

## A WINNING KNEELING POSITION

# DEVELOPING A WINNING KNEELING POSITION

*By Gary Anderson, DCM Emeritus*



## 2018 World Championship Men's 50m 3x40 Rifle Final

*Kneeling is now the first position fired in ISSF three-position events. This photo shows the kneeling positions used by the top eight athletes at the start of the 2018 World Championship 50m 3x40 Rifle Men final. The athletes are (from l. to r.) Croatia, Belarus, P. R. China, Australia, Poland, USA, Norway and P. R. China.*

The origins of kneeling as a target rifle firing position go back more than 2,000 years. From Xian China's 3rd century BCE terracotta warriors that protected the first Chinese emperor in the afterworld to combat firing positions used in 18th and 19th century military operations, kneeling became a target rifle firing position that, like virtually all modern sports skills, traces its origins to human efforts to practice martial or survival skills.

Kneeling became a standard target rifle firing position in the late 19th century when it was adopted as one of three positions in the 300-meter free rifle course of fire. Kneeling is now the first of three positions fired in ISSF 50- and 300-meter 3x40 rifle events. For junior rifle athletes, kneeling is the third of the positions fired in Three-Position

Air Rifle events.

In today's three-position rifle events, the best men and women athletes shoot kneeling scores that are nearly as high as their prone scores. In the 2021 Tokyo Olympics, the top eight men averaged 393.125 kneeling compared to 397.75 prone. The top eight women averaged 392.50 kneeling compared to 395.63 prone. In this summer's National Junior Olympic Three-Position Air Rifle Championship, the top 10 athletes averaged 198.7 kneeling compared to 199.2 prone. Those scores support the conclusion that winning rifle athletes must develop kneeling positions capable of producing prone-like holds and scores.

Those statistics, nevertheless, should not deceive anyone into thinking that developing a winning kneeling position is easy. Kneeling has a smaller area of support limited to the left foot, right foot, and right knee. Its center of gravity (COG) is mid-way between the COGs of prone and standing. And with so many possible position adjustments, it is certainly the most complicated position.

Developing a winning kneeling position depends upon building a kneeling position that adheres to a series of “Position Features” and then working out “Position Adjustments” that determine the final position. One of the best ways to start this endeavor is to study the positions used by the world’s best. First, consider the features identified in the “*Kneeling Position Features*” illustration (on right). Then study the six positions in the “*Olympic Medalists’ Kneeling Positions*” illustration on page 10. Those illustrations should give you a clear mental image and understanding of how to configure a fundamentally sound kneeling position.

### ***Kneeling Position Fundamentals***

This article starts with a detailed discussion of the kneeling position fundamental features.\* If you are building a new position from start or rebuilding a kneeling position that has not worked well, an excellent way to begin is to first work out your position without a rifle and sling, and then add the rifle and sling after the body configuration is established. Here are the steps, in order, that should be followed in developing a winning kneeling position.

**1. Kneeling Roll Size and Placement.** Getting into a kneeling position begins with the kneeling roll and its placement on the floor (*Do not use a shooting mat; check the photos of champion athletes — none of them use shooting mats.*). Start with a kneeling roll that is loosely filled so that the body-rifle position will be lower. Turn the roll so that when the right leg kneels on it, the leg points 50 to 80 degrees away from the line of fire.

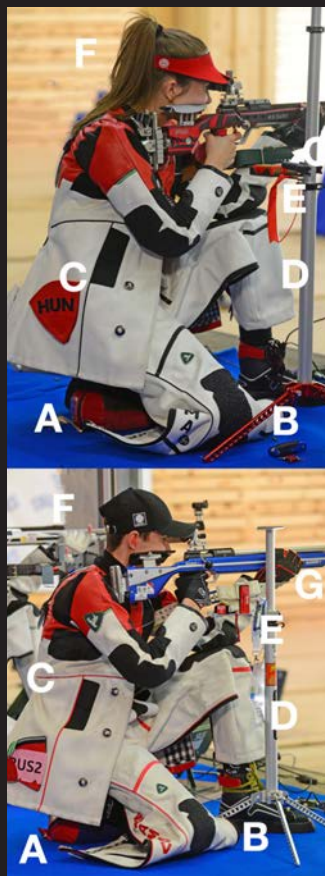
**2. Sitting on the Kneeling Roll.** The correct right leg placement on the kneeling roll requires 1) keeping the right foot vertical (*do not turn the foot at an angle*), 2) extending the toes so the top of the foot contacts the floor, 3) placing the lower leg so it is supported at or just above the ankle, and 4) sitting on the heel so it is centered on the buttocks.

**3. Body Position on Right Heel.** Most top kneeling competitors sit with all or most of their body weight back on their right heel. They relax their shoulders and upper spine down (*do not use muscles to keep the spine straight*). Their shoulders and hips are aligned (*twisting the torso creates unnecessary tension*).



*The origin of the kneeling position is more than two-thousand years old. Many of Xian, China’s 8,000 terracotta warriors were posed in this kneeling position.*

### ***KNEELING POSITION FEATURES***



- A. Torso sits on erect heel supported by the kneeling roll.
- B. Body (hips and shoulders) is turned 50 to 80 degrees from the line of fire.
- C. Torso weight rests on right heel; shoulders and spine are relaxed down.
- D. Left leg supports rifle and left arm; left leg is vertical or angled forward – never back.
- E. Left elbow is placed on leg or knee while keeping body weight balanced over heel.
- F. Head is erect.
- G. Rifle height is adjusted with left hand position on fore arm so that sights come up to eye level.

\* All position descriptions in this article are for right-handed athletes. For left-handers, simply reverse right and left.



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A trend in the last decade has been to turn the body more to the side (*with the right leg pointing 70-80 degrees away from the target*) so that the rifle shoots across the body.

**4. Left Leg Location.** The lower left leg supports the weight of the left arm and rifle. The left heel is the forward balance point for the position and should be located just to the left of a point directly below the rifle (see “Kneeling Position Balance” illustration). The left lower leg should be vertical or angled forward (*do not angle the leg to the rear*).

**5. Left Arm Location on Left Leg.** To determine where to place the left elbow on the leg, start with the upper body in a natural, relaxed position with its weight back on the heel. Without moving the body, extend the arm and let it drop down onto the knee or leg. If the elbow falls on the knee, leave it there; if it falls behind the knee (*do not lean further forward to reach the knee*), leave it there because that is where the upper body will be most relaxed.

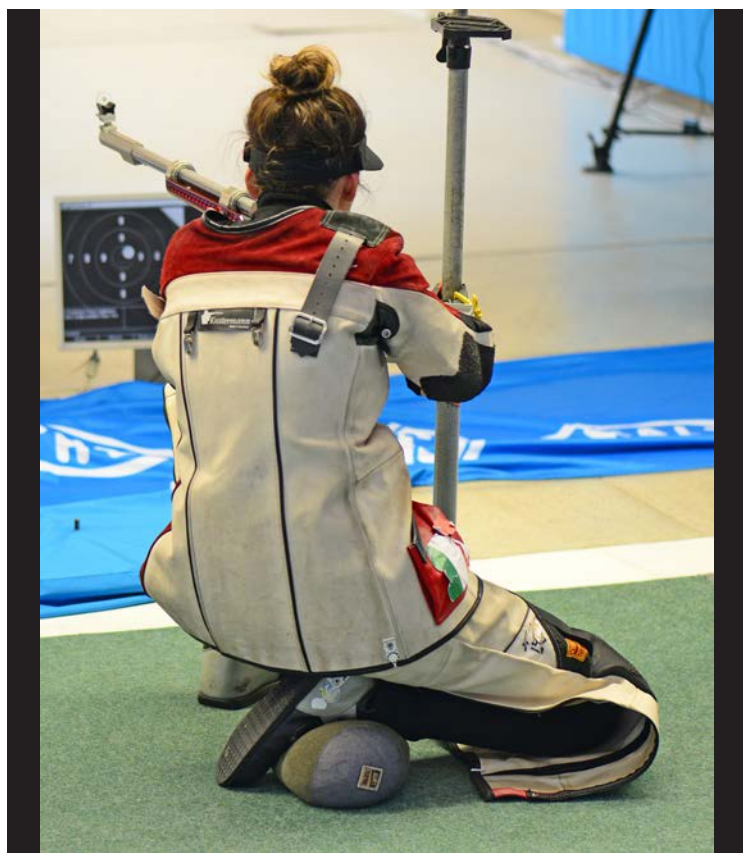


*A loosely filled kneeling roll with a depression in the center lowers the position's COG and helps to support the lower leg.*

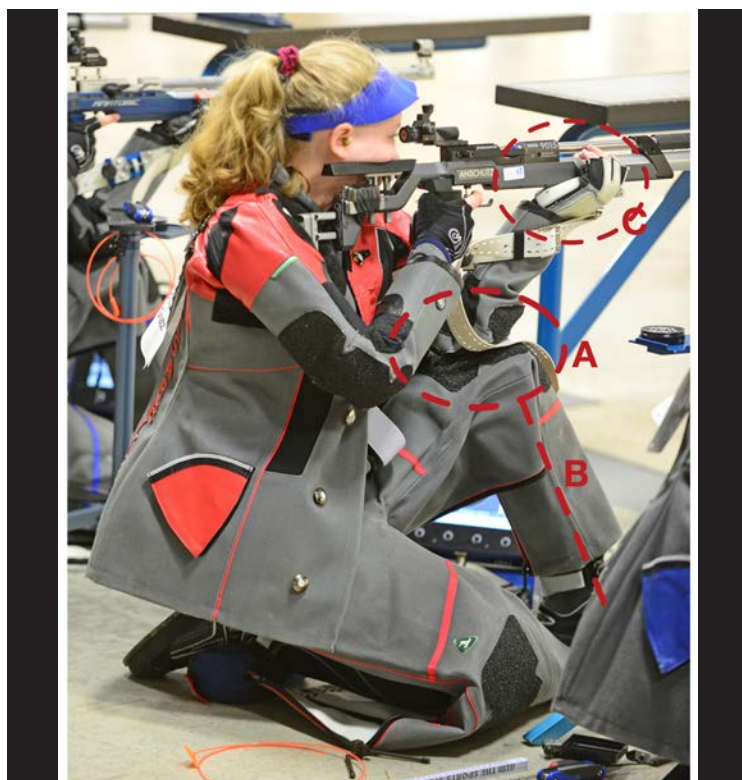
**6. The Rifle Position, Head and Sling.** The next step is to determine how the rifle will be held. If you are developing a new position, shoulder the rifle first without the sling and hand stop. Hold your head in an erect, relaxed position, move your left hand forward or to the rear to raise or lower the rifle sights until they align with the aiming eye. All rifles used in junior three-position shooting today have butt-plates with vertical adjustments so as you raise the rifle to eye level, it is also necessary to adjust the butt-plate up or down to keep it centered on the shoulder. With rifle sights at eye level,

lock the butt-plate in place, then slide the hand stop back against the left hand and secure it to mark that adjustment. Finally, add the sling. Place it high on the arm and start with it loose. Gradually tighten the sling until it takes over the work of holding the rifle (*left arm muscles must be completely relaxed*).

**7. Right Hand and Arm.** The main functions of the right hand and arm are to operate the trigger and reload



**Correct Body Position:** Body weight is back on the heel; the right foot is vertical and the ankle rests on the kneeling roll.



**Left Leg and Arm Positions:** With the body erect, the left elbow may fall behind or on the knee (A); rifle height is determined by the left lower leg angle (B) and/or the left-hand location on the forearm (C).

the rifle. The arm can be relaxed down but special care must be taken to keep the wrist straight as the hand grasps the pistol grip. It must position the index finger so that it presses the trigger straight to the rear. After becoming comfortable with the position, learn to reload the rifle while keeping it in the shoulder. Adjusting stock length may be necessary to comfortably reach the loading port or breech end of an air rifle barrel. Also, have a plan for taking breaks after 10 or 20 shots when the rifle comes down from the shoulder.

**8. Position Balance.** A key to kneeling position stability is balancing the position so that minimal muscle effort is applied to maintain the position. Kneeling is said to have three points of support, the right foot resting on the kneeling roll, the left foot, and the right knee, but the right knee should not be used as a primary support. Kneeling has two primary support and balance points, 1) the right heel and kneeling roll that support the torso, and 2) the left heel and foot that support the rifle and left arm. Proper balance technique calls for finding the neutral balance point over those two points and then shifting the position just slightly off-balance.

### Perfecting the Position

After you establish a basic position, there is still a lot of work to do to perfect it. You need to practice the position, but also to refine the position by evaluating how it performs and then deciding what position adjustments to make to fine-tune the position.

- **Position Preparation.** Before getting into position with shooting trousers, the fly should be open to relieve pressure on the abdomen. Leg zippers are open to eliminate bending the legs over trouser folds. Shooting jackets should be buttoned at the top two or three buttons only.

An important step in perfecting the kneeling position is having precise plans for getting into position, shouldering the rifle, and reloading. Shouldering the rifle and resuming the position for successive shots must involve minimized, consistent movements. To start each shot, there should be a brief conscious effort to relax the body and left arm. This is usually done in conjunction with the breathing process.

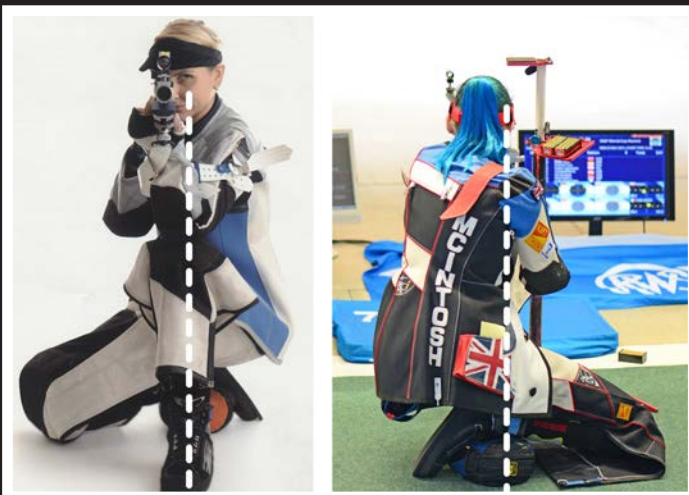
- **Evaluating the Position.** Perfecting a kneeling position starts with evaluating it. The first criterion is how good is the hold that it produces (*the magnitude of front sight movements while aiming*) -- how long does the hold last and how difficult is it to keep it centered. This evaluation can be done by live and dry fire shooting. Electronic training devices like the Scatt™ system may provide even more objective data on hold movements and their duration.

## LOADING IN KNEELING



Athletes should learn to reload in kneeling while keeping their rifles in their shoulders. Use a rifle stand to hold pellets or cartridges where they can easily be reached.

## KNEELING POSITION BALANCE



These front and rear views of kneeling positions show how the position should be balanced. The dashed white lines designate how the weight of the body-rifle system should be balanced over the left heel and right foot.



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# OLYMPIC MEDALISTS' KNEELING POSITIONS

The photos on this page show the kneeling positions used by 2016 and 2021 Olympic medal winners in the 50m 3x40 Rifle events. Note how, except for Zhang, all other medalists keep their body weight back on their right heel and kneeling roll. All positions are relatively open with bodies turned 60-70 degrees away from the line of fire. Their left elbows are either on the left knee or slightly behind the knee. Two keep their left lower legs vertical; the others extend the left foot further forward.



Changhong Zhang, China  
2021 Olympic gold medal



Yulia Zyкова, Russia  
2021 Olympic silver medal



Yulia Karimova, Russia  
2021 Olympic bronze medal



Nicco Campriani, Italy  
2016 Olympic gold medal



Barbara Engleder, Germany  
2016 Olympic gold medal



Sergey Kamenskiy, Russia  
Olympic silver – 2016, 2021



• **Inner Position Evaluation.** In kneeling, hold movements and poorer scores are often caused by conflicting tensions within the body. You can discover them by evaluating your inner position, that is, by sensing how different parts of your body feel and function while you attempt to hold the rifle still while aiming. It is possible to gain some insight into how muscles feel and function while dry firing or shooting, but a more effective way to evaluate the inner position is to do holding exercises in kneeling while aiming at a blank wall or blank target. Some athletes will even set up their kneeling positions in a dark room to evaluate their inner positions.

In kneeling, the body must remain calm and relaxed, with only minimal muscle efforts being made to hold the rifle steady on the target. Hold and inner position evaluations help to identify muscle groups that feel tense, strained, or uncomfortable while holding the body and rifle on the target. By identifying those points, position adjustments can be made to eliminate or reduce them.

### Kneeling Position Adjustments

The complexity of the kneeling position comes not only from the way the body is configured to get into a legal position but also from the many different position adjustments that can be made. Working out a position that performs best for each athlete is a process of making fine tuning adjustments to evolve a final position. Every adjustment should be based on prior evaluations and be carefully planned. When experimenting with position adjustments, it is important to understand how several of these adjustments have counter effects that must also be considered. Kneeling position adjustments include the following:

• **Kneeling Roll Height.** Adding or removing filling to the kneeling roll can raise or lower the torso. Using a smaller kneeling roll is generally recommended but some athletes use a higher bag to alleviate foot comfort issues. Changing kneeling roll height must also be accompanied by adjusting the left-hand location on the forearm and sling length to raise or lower the rifle in the same direction that the torso goes up or down.

• **Right Leg Angle and Body Position.** A couple of decades ago, kneeling position instruction stressed more open body positions where, as in prone, the body faced toward the target with the right leg turned only 30 to 45 degrees from the target. Recent kneeling instruction has advocated so-called closed positions where the body is turned further away from the target with the right leg pointing 60 to as much as 90 degrees away from the target. With most of today's great kneeling scores being produced by athletes who favor the latter variation, with the body



*A classic modern kneeling position—the product of countless hours in evaluations and on the range. The athlete is former University of Kentucky star Henrik Larsen of Norway. His kneeling score of 398 in the Tokyo Olympics Men's 3x40 event was the highest kneeling score fired there.*



*Left hand and/or sight height adjustments must align the sights with the aiming eye while the head remains erect.*

turned away from the target, athletes who have been using a more open position may want to experiment with turning their bodies further away from the target.

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### THE LOW KNEELING POSITION



Two examples of successful low kneeling positions. The athletes are Stine Nielsen, Denmark (top) and Bremen Butler, 2021 National Smallbore Matches Junior Champion.

- **Body Weight Distribution.** The weight of the body can be shifted from keeping all or almost all body weight back on the right heel to placing some upper body weight on the left knee or leg by extending the left elbow further forward on the leg. The “Olympic Medalists’ Kneeling Positions” on page 10 show a clear preference for keeping body weight back on the right heel but Olympic 3x40 rifle gold medalist Changhong Zhang’s position has some of his body weight supported further forward on his left leg.

- **Left Lower Leg Position.** This decision depends mostly on the relative lengths of an individual athlete’s torso, legs, and arms. Athletes whose legs and/or arms are proportionately longer than their torsos usually must extend their left foot further forward. As that is done, rifle height may need to be raised by shifting the left hand to the rear and shortening the sling.

- **Left Elbow Location on the Left Leg.** The proper technique for determining left elbow location on the left

leg is to first get the upper body in a relaxed position and then drop the left arm as it holds the rifle down onto the knee or leg. The elbow may fall on the knee, but in many cases, it will fall behind the knee. Wherever it falls is where it should be placed. This location may be fine-tuned to remove tension in the body but significant changes in left elbow locations should be avoided.

- **Left Hand Location on Forearm.** Shifting the left-hand location on the forearm raises and lowers the rifle and sights. The objective is to raise the rifle and sights high enough to keep the head erect while aligning the sights with the aiming eye.

- **Sight Height.** Sight height is fixed on sporter class air rifles and can only be raised by raising the rifle. On precision class air and smallbore rifles, riser blocks can be used to raise the sights (*air rifle sight height is limited to 60 mm/2.4” from the center of the bore to the center of the front sight*). This may improve the head position by keeping it more erect. These attachments can also be used to lower the rifle and the position’s COG.

- **Rifle Adjustments.** Modern air and smallbore rifles, including sporter class air rifles, have adjustments for stock length, cheek-piece height and butt-plate height. Adjusting stock length may relieve shoulder tension or improve the athlete’s ability to reach the loading port to reload in position, but stock length changes may also require compensating changes in the left-hand location on the forearm. Weights can be added to precision rifle barrels or buttstocks to change the rifle’s balance. Cheek-piece adjustments can ensure better support for the face, but consideration must also be given to whether additional cheek pressure adds stability or undesirable muscle tension. Vertical butt-plate adjustments should be made to keep the shoulder relaxed. Smallbore butt-plates and cheek-pieces have a multitude of additional adjustment possibilities that challenge even the most advanced athletes to get them right (*be sure any extreme butt-plate adjustments comply with the rules*).

- **Sling Tension.** In principle, sling length should be adjusted so the sling, and not the arm muscles, supports the entire weight of the rifle. If the sling is too long it may not fully support the rifle; if it is too short increased shoulder pressure may add tension to the shoulder muscles and upper body that must be avoided.

### Is the Low Kneeling Position a Viable Alternative?

The low kneeling position where the athlete sits on the side of their foot and does not use a kneeling roll has been around for a long time. Some U. S. shooters used it in the 1930s and 1950s, and it has made occasional returns since



then. The author, Gary Anderson, used it successfully in the late 1960s. In recent years a few athletes have used this position with enough success to spark renewed interest in it. 2021 NCAA Smallbore Rifle Champion Mary Tucker, who won a silver medal in the Tokyo Olympics 10m Air Rifle Mixed Team event and placed 13th in the 50m 3x40 Women event, shoots in this position.

The potential advantages of this position are its lower center of gravity and larger support area (*the athlete sits on the entire foot, not just the heel*). Its disadvantages include the discomfort that comes from sitting for prolonged periods in that position and tensions that can be created by extending the left foot further forward.

The most productive version of this position is illustrated in the two photos on the previous page. In these positions, the athlete sits with their body resting on the inside of the right foot (*a shooting mat should be used in this position*). All body weight should rest on the right foot, with the shoulders relaxed down. The left leg must be extended further forward and with the foot in this position it is vitally important for the left shoe to have a firm grip on the mat or floor to prevent it from slipping. Left leg muscles must be completely relaxed. To keep the torso erect, the left elbow must be placed well back of the knee (*the elbow cannot be more than 150 mm/5.9" behind the "point of the knee"*).

If the low kneeling position's potential advantages can be incorporated into a position that mitigates its disadvantages, this position may be capable of even higher average scores than the high position, but at this point not enough athletes and coaches have had successful experiences with it to justify reaching any final conclusions.

## Shot Technique in Kneeling

Shooting winning scores in kneeling not only depends upon working out a position that produces excellent, durable holds but it also depends upon being able to reproduce that same position each time you shoot kneeling, as well as the skill to prepare for and execute good shots in that position.

• **Position Preparation.** There are two phases of position preparation, 1) setting up the initial position and 2) the procedure of preparing for each shot. After developing a fundamentally sound position, you need a plan for getting back into that same position in exactly the same way each time you shoot kneeling.

Correct shot technique in kneeling requires a pre-shot routine where the movements to align the rifle with the target are consistent and minimized (*therefore keeping the rifle in the shoulder while reloading is advantageous*). Shouldering the rifle must be followed by brief checks to confirm position balance and muscle



*To set up a kneeling position, athletes must have a precise plan for how the parts of the body and rifle are to be placed, and they must be meticulous in following that plan.*

relaxation. In outdoor smallbore rifle shooting, it is also necessary to recheck the wind flags and decide if conditions are right to proceed.

• **Shot Technique.** When the pre-shot procedure confirms that it's OK to proceed, the aligned sights must be brought onto the aiming bull—in the same way for each shot. Initial pressure must be applied to the trigger and the sight picture must be centered and settled. Adding steady-smooth pressure to the trigger fires the shot. Applying consistent pressures on the rifle with the hands, shoulder and cheek ensures favorable recoil control during follow-through and calling the shot.

Firing winning scores in the kneeling position presents unique challenges but shooting athletes who put extra effort into evaluating and perfecting their positions will be rewarded with scores that will help them achieve their goals in shooting.

## About the Author

Gary Anderson is the Director of Civilian Marksmanship, Emeritus, and is the holder of two Olympic gold medals, seven World Championships and 16 National Championships. Mr. Anderson 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."

