBACK. Each shot fired should end with a brief analysis. The shot call must be compared with the shot location. Was the shot on call or off call? Is a sight change required? Did everything feel right when the shot was fired? Or do I need to focus on doing some aspect of performance better? Was the recoil pattern normal or does it suggest a need for better position preparation. With this feedback the athlete can proceed back to Position Preparation for the next shot.

About the Author

Gary Anderson, Director of Civilian Marksmanship Emeritus, retired as the full-time CMP Director at the end of 2009. He continues to work with the CMP as the senior marksmanship instructor. During his remarkable career, he won two Olympic gold medals, seven World Championships and 16 National Championships. He served as a Vice President of the International Shooting Sports Federation (ISSF) from 1990 through 2018. He is a former Nebraska State Senator and Past President of USA Shooting. He served as a Technical Delegate for Shooting during the 2012 and 2016 Olympic Games as well as for the 2014 and 2018 World Shooting Championships.

In 2012, the International Olympic Committee awarded Gary Anderson with the Olympic Order, its highest honor "for outstanding services to the Olympic Movement."

In 2014, the CMP expanded its world-class air gun center at Camp Perry and renamed the facility the Gary Anderson CMP Competition Center, in honor of Anderson's contributions to the organization and the marksmanship community.