UNITED STATES ARMY

MARKSMANSHIP TRAINING UNIT





THE HANDBOOK OF

FREE RIFLE SHOOTING

1965 EDITION

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TO THE READER

This new edition represents a complete revision of the Handbook of Free Rifle Shooting. We hope it is more readable and more informative than previous editions.

This book is basically a description of free-rifle shooting. Its purpose is to record the best methods and techniques of rifle shooting as we know them. It is not designed to solve every problem a shooter will encounter in the course of his development for such a task would be impossible. Experience has taught us that even in those cases where two shooters claim to have the same problem, the likelihood of the two of them finding the same solution to their problems is very remote. This is simply because no two individuals are exactly alike. In this book, then, we have attempted only to tell the shooter where he should be; we have not attempted to solve his individual difficulties in getting there.

The type of individual most likely to succeed with the free rifle is the type who can sit down and think about his shooting. An individual's progress in free-rifle shooting is directly proportional to how much--and how clearly--he analyzes his performance. This book is designed to orient the shooter in his thinking.

And finally, we have attempted to avoid the common pitfall of expressing principles in mechanical terms. If every shooter were a mechanical robot, cast in the same mold, then shooting could be defined in precise mechanical measurements. However, individuals are not cast in the same mold, and mechanical descriptions of a shooting position--or a sight system or a training program--would at best be only a clumsy approximation. We have attempted to record the principles--the reasons behind the mechanics--of shooting techniques. We hope we have succeeded.

We invite our readers' comments upon any part or portion of this book. Address all remarks to Head Coach, International Rifle Team, USAMTU, Fort Benning, Georgia.

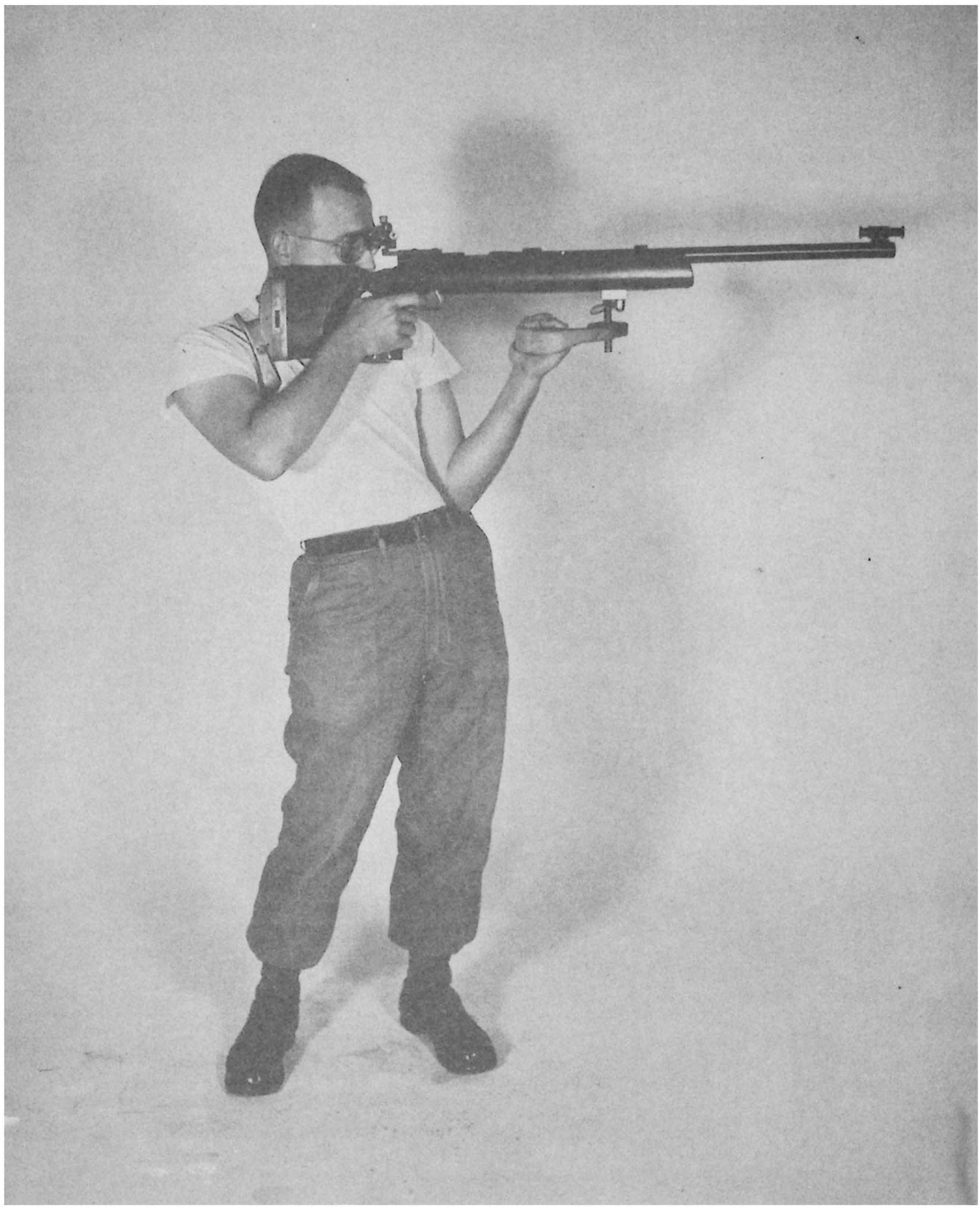
WILLIAM C. PULLUM
Lt Col, Inf
Head Coach

THE FREE RIFLE

The free-rifle is fully defined in the ISU (International Shooting Union) rulebook (see chapter 14). Basically it is a rifle with a thumb-hole stock, a removable palm rest, and an adjustable butt assembly with an interchangeable hook and plate. The smallbore free rifle is calibre .22 long rifle. The unrestricted free rifle is a calibre "not to exceed 8 millimeters."

The thumb hole stock is desirable, but not necessary to free rifle shooting. However, a palm rest and butt hook are essential to the employment of the shooting methods set forth in this book. Palm rests and butt hooks and plates are available from shooting supply houses and may be attached to a standard match grade rifle.

Excellent free rifles are mass produced by several arms manufacturers. Many custom gun builders also produce them; and of course the gun fancier may design and build his own. As the popularity of the free rifle continues to grow, it is anticipated that American arms manufacturers may introduce more models to compete for the growing market.



THE INTEGRATED ACT OF SHOOTING

To a spectator, the performance of a shooter appears deceptively simple. The shooter places the rifle in position, takes aim, and pulls the trigger.

But the man behind the gun knows differently. Shooting is not simple. It involves a complex coordination of several mind and body factors.

In this chapter we are going to consider several of the factors that must be integrated to produce the total act of firing. The reader should bear in mind that we consider each factor separately only for ease of discussion. All converge at a single moment to produce the shot.

He should also remember that it is relatively easy to talk or write about correct shooting methods. To put these methods into practice is vastly more difficult. It is partly because of this difficulty that shooting fascinates so many thousands of people.

Definitions

Throughout this chapter we will discuss the act of shooting as it applies to the standing position. This is the least stable of the four positions, and therefore the most difficult. All the factors that we discuss apply to the other positions. However, in the other positions their relative importance may change. The reader should have no difficulty in modifying our statements to apply them to the lower, more stable positions.

Throughout this book we will speak of the rifle as "motionless." When the shooter is in the standing position, the rifle is never completely motionless, as a rifle scope will reveal. But to the shooter looking through metallic sights, the rifle at time will appear to be motionless. This motionless period will last for a second or more. During this period, the area of wobble will be less than the area of the 10-ring. For purposes of discussion, we will call the rifle "motionless" during this period.

Shooting Method

There are two methods of shooting tens. One is to hold the rifle in the 10-ring and pull the trigger without disturbing the rifle. The other method is to allow the rifle to move about on the target, and pull the trigger as the rifle crosses the 10-ring.

The last method of "shooting on the move" has a definite disadvantage. The shooter cannot always predict the path of the rifle's movement. He will therefore never completely eliminate wild shots.

The only method we teach or accept is the method of holding the rifle in the 10-ring and pulling the trigger without disturbing the rifle. This method requires the shooter to develop his ability to hold the rifle motionless.

The Position is Built Upon Bone Support

The position that delivers this motionless hold is based upon bone support. Bone structure supports the weight of the rifle. Because the muscles are relieved of this weight, they do not fatigue and develop tremors. The shooter maintains better muscle control, and his area of wobble remains at a minimum throughout the course of fire.

To illustrate how bones may support the weight of the rifle, let us imagaine that we see the shooter on page 1 on the screen of a giant flouroscope. We see only the rifle and the shooter's skeleton.

The shooter's left upper arm rests against the left rib cage. Supported by the ribs, the bones of the left forearm form a bracket that supports the rifle. The butt hook under the right armpit prevents the rifle from falling forward from the weight of the barrel.

If the shooter lifted his left elbow away from his left side, he would be "holding" the rifle up with the muscles of his left arm and shoulder. But he can lower his elbow to the rib cage (in some cases the hip bone) and the bones will do the work for him.

The shooter is bent back and to the right to gain further bone support. If the shooter stood straight, the weight of the rifle would pull his body to his left front. He would have to strain the muscles of his back to keep his body from falling. But by bending back and to the right he moves the weight of his body to the right rear of his feet. At a certain point the weight of his body to the right rear of his feet equals the weight of the rifle to the left front of his feet. The body-rifle then reaches a state of balance, with the center of gravity directly above the feet. The shooter no longer has to strain the muscles of his back to keep his body from falling.

As a result of this back bend, the weight of the rifle and upper torso falls upon the bones of the lower spinal column. Hip and leg bones transmit this weight ultimately to the feet. Thus the weight of the rifle is almost completely supported by bones. The only work required of body muscles is to keep the body standing and prevent it from swaying away from its point of balance.

Muscles are Used to Stop the Movement of the Body-Rifle.

Even though bones support the weight of the rifle, the body is never completely still. If we put aside our fluoroscope and watch the shooter closely, we will detect a certain amount of swaying movement in the body. This movement is normal. It occurs because the shooter does not reach, and maintain, a state of perfect balance. It is impossible for a living, functioning organism to hold itself with rock-like rigidity. There is a continuous, though minute, shifting of tensions and of the center of gravity of the organism. Thus the balance is continually disturbed, and hence the swaying motion.

As the position is refined, however, the limits of this swaying motion become smaller and smaller. As a result, the movement of the rifle also decreases. Some shooters have refined their standing position to the point that at times movement of the rifle is confined to the 10-ring (NRA).

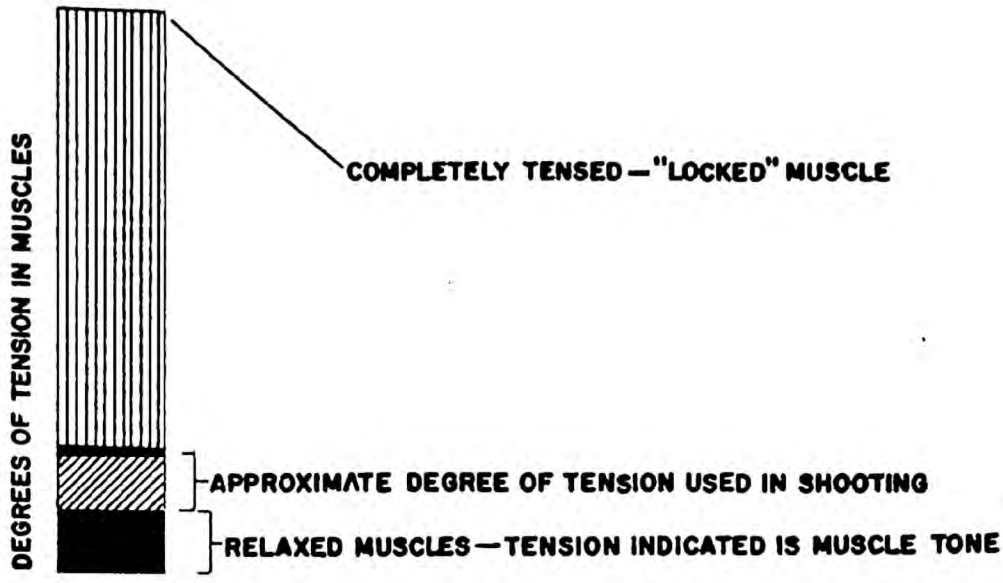
Most shooters have not reached this point of refinement. However, with experience most shooters can develop at least a 9-ring hold.

The shooter who cannot maintain a 10-ring hold must make a conscious effort to stop the sway of the body as the rifle drifts into the 10-ring. He does this through muscle control. In effect, when the rifle drifts into the 10-ring, the shooter uses will power to "hold" the body still long enough to allow correct trigger control.

Muscle Tension

To aid in holding the body still, the shooter should maintain a slight degree of tension in all body muscles. This tension provides for finer gradations of muscle control.

It must be emphasized that the tension is very slight. Completely tensed or "locked" muscles quickly fatigue and begin to tremor. The correct tension is very near to complete relaxation. Portrayed on a graph, the tension would appear this way.



This tension is so slight that it is hardly felt by the shooter. Experienced shooters are normally unaware of it because it has come to feel completely natural. The degree of tension undoubtedly varies from shooter to shooter. Some individuals use as much tension as they can without becoming fatigued. Others use just as little as they can without losing control of the muscles. It is entirely up to the individual shooter to find and maintain the degree of tension that gives him the best control of his body.

The Left Arm

The left forearm that supports the rifle is not completely rigid. The shooter is capable of "steering" the rifle somewhat with his left hand. But like the body, the left forearm can be placed in a point of balance. If the muscles of the left hand function properly, it can be held at this point of balance without moving. Also like the body, it can be held in balance with a very slight, almost relaxed, muscular tension. It is at this point of balance that the shooter should place his left forearm. He should avoid using the muscles of the left arm to steer the rifle into the 10-ring.

Hold, or Steadiness of Aim

The shooter has two methods of appraising his hold. One of these methods is the movement (or lack of movement) he sees in his sight picture. The other is the movement (or lack of movement) he feels in his muscle system. As closely related as they are, these two methods become clearly separated in the mind of a trained shooter.

Mental Processes Involved in Shooting

In the moment before pulling the trigger, the shooter is attempting to stop the movement of the body and hold the rifle in the 10-ring. He is thinking about stopping all movement in his body muscles and maintaining body control.

We usually define "thinking" as a reasoning process involving words and sentences, or some other meaningful symbols such as numbers. But there are times when "thinking" includes neither words nor symbols. The trained athlete who drives a golf ball, shoots a basketball, or throws a baseball does not think with words at the moment he performs these activities.

He "concentrates" upon body control; but he does not form a verbal plan for each musclar movement, such as "I will continue to grip the club, contract the muscles of my right shoulder and side, break my wrist to the right, ..." etc. He is aware of these different muscular activities, but he is not thinking about them in words. His mental processes are best defined as a state of heightened awareness of the conditions of his body.

The same is true in shooting. The trained shooter does not think with words at the moment he attempts to hold the rifle motionless. He is aware of the amount of control he has over his muscles and the degree of steadiness he can expect from them. He can also anticipate an involuntary muscle movement by learning the "feeling" that precedes these movements. But this thinking does not necessarily involve words, and is best described as "awareness."

This awareness of body control should continue through the delivery of the shot to provide follow-through. This is especially necessary in smallbore shooting because of the relatively slow barrel time of the cartridge.

There are several factors that interrupt the awareness of body control and thereby cause a breakdown of performance. These factors will be considered in the chapter on psychology.

Trigger Control Can be Developed into a Reflex

The awareness of body control will include an awareness of trigger control. However, the shooter can develop his trigger control to the point that pulling the trigger requires no conscious effort. He will be aware of the pull, but he will not be consciously directing it. Everyone exhibits this type of reflex activity in daily living. The individual who walks or drives a car while carrying on a conversation is an example. He is aware of his muscular activity, but not "planning" it. He is thinking about the conversation.

A closer analogy to shooting is found in the typist. When first learning to type, she reads the alphabetic letter she wishes to type, mentally selects the corresponding key, and consciously directs her finger to strike the key. But after being trained, she can simply read the letter she wishes to type and her finger will strike the corresponding key automatically. She no longer has to consciously direct her finger. It is as if a nerve circuit had been formed between her eye and her hand, and the nerve impulse traveled directly from her eye to her finger. The activity resulting from this built in circuit is a conditioned reflex, conditioned because it is built in, reflex because it is not consciously directed.

The same type of reflex circuit can be developed by a shooter. When he initially begins shooting, he must consciously direct his finger to pull the trigger when the rifle settles in the 10-ring. As a result of training, however, a circuit will be established between the eye and the trigger finger. The eye, seeing a sight picture centered on the 10-ring, will then cause the finger to pull the trigger without a conscious mental effort from the shooter. The shooter, like the typist, is aware of the activity of the finger, but is not planning or consciously directing it.

The analogy with the typist was chosen because of the close parallel of coordination between eye and finger. But the same type of conditioned reflex is by no means limited to shooting or typing. A more familiar example is the baseball player swinging at a pitch. He sees the ball coming, accepts the pitch as being within his batting zone (this acceptance does not necessarily involve thinking with words), and starts his swing. If the batter is well trained, the swing is "in the groove," automatic in the same sense that the typist's finger movements are automatic. He sees the path of the ball and his swing adjust to it automatically.

But if the batter suddenly sees that the pitch is a bad one, he can stop the swing before it crosses the plate. He can "break the circuit," so to speak, that has been established between his eye and his body muscles.

A shooter can do the same thing. He accepts a sight picture and the trigger pull starts automatically, just as the batter's swing started when he accepted the pitch. But if the shooter suddenly realizes that his rifle is beginning to move out of the 10-ring, he can "break the circuit" and stop the pull. He must then begin the entire shooting cycle over again.

The progressing shooter will at first give a great deal of attention to trigger pull. Experienced shooters will also have difficulty with trigger control from time to time. But by making a repeated effort to develop a correct trigger pull, the pull itself will require less and less conscious effort and will eventually assume reflex characteristics.

There are different methods, or techniques, of pulling the trigger. These techniques will be discussed in a separate chapter.

Body Control in the More Stable Positions

We have considered several of the factors involved in the integrated act of shooting. These factors were discussed as they apply to the standing position. The application of one of these factors may change notably under certain circumstances, and deserves to be mentioned.

In the standing position most shooters must force the rifle to stay within the 10-ring. To do this, they must center their awareness on body control in order to hold the muscles (and rifle) still and motionless. They must overcome the natural tendency of the body to move around its center of gravity. If they shift their attention away from body control, the hold may break out of the 10-ring during the trigger pull, resulting in lost points.

In the more stable positions this may not be the case. Many shooters can hold 10-ring in the prone position without much effort. Some can do this in the kneeling position. A few can do it standing. Because of their stable positions, these shooters can dependably hold 10-ring without a great deal of attention to body control. Body control is then no longer the critical factor in the delivery of a ten. Chances are that eye fatigue, wind conditions, or a smoothly controlled trigger pull may emerge as a more important factor. In that case, the center of awareness will shift to this more critical factor. If awareness centers on trigger control, the reflex characteristic of the trigger pull will be modified.

This shifting of awareness may apply to any shooter in any position if the hold is dependably less than 10-ring. However, if the shooter cannot hold 10-ring, body control must be considered the critical factor. The shooter who fails to realize this is attempting to shoot "on the move" and appreciably limiting his performance.

TRAINING

Mental Training

If the mind is distracted, or if concentration is incomplete, the shooter will lose control of his performance. His score will be considerably affected. There are three broad categories of conditions that can influence the ability to concentrate.

1. Inability to concentrate for extended periods of time.

Almost everyone is capable of intense concentration, but not all people can concentrate for equally long periods. A full course International Match or a full day of NRA shooting requires a shooter to concentrate intensely for several hours. Many shooters complain of being mentally exhausted at the end of one of these matches. They feel that they could not devote full concentration to their shooting if they were required to perform much longer.

Other shooters cannot concentrate even this long. They become mentally exhausted before the completion of the day's firing. Their performance deteriorates toward the end of the day because they can no longer concentrate on body control (or other factors they consider critical to their performance).

The ability to concentrate throughout a course of fire can be developed through practice. A shooter should practice as regularly as possible. During practice he should attempt to make each shot (live or dry) the best he is capable of. He will gradually acquire the ability to concentrate intensely for longer and longer periods, for more and more consecutive shots.

This development cannot take place overnight, and must be acquired patiently. Shooting sessions should not continue beyond the point where concentration is completely exhausted, because bad habits are easily acquired unless practice is conducted with great care. In practice, the quality of performance is more important than the number of rounds fired.

2. Interference from physical pain or discomfort.

Pain distracts the shooter's mind and interferes with concentration. A shooter should not hesitate to alter his clothing or shooting equipment in order to achieve comfort. The only requirement is that the correct shooting positions must not be violated.

Even minor discomfort can have a cumulative damaging effect. A thing so small as a pebble underneath a shooting mat may cause mild discomfort. It may distract the shooter for only a single shot, but even this can easily lose a match. This kind of discomfort and distraction can easily be avoided.

Under certain circumstances, a certain amount of pain is unavoidable. The high kneeling position, for example, places the body weight almost completely upon the ankle. The ankle can become somewhat conditioned to carrying this weight. However, many people find that even after years of shooting, the ankle still becomes uncomfortable after they have been in position for a certain time. In addition, some shooters find that they can never completely eliminate discomfort in the prone or sitting positions.

In cases where pain is unavoidable, the shooter must learn to ignore it and concentrate on performance. However, forcing one's self to ignore discomfort requires increased mental effort and hastens the approach of mental fatigue. The shooter, then, should avoid shooting for a long period in an uncomfortable position. A break after a 10-shot string will relieve the pain and allow the shooter to rest his mind and body. In no case should an individual attempt to shoot when pain is so great that he cannot fully concentrate on performance.

3. Nervous or emotional reactions to competition.

New shooters, especially, are subject to nervousness when they shoot in competition. They worry about the score they will get. They think about their score so much that they cannot concentrate on performance. Consequently they shoot a score that is way below their average.

Nervousness in most cases is nothing more than a fear of failure. Many new shooters feel that competition "causes" them to be nervous. This is not true. They cause themselves to be nervous. They work themselves into a state of agitation because of fear that they will not shoot the best score they are capable of.

It is helpful to a shooter to realize that worrying can only harm his own performance. There is no way that he can affect the performance of other shooters. He cannot control their scores by thinking about them. But he can shoot a good score himself by concentrating on his own performance.

A new shooter cannot expect to conquer nervousness overnight. It is a reaction of his entire personality. Psychologists have learned that the entire personality participates in an individual's every action. More correctly, the entire personality determines an individual's every action. (For that reason there can be no part of an individual's personality that can be called his shooting personality, and there can be no separate psychology. There can just be psychology, simply.) Nervousness, then, is a highly complex reaction. Because of this complexity, there is no simple, easy solution to overcoming the reaction.

The only solution is experience and exposure to competition. The shooter must attempt to exert more control over his nervousness each time he shoots a match. Gradually his personality will change to adjust to the competitive situation, his complex feelings and attitudes will change, and he will conquer his fears about his performance. He can then approach competition calmly and thoughtfully, and devote full concentration to performance.

There is a popular opinion among some people that alchohol or drugs can help the shooter overcome nervousness. This is false. Medical authorities, using sensitive measuring devices, have found that alcohol, coffee, tobacco and drugs increase muscle tremors and impair the ability to perform delicate muscular movements. In addition, alcohol and drugs give a shooter a false sense of security. They make him feel that even if he makes a mistake it will not really matter. The individual thus does not try as hard, but feels that he is nevertheless doing quite well. Inevitably he is defeated by a shooter in full control of his body, senses, and willpower.

Alcohol and drugs will not aid a shooter in gaining experience in overcoming nervousness. They only blind the shooter to his reactions, and he learns nothing about controlling them. A person learns to overcome nervousness by facing up to it in an intelligent, clear-headed manner. This is not accomplished through the use of alcohol or drugs.

Experienced champion shooters concentrate on performance while they shoot a match, and think about scores when the match is over. They learn to do this through self-discipline and competitive experience.

Physical Training

Physically, the shooter must be able to 1. assume a comfortable position; 2. hold the rifle motionless (as defined in chapter one); and 3. shoot for a sustained period without fatigue.

1. A comfortable position is based upon natural structures. It is not based upon unnatural stresses between body and rifle. Positions will be discussed in detail in later chapters.

Comfort in a position also requires that the body be accustomed to the position. The beginning shooter is likely to find certain things uncomfortable in all positions. For example: the back bend in the standing position; the weight placed upon the ankle in the kneeling position; and the sling pressure in the prone position. Discomfort arises because portions of the body are being put to new use. If the basic position structure is correct, the discomfort will usually disappear as the shooter's body becomes accustomed to the position. (We have noted a slight exception in the kneeling position.)

The best way to condition the body to a position is to practice shooting or dry firing in that position.

2. Holding the rifle motionless requires a stable position. An incorrect head position in the higher positions, for example, will cause the body to sway involuntarily. This movement is reflexive and the shooter is powerless to control it. A position that is out of balance will also cause involuntary movement and muscle strain.

By using bone support for the body and rifle, the shooter uses muscles only to control the body. To hold the rifle in the 10-ring the shooter must be able to control his muscles and hold them still and motionless.

The best way of training the muscles for the work they must do in shooting is through shooting or dryfiring. Practice sessions should be conducted regularly. Short sessions conducted on a regular schedule are much more valuable than long practice sessions conducted infrequently. Frequent practice enables the shooter to acquire a "feeling" for muscle control. He learns to anticipate involuntary muscle contractions, which disturb a 10-ring hold and are responsible for erratic shots. By learning to anticipate these movements, the shooter becomes able to inhibit the trigger pull and prevent bad shots. And, regular practice enables the shooter to increase his ability to hold his muscles still and motionless.

The body can be trained to near perfection in holding itself motionless. An individual who can shoot a string of tens from any position illustrates this. It is conceivable that anyone who can fire several tens in succession has the ability to fire tens for a complete match course. We have good reason to believe that there are shooters in this country who are physically capable of shooting scores of 1190 or better (ISU). These scores have not been recorded not because of physical limitations, but because of psychological limitations. When the scores become psychologically acceptable, they will appear in higher competition. The human body is capable of firing much higher scores than those that appear in competition today.

3. The muscles must be capable of controlling the body-rifle for a sustained period without experiencing fatigue. Many of our best shooters often keep the rifle in position for long periods, waiting for the right conditions of light, wind, or body control. If muscles fatigue, they develop tremors and the shooter loses control of his body.

The body must be capable of shooting an entire course without fatigue. A full day of shooting requires a tremendous amount of lifting and holding. Obviously, the muscles must be conditioned to perform such work. Since shooting exercises a specific set of muscles, shooting practice is the best method of developing strength and endurance in these muscles.

Physical conditioning (exercises) has been the subject of much discussion. Recent experiments conducted at the USAMTU have yielded the following conclusions:

1. General physical conditioning, if conducted properly, in no way impairs shooting performance; but

2. Physical conditioning does not contribute significantly to improving scores.

Before applying these conclusions, we must recognize two other specific facts.

1. The experiments were conducted with physically mature individuals who lead physically active (though not necessarily strenuous) lives. Individuals who lead sedentary lives and lack muscle tone or strength would certainly benefit from exercises that tone and condition the body. All conditioning programs, however, must be long-range programs. Crash programs in physical conditioning definitely impair shooting ability.

2. Physical conditioning may give some shooters a psychological boost by contributing to a feeling of health and well being. The shooter who follows a regular schedule of physical conditioning may acquire the confidence that he is better trained than his competitors. Some individuals are also capable of using physical conditioning as a form of self-discipline. They force themselves, for example, to run at top speed for 200 yards or more. Forcing themselves beyond easy limits becomes a means of developing will-power and self control. They feel that this discipline increases their ability to control themselves under pressure. It is important to note that this form of training must be self imposed. An individual must impose it upon himself because of a strong desire to excell in shooting and because of a compelling motivation to win. Such rigid discipline should not be imposed by a coach. The shooter who wishes to train this way, will do so. For a coach to force such discipline upon a shooter will only make training a difficult chore and cause the shooter to lose interest.

There is no one physical training program best suited for shooters. MTU shooters have had good results with a light program of dynamic tension exercises (as a warm up before shooting) combined with 5 or 6 calesthenics from the Army "daily dozen" (these taken at the end of the shooting day). Dynamic tension exercises seem to develop muscle control as well as muscle strength. (A series of these exercises is included in the back of this book.) MTU shooters are also encouraged to run each day. Many shooters feel that this is the most valuable method of conditioning outside of shooting itself. In addition, almost all shooters participate in softball, basketball, touch football, volleyball, and golf. Generally speaking, any activity that keeps the individual active and fit, and which breaks the monotony of shooting, is considered valuable. However, after an individual has reached a level of fitness, additional physical conditioning does not contribute to his physical shooting ability.

Some of our best shooters feel best when they run a great deal and participate in vigorous sports. Others perform merely enough exercise to maintain muscle tone. Apparently each individual should develop a physical training program that best suits his individual needs and temperament.

Characteristics to Develop in Training

MTU shooters have dominated the '62 World Championships, the '63 Pan American Games, the '64 Olympics, and recent National Matches. The individuals who won these matches feel that a champion shooter must have three characteristics.

1. A champion shooter must be able to analyze his performance. Thinking about his performance is the only way he can determine why he has a specific problem. Thinking about the problem is the only way he can find a cure. Then he must plan how to put the corrective measure into practice.

Thinking habits are vitally important. A shooter must never form conclusions on the basis of a hunch or a sudden flash of insight. In fact, he should never hold anything more than probable conclusions until he has tested his opinion in a controlled experiment. Then he must accept the results of the test, even if they contradict what he thought was a brilliant opinion. He must also accept facts about his performance that are pointed out to him by others. He must never allow pride or personal feelings blind him to the truth.

A shooter would do well to look upon shooting as a science and to look upon himself as a scientist. He should view shooting as an experiment with a purpose--to shoot the best score possible. With this detached, impersonal approach, he can work strictly within the limits of the scientific method. Controlled experiments as they apply to shooting will be briefly discussed in the next chapter.

Conclusions should not be based purely on the result of practice sessions. The final test of a method is whether it works under match conditions. A shooter should enter a number of minor matches simply to test new methods before using them in a big event. In addition, he will gain valuable match experience.

The further a shooter advances, the more importance he gives to analyzing performance. Our best shooters feel that the ability to analyze performance accounts for at least 75 per cent of a champion shooter's ability.

2. A champion shooter must have confidence. When he goes to the line to shoot, he must feel that he is the man to beat. He must be convinced that if he concentrates on performance, he can shoot a certain score; and he must know that his score will win the match.

The champion never allows himself to be overconfident. He never feels that winning will be easy. He puts a full measure of effort into every shot in every event.

But the champion shooter never feels underconfident. He never feels that he is good only for second best. If he thinks of himself as second best, he will shoot for only a second best score. If he gets that score toward the end of the match, he will relax. And he will seldom if ever beat the man who keeps shooting for first place.

3. A champion shooter must have a compelling desire to win. A strong desire to win will drive the shooter to train correctly. It will cause him to analyze the smallest detail of his positions in order to gain an additional point. It will drive him to give up coffee, tea, alcohol, and tobacco. It will drive him to practice regularly and to make every shot count. It will drive him to perform better than anyone else, and to continue to improve in order to stay out in front of the field. It provides him with the will power to control and discipline himself in the face of intense competition. It instills in him the killer instinct--the desire to beat everyone else on the line, regardless of their ability or reputation. It enables him to be a champion.

Champion shooters are quick to point out, however, that mere desire to win will not in itself win a match. It must be backed up with an ability to shoot a winning score. An intelligent analysis of shooting is necessary to develop this ability. Desire to win is simply useless energy unless harnessed by intelligent planning and self-discipline.

Champion shooters feel that they started to be successful when they set high goals for themselves. They decided that instead of being good shooters, they would become the best shooters. When they began to accept nothing but the best from themselves, they became champions.

Shooting Diary

Beginning shooters should keep a shooting diary. As a written analysis of each day's performance, it serves as a permanent record of training results. Such a record is invaluable in enabling the shooter to see trends and patterns in his performance. It is an excellent aid to the process of refining positions, techniques, and training methods.

The most important function of a diary is to force the shooter to analyze. In addition, writing helps to reinforce any learning which took place as a result of the analysis.

One common tendency of all shooters is to analyze performance only in terms of mistakes made. A shooter should actually pay more attention to his good shots than to his poor shots. It is necessary to know why a shot was poor in order to avoid the same mistake on the next shot. But it is even more necessary to know why a shot was good in order to repeat that performance in the future. Analysis is a constant, continuing process: it is not reserved for days when performance is poor. A diary is a method of insuring continued analysis.

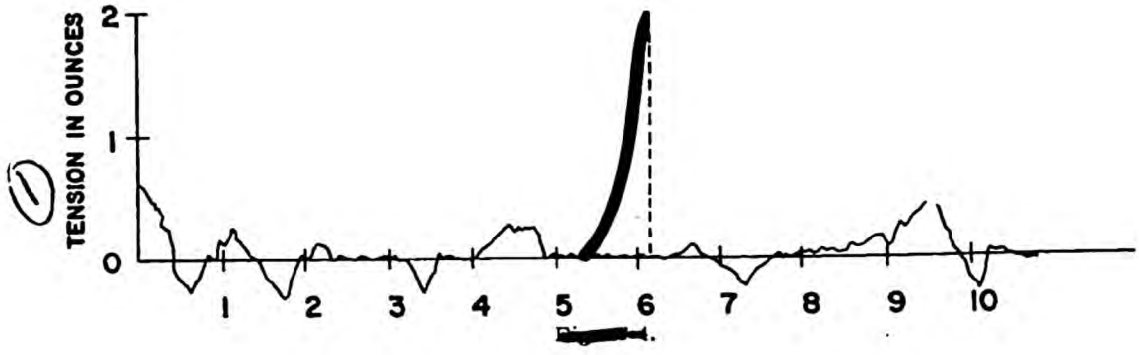
METHODS OF TRIGGER PULL

The broader characteristics of trigger control were discussed as an aspect of the integrated act of shooting. Controlling the trigger is a mental process. Pulling the trigger is a mechanical process. This chapter deals exclusively with the mechanical method of pulling the trigger.

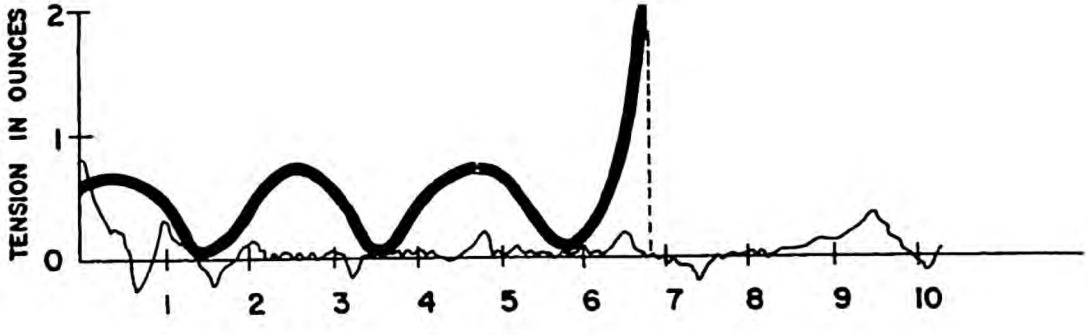
In NRA competition a minimum weight of three pounds is required to pull the trigger, although it is hoped that this rule may soon be modified. In ISU competition, no restrictions are placed upon the weight of the trigger pull except that it must be "adjudged safe" by the match officials. Most shooters prefer a double-stage set trigger or a single stage trigger adjusted to a few ounces of pull. A trigger pull that is too light causes the shooter to worry about accidental set-offs, and disturbs his concentration.

There are four methods of pulling the trigger.

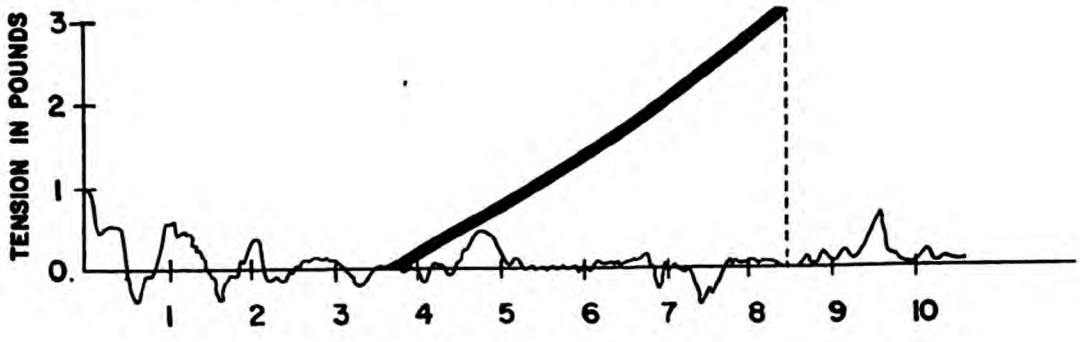
1. The finger is placed close to the trigger, and may actually touch it. The shot is released by a single swift movement of the finger. (Light trigger only.)



2. The trigger finger pulsates up to and away from the trigger, touching it lightly. When the sight picture is perfect, the finger pulsates into contact with the trigger with a slightly increased force and releases the shot. (Light trigger only.)



3. The finger rests against the trigger and, when the sight picture settles, pulls the trigger with a single smooth motion. (Light and heavy triggers.)



4. When the sight picture begins to settle, the finger applies pressure to the trigger as long as the sight picture looks good or continues to improve; if the picture deteriorates briefly, pressure is maintained at a constant level, and is increased when the picture again begins to improve. (Heavy triggers only.)



There are variations of each of these methods. A beginning shooter should experiment with more than one technique to find the method which best suits his coordination. He should then stay with that method until he has mastered it completely. Advanced shooters usually develop a slightly different method of trigger pull for each position.



THE STANDING POSITION

Area of Aim

When a shooter gets into the standing position, he seeks to use bone support and to find a point of balance. When he finds that position, the adjustments of the rifle determine that the rifle will point naturally in a certain direction.

However, the position is not limited to this one point of balance and area of aim. Notice that the shooter can move the center of gravity of the body-rifle structure by a small movement of the left elbow and the rifle (right-handed shooter). He can then make a slight shift in the posture of his body and find a new point of balance. The rifle will then point in a slightly different direction than it did in the first point-of-balance position. It must be emphasized that the shift in the position can never be very great, or the entire bone support structure will lose its efficiency. But a small shift can safely produce a small change in the direction of aim if no strain is incurred in the body.

The standing position, then, does not have one single point of aim that is natural to the position. There is rather an area of aim that is natural to the position. The shooter must adjust his rifle and the placement of his feet so that when he assumes the position, the bull is within his area of natural aim. If the bull is outside this area, he will have to use muscles to force the rifle into the bull, and thus defeat the principle advantage of the position.

With a properly adjusted rifle, a shooter with some experience can assume a position that points the rifle to the general vicinity of the bull. By moving his feet, or by changing the position of the left elbow and modifying the body posture, he can find a balanced position that points the rifle directly at the bull. (Or above it. Some of our better shooters prefer to take a deep breath and simultaneously assume a position that aims the rifle at a point above the bull. They then breath two or three times, allowing the left elbow to settle as a result of chest movement. They control the final elevation of the rifle by breath control, allowing only a small amount of air to remain in the lungs.)

The shooter seeks a balanced position, but he rarely finds perfect balance. Therefore he does not achieve a "point" of aim. The rifle will continue to drift around or across the bull. The extent of this drift will depend upon the stability of the position. When the rifle drifts into the 10-ring, the shooter must stop the movement and hold the body-rifle motionless. He does this by will power--by exerting complete control over his muscles and holding the body-rifle still.

In this discussion of balance and aim, we have assumed that the shooter has already acquired 1) a good basic position; and 2) a rifle adjusted to fit his position.

The beginning shooter will find that correctly adjusting the palm rest and butt hook is a bewildering task. Part of this diffuculty arises because he does not yet "know" his position. He has not used the position enough to be able to feel minor changes in body posture. Consequently he will not know whether he has assumed the same position each time he fires; and so from time to time it appears that the rifle is not adjusted.

Another part of the new shooter's problem is the difficulty of determining and actually making correct adjustments to the palm rest and butt hook. Even experienced shooters find that some experimentation is necessary to correctly adjust an unfamiliar rifle.

A new shooter will normally require a week to ten days of practice to find a basic position and adjust the palm rest and butt hook. This is a period of basic experimentation, and during this time major adjustments may be made to the rifle.

The basic position is described as follows.

1. The shooter faces approximately 90 degrees to the right of the target.

2. He places the feet slightly less than shoulder width apart, toes pointing slightly outward.

3. He places the rifle to his shoulder, muzzle elevated, and bends backward, keeping the legs straight.

4. He drops the left elbow until it contacts the body, and pivots the torso left from the small of his back until the rifle is pointed at the target. If he properly maintains the back bend, he will feel as though the weight of the rifle were falling down upon his chest. His legs should be straight, and he should be able to find a balance point. Weight should be almost evenly distributed on both feet.

At this point, the rifle is properly adjusted if the following requirements are met:

5. The rifle is pointed at the target (assuming the feet are facing away from the target at the proper angle).

6. The palm rest is on the heel of the hand, and the left wrist is comfortable. The wrist may or may not be bent back, but it must never be twisted.

7. The left elbow should rest against the left side or hip and support the rifle without noticeable tension in the arm muscles.

8. The head should be in an upright position, with the eyes looking straight forward out of the socket and through the sights. If the head is tilted, the organ of balance, located in the head, assumes that the entire body is tilted and automatically sends out signals to correct the tilt. Consequently, the body sways involuntarily. In order to keep the head erect, it may be necessary to cant the rifle. It is essential that the angle of cant remain the same for each shot.

9. The butt hook should be comfortably under the right armpit, preventing the rifle from pivoting forward from the weight of the barrel.

10. The right arm may be slightly tensed or completely relaxed, but never strained.

11. The right hand should be comfortable and under no strain whatsoever. It should provide for a straight trigger pull that is directly in line with the bore of the barrel. The trigger finger should not touch the stock in such a manner that pressure applied to the trigger also applies pressure to the stock.

In summary, the position is beginning to take shape when the rifle is pointed at the target and when the body meets the requirements of 1. bone support; 2. balance; and 3. slight, more or less even tension in all body muscles, but with no strain anywhere in the body. The beginning shooter should not hesitate to make major changes in the adjustment of the rifle, and small changes in the initial body position, in order to find this basic position.

After the initial period in which he is finding a basic position, the shooter should proceed cautiously in making changes. This is partly due to the fact that in the early stages, his position may actually be correct, but he has not developed sufficient body control to enable him to hold well. Needless to say, to change a correct position would be harmful.

Another reason is that the entire process of developing the standing position is a process of refinement. It should be conducted with the care of a scientific experiment; and by its very nature it must be developed over an extended period of time.

Use of the Scientific Method

Because a great many adjustments are possible in the standing position, it is difficult to determine which possible adjustment would best correct a particular problem. The shooter should not make a change until he has carefully thought out the cause of his problem and the result of a number of changes. Then he should note his present position, make the selected change, and note the results over a period of training sessions. If the change is not beneficial, then he should return to the position he used before the change, and from that point determine a new change. In this way he avoids straying away from his basic position. If the change is beneficial, of course, he should adopt it and consider it a part of his basic position.

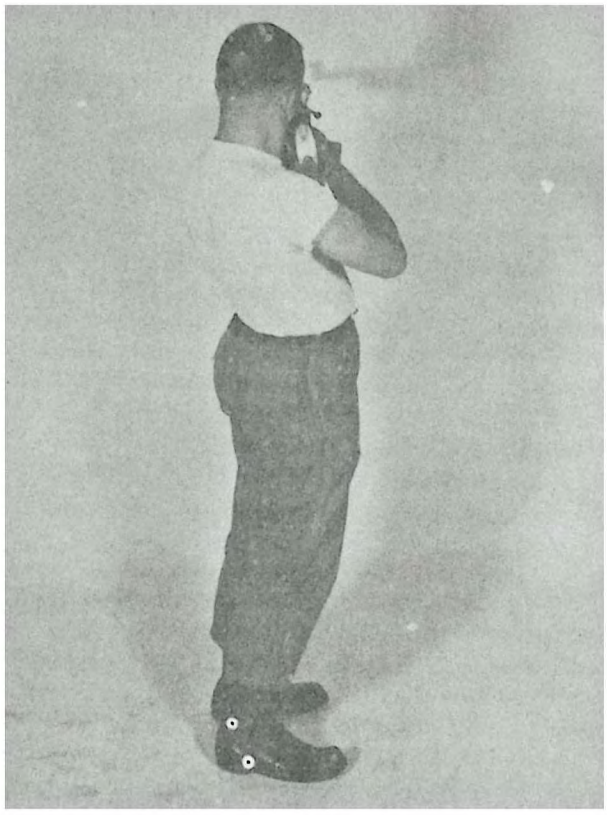
There are two things to remember in experimenting with changes in position or technique.

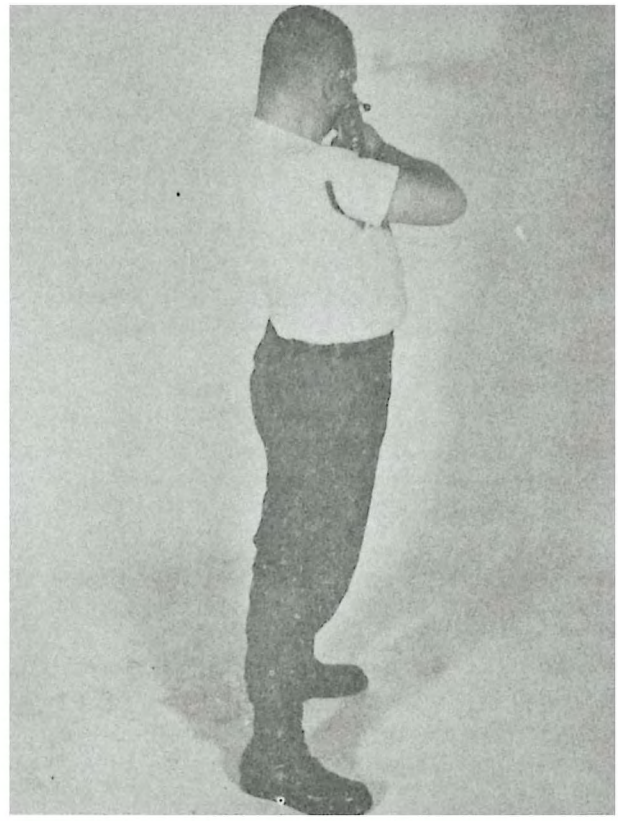
1. Never make more than one change at a time. This allows the determination of the specific results of a specific change.

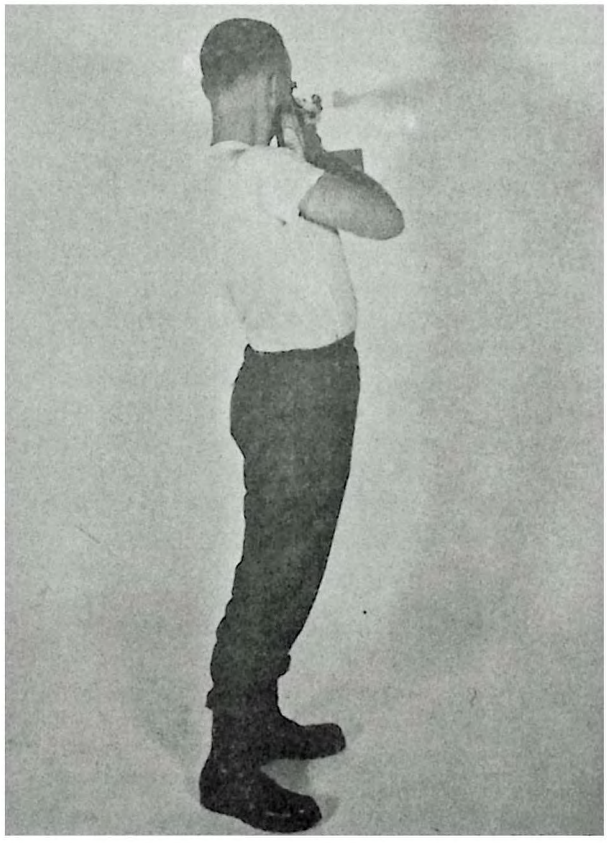
2. Never evaluate a change on the basis of a single shooting session. The results of a single test are not conclusive. There are too many factors---including the effects of change itself---that can affect performance. Any test should be run until the results are proved conclusive beyond any doubt.

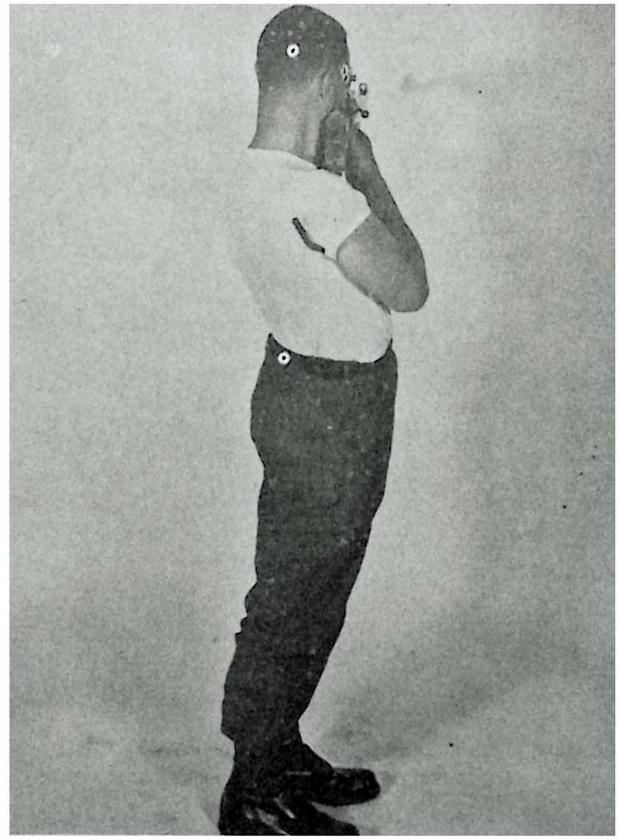
As a shooter progresses and refines his position, he will make smaller and smaller changes in his position, and his hold will become better and better. No shooter, however, ever assumes that he has finalized his position. Progress grows out of constant (though careful) refinement, and this refinement is a continuing process.

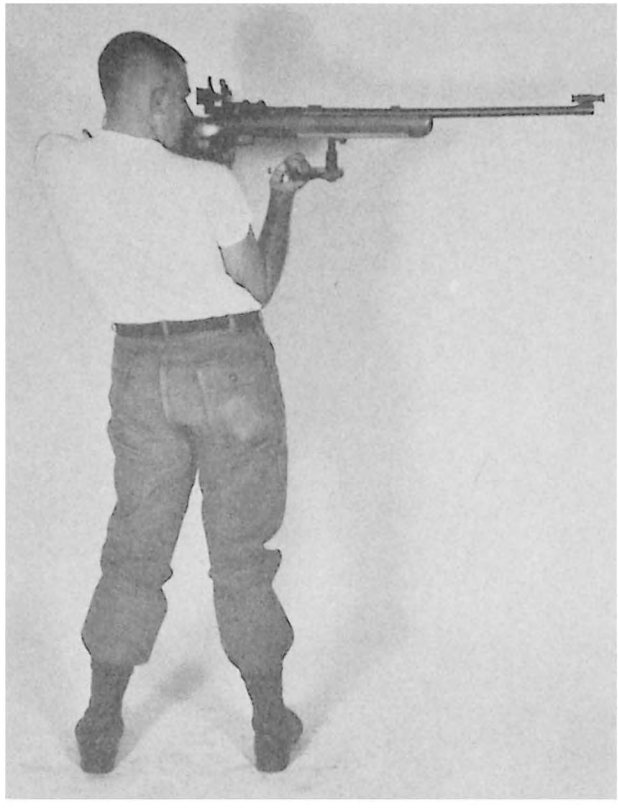
A study of the following pictures will illustrate how the standing position is not built upon measured mechanical distances for the placement of the feet, position of the palm rest, etc. The positions in these pictures are built upon the principles discussed above. While there are variations in the placement of the feet, etc., all the pictures illustrate these principles adopted to the differences in individual body conformations. The reader may find that a slight deviation from the "classic" position is best for his body conformation, as long as the principles of the position are not violated.

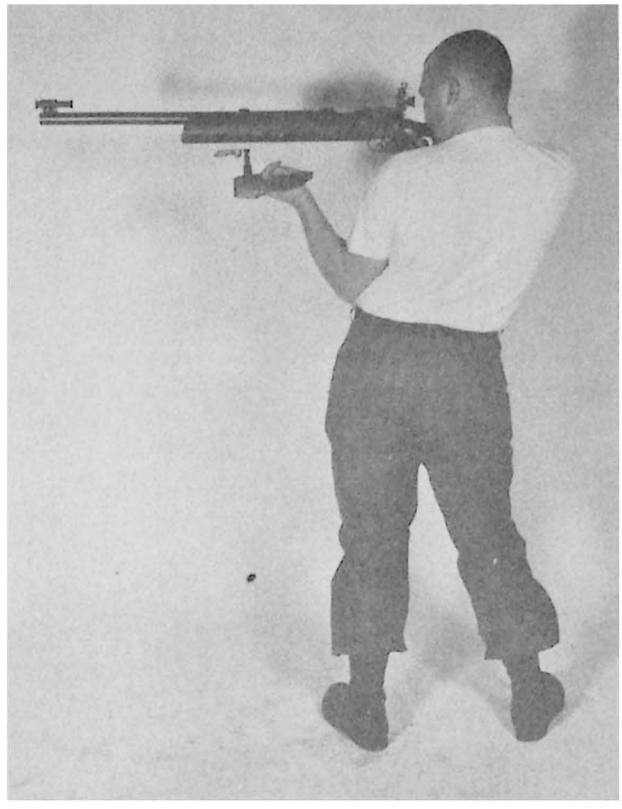


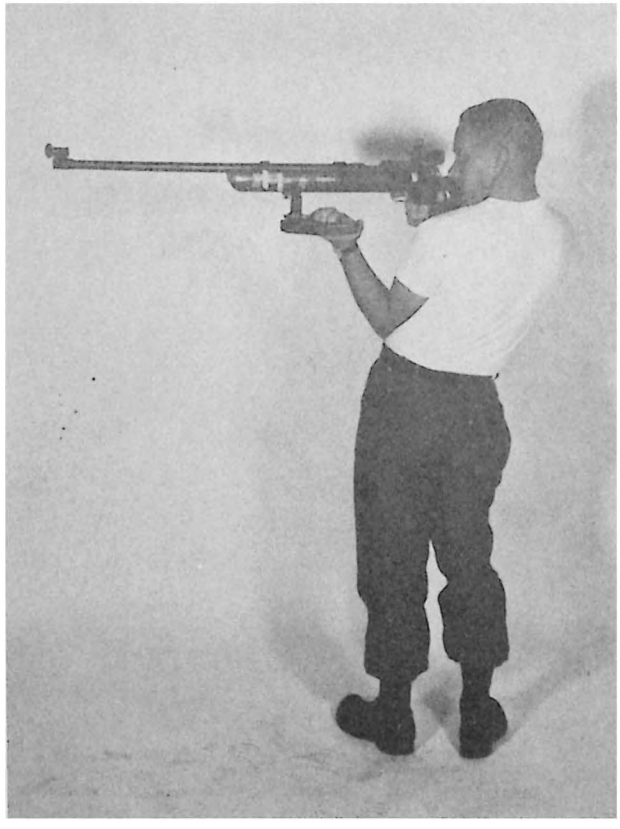


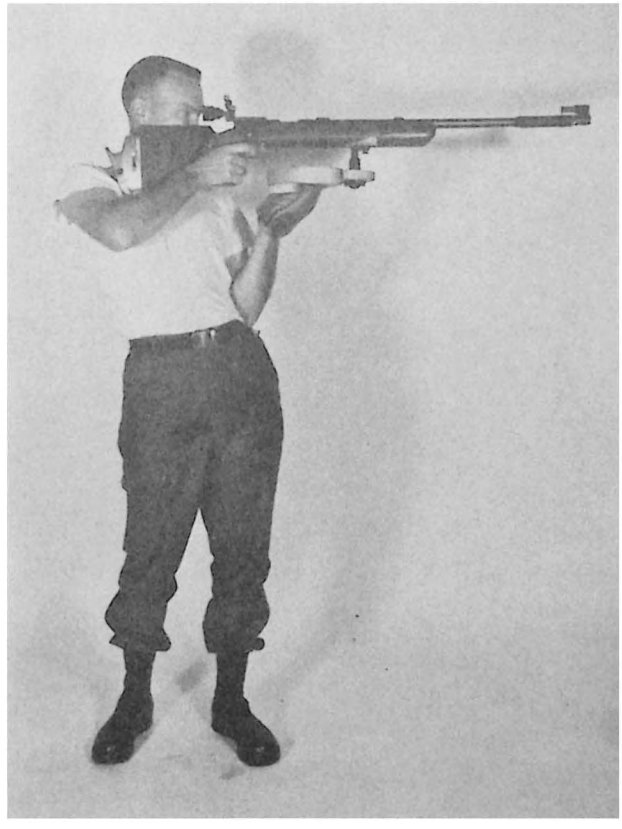


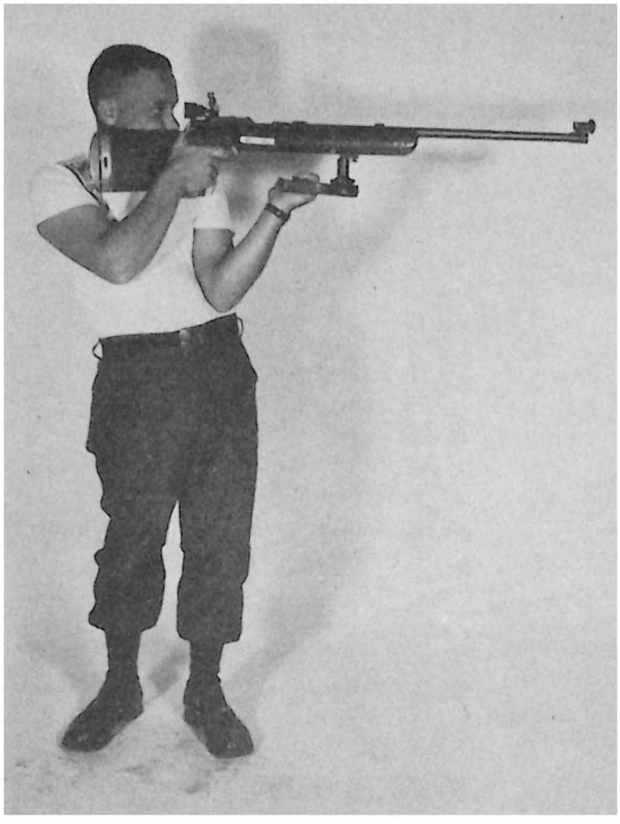


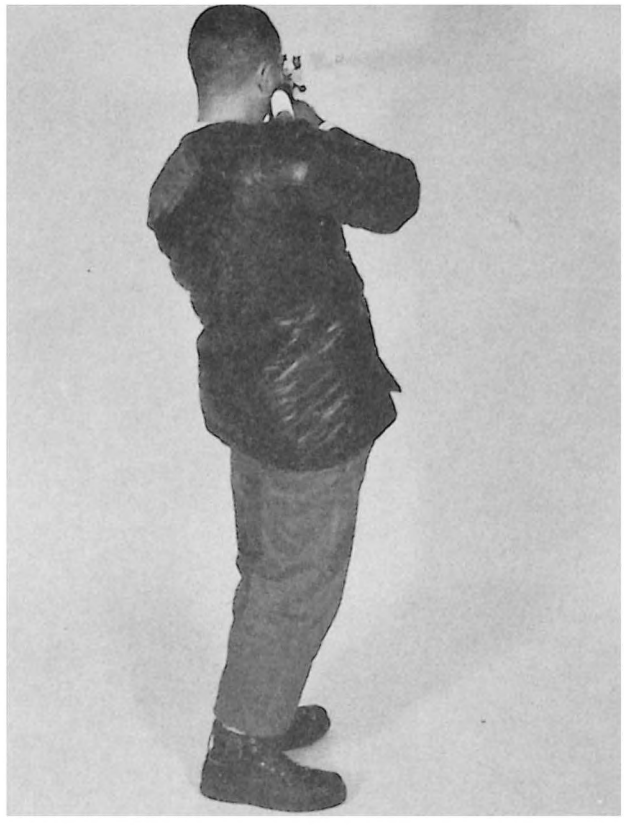


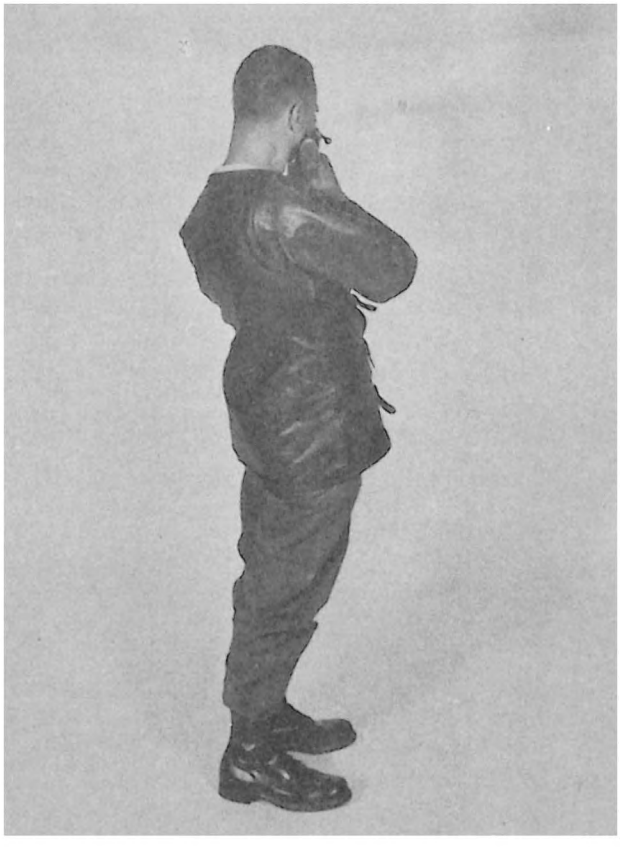


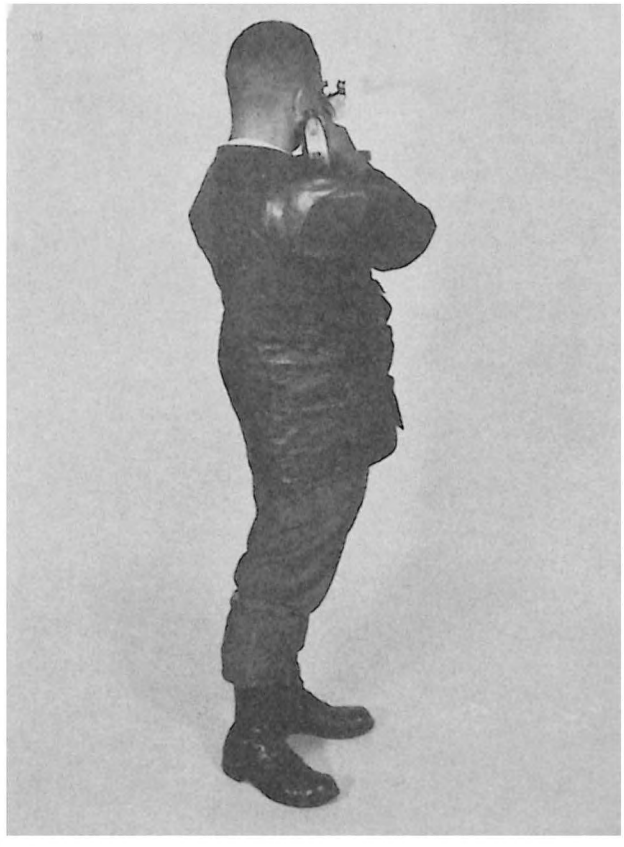


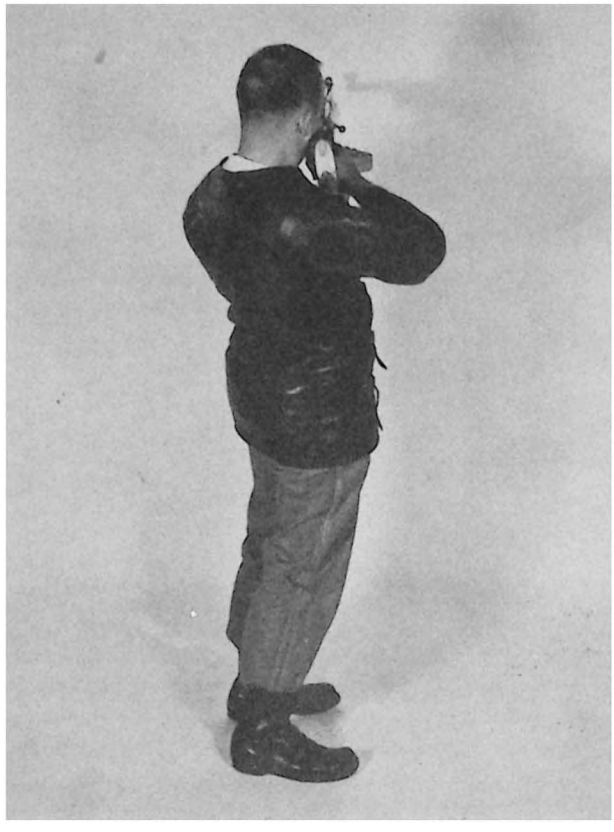






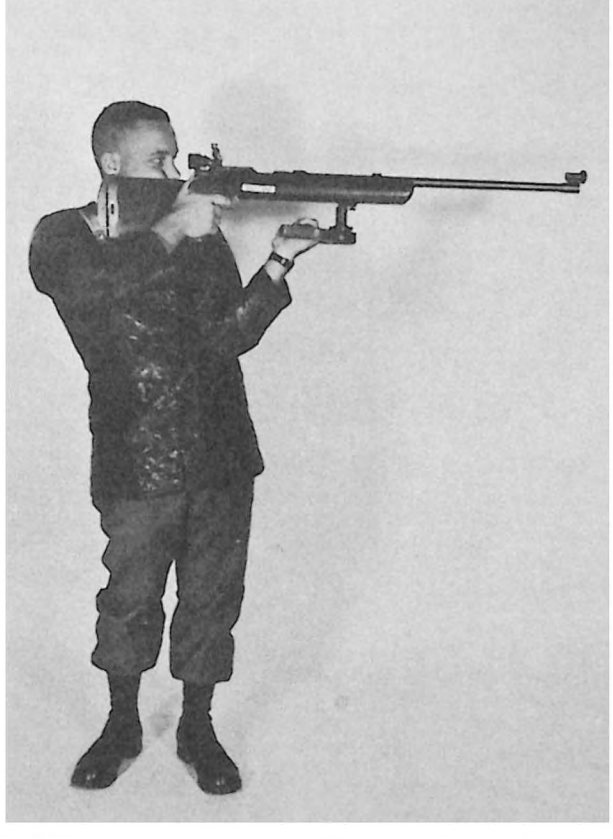


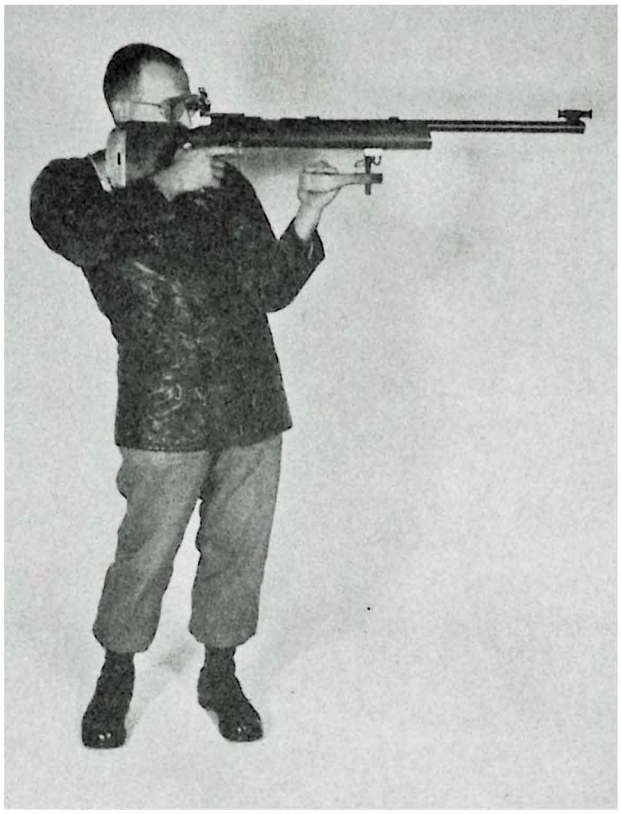






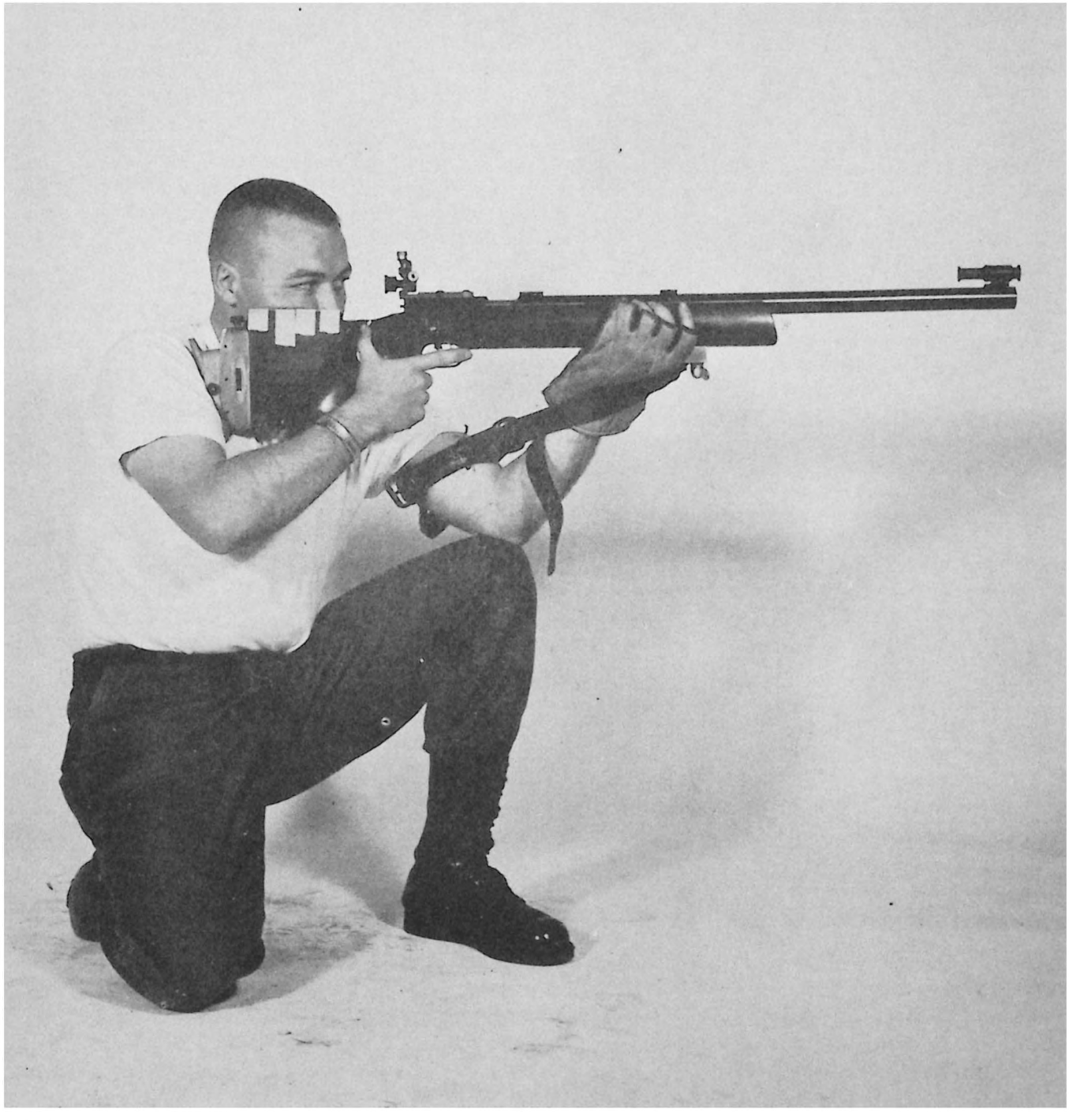












THE KNEELING POSITION

For many years kneeling was considered an "intermediate" position. Kneeling scores were expected to be midway between standing and prone scores, and received less interest and attention than the other two. Especially on the ISU target, mediocre scores were accepted as being "excellent" scores. Even worse, when a shooter did post a good kneeling score, everyone--including the shooter himself--felt that he was shooting "over his head".

Recently this attitude has changed, largely because standing scores have approached the level of kneeling scores. As more and more shooters push for first place, each of them is looking for more points. The obvious place to find them is in the kneeling position. Surprisingly to most shooters, they do not have to change their position or techniques: they simply have to shoot for higher scores.

As a result of this re-evaluation, shooters are beginning to accept the kneeling position as being practically equal to the prone position in terms of scoring capability, even on the ISU target. The position is now receiving more interest and attention.

The following position, like the standing position, is based upon bone support and balance. It is commonly known as the "high" kneeling position. The basic position is described as follows.

1. The shooter faces between 30 and 45 degrees to the right of the target (right handed shooter) and sits on his right heel (the heel between the buttocks or on the inside of one buttock).

2. All the weight of the torso is placed upon the right heel, ankle, and the kneeling roll, so that the right knee carries no weight and barely touches the shooting mat. The torso is erect and balanced over the kneeling roll. The spine may be slightly arched out over the kneeling roll to balance the slight forward hunch of the shoulders.

3. The left foot bears only the weight of the left leg. The inside of the left boot is approximately parallel to the inside of the left thigh. The left ankle and shin bone form a straight vertical support.

4. The left elbow is placed solidly on the left knee. The left arm is not rigid, and should be balanced so that a minimum or muscular effort holds the arm and rifle in position. The sling prevents the left forearm from falling forward with the weight of the rifle.

5. The sling should be attached comfortably to the upper left arm. If the sling is too tight, it will cut off blood circulation and pick up pulse beat. If the sling is too loose, it will slide gradually down the arm and lose its support value.

6. The sling may be attached high or low on the arm. The shooter must judge for himself at what position the sling provides the best 1. support; 2. steadiness; and 3. comfort.

7. The sling should be adjusted in length so that the left hand pushes comfortably into the fore-end stop. The sling is too short if the fore-end stop causes excessive pain in the left hand. The left hand and arm must be conditioned to the pressure of the stop and the sling.

8. As a guide for the average, the left forearm and the left thigh should form a straight line when supporting the rifle. The forearm may angle up or down from this line, depending on the individual's body conformation.

9. The rifle rests comfortably on the left hand (exact placement of the rifle on the hand is a matter of individual choice) and the left wrist is not cramped or strained. The left forearm is balanced. The weight of the rifle is supported entirely by the sling, the bones of the left forearm, and the shin bones.

10. The butt hook of the rifle rests comfortably under the right armpit, and is properly adjusted when the elevation of the rifle is centered on the bull; and when the head is perfectly erect and the eyes are looking straight out of the socket and through the sights. To achieve this it may be necessary to move the fore-end stop forward or back and to cant the rifle.

If the rifle is centered to the right or left of the bull, the shooter should not move the left foot, but move the entire position, as though the shooting mat were rotated.

As is evident in this description, the shooter has some latitude in building a "tight" or a "loose" position, depending on how tightly he brings the rifle back against his right shoulder. The only measure of the correct amount of pressure against the shoulder is how it affects the individual's score. Some of our better shooters have very loose positions. They describe the rifle as "floating," that is, barely touching the right shoulder and seeming to balance on the left hand. Other shooters have relatively tight positions. They bring the rifle back until it feels as though they were leaning into the rifle and placing tension on the sling and upper left arm (the weight of the torso, however, is not shifted forward to the left foot). Still other shooters appear to have intermediate amounts of pressure on the butt hook.

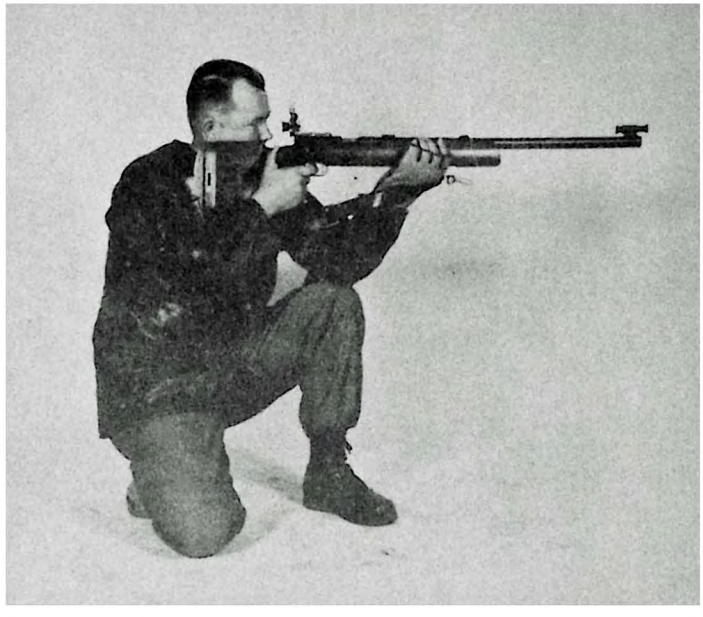
A shooter will usually have difficulty when first using the high position. Initially the right knee, ankle, or foot will be uncomfortable because of the weight of the body being placed entirely on the right foot. The leg and foot must simply be conditioned to bear this weight. Some shooters are never able to kneel in this position for very long without some discomfort. If so, they should take a break after each 10 or 20 shot string.

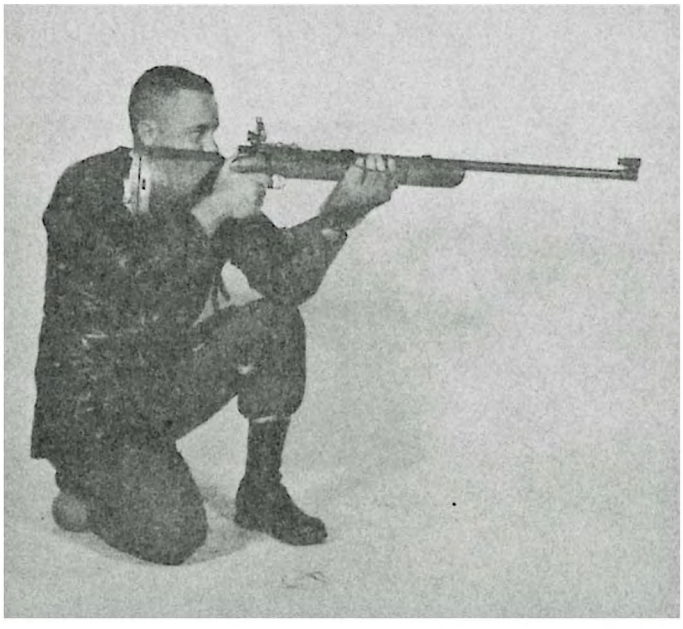
Initially, the high position will probably be unsteady. The unsteadiness may be caused by any number of factors that are peculiar to that individual's position. Correcting this unsteadiness requires a process of experimentation, of trial and error. As in the standing position, changes in position and technique should be conducted with great care and should be recorded and analyzed. When the shooter finds a steady position--which often occurs suddenly and unexpectedly in this position--he should note exactly all the characteristics of the position in order to "find" it the next time he shoots. He should also note tension in the stomach and back muscles that influences hold, and learn to use that tension habitually.

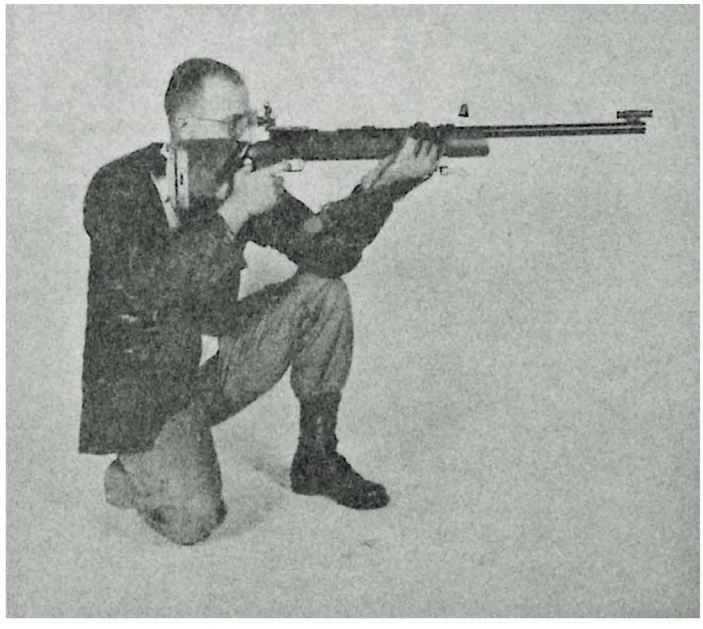
A 10-ring hold is not unusual in the kneeling position. When the shooter develops a 10-ring hold, his greatest problem becomes trigger control, especially if he has a loose position and the rifle is easily disturbed. Dry firing is the best way to detect and correct jerks or body movements that accompany the trigger pull.

The high kneeling position is definitely the best for indoor or calm weather shooting. In windy conditions, however, the shooter may find it to his advantage to assume a lower position by lengthening the sling and moving the left foot forward. This allows him to lean forward, placing more weight on the left foot and right knee, thus creating a more rigid position to withstand the buffets of the wind. The decision to do this, of course, is entirely up to the individual. In calm conditions, a low position does not deliver the steady hold that is obtainable with a good high position.





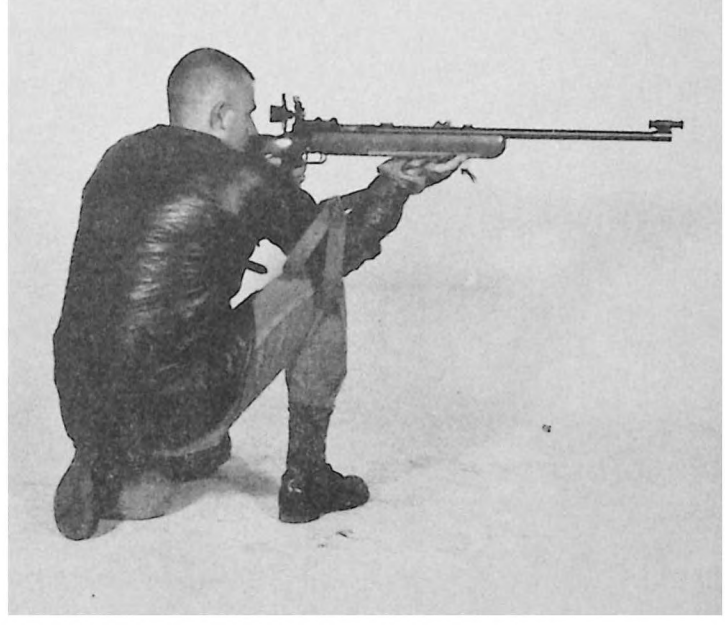












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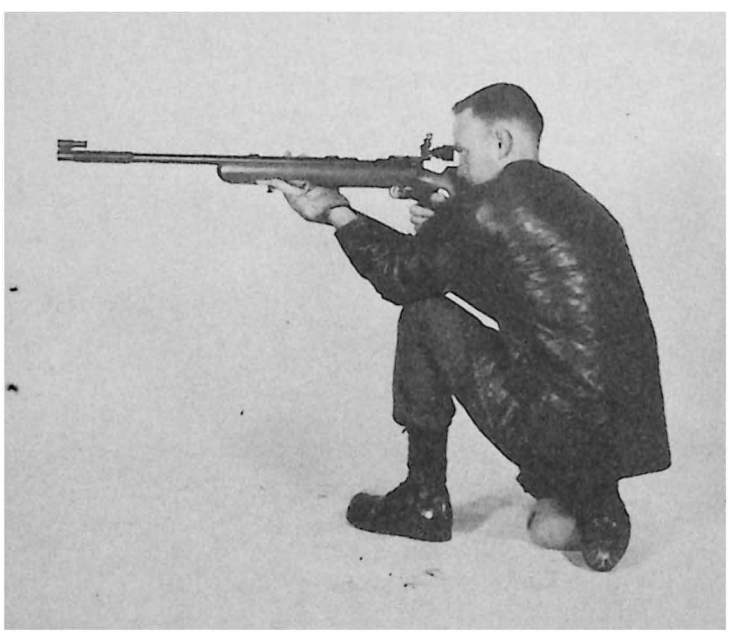

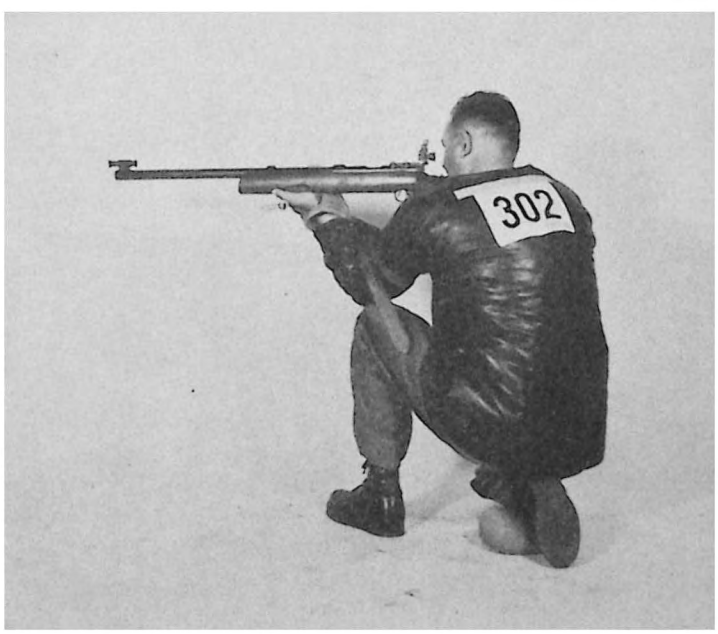
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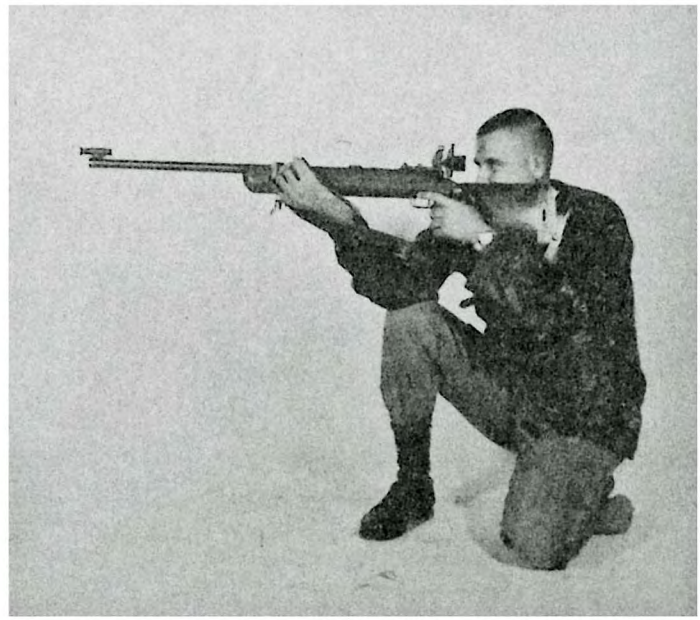
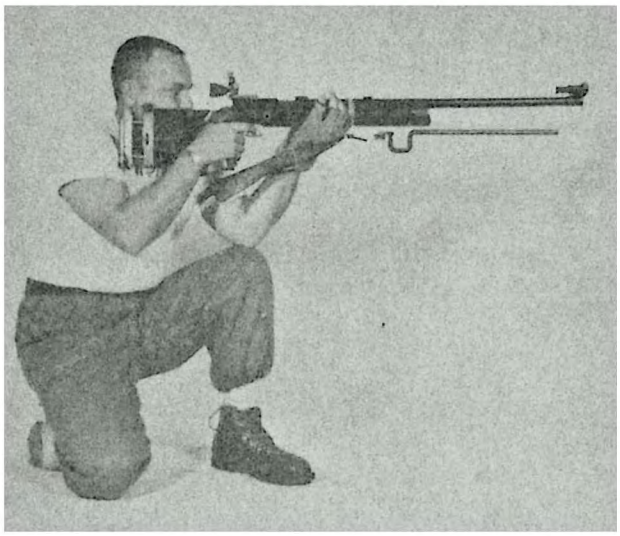
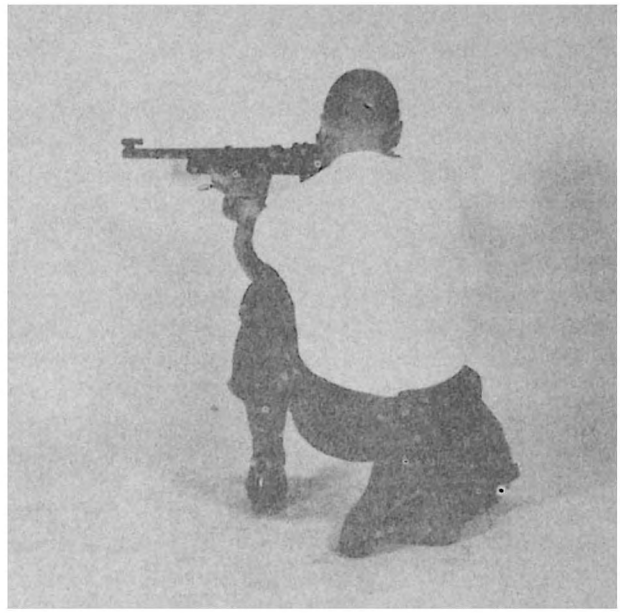
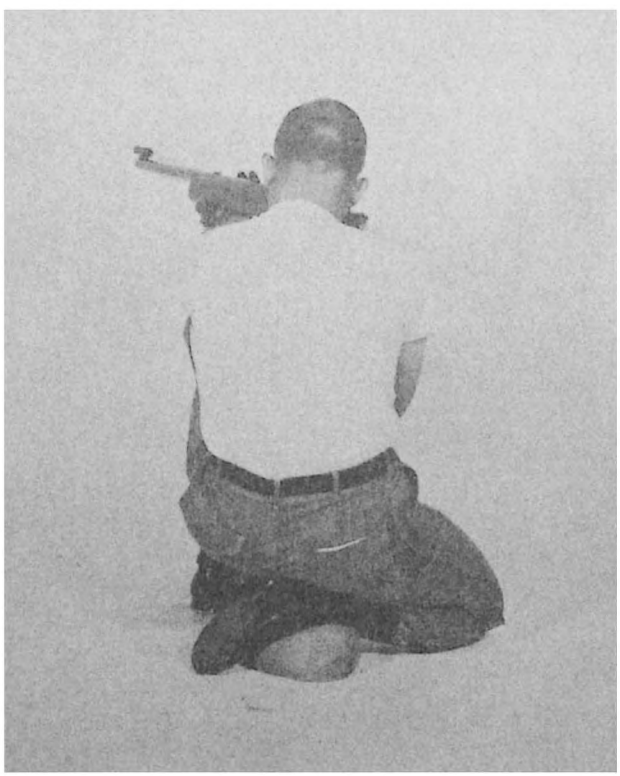
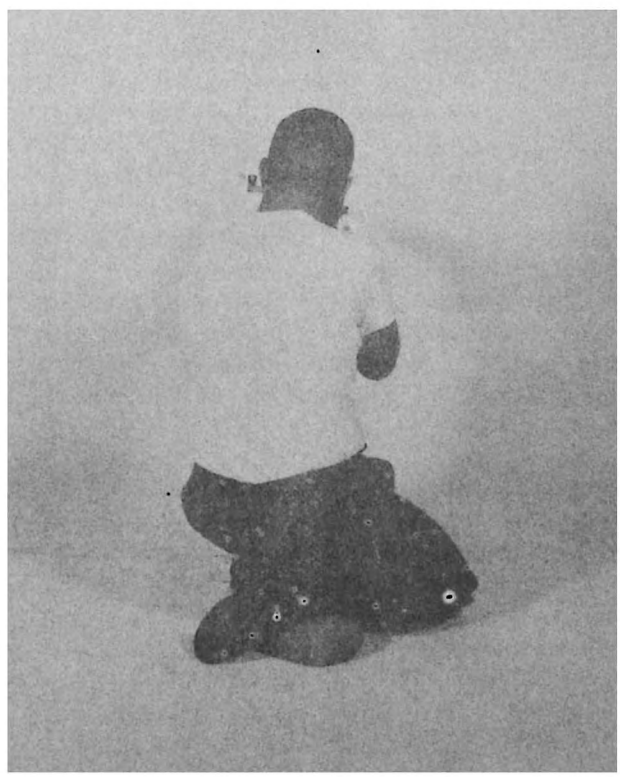
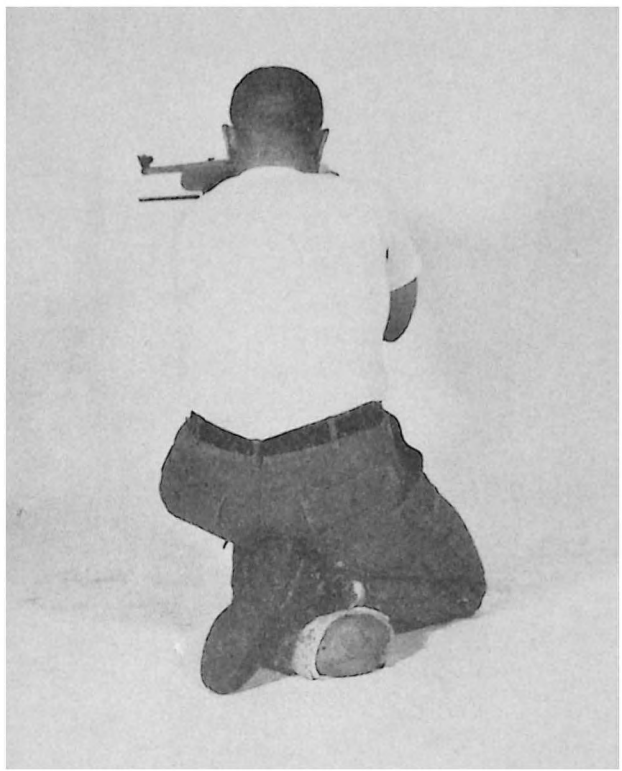


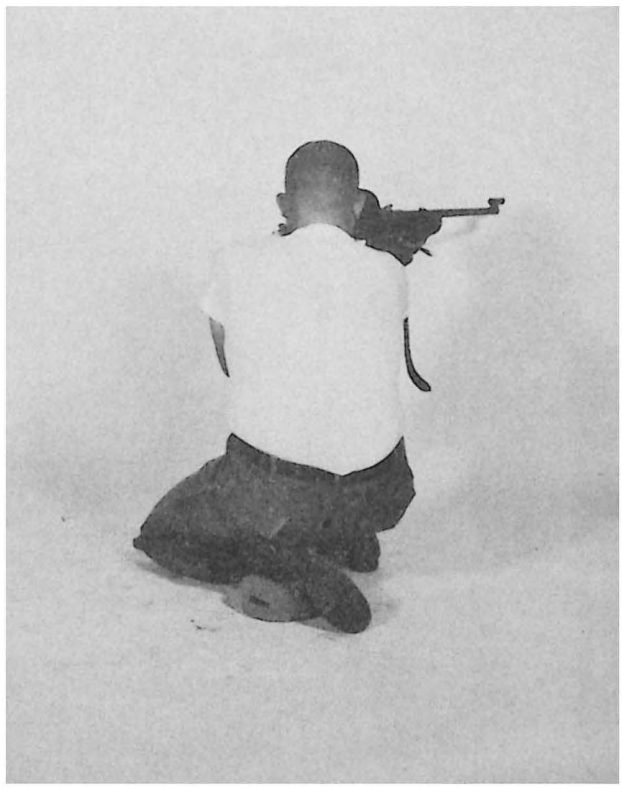














THE SITTING POSITION

The sitting position is not used in ISU shooting, but is used extensively in NRA type events. Because the position is low and has a relatively large support area, it is stable and produces scores comparable to the prone position. There are three major variations of the sitting position, and each of these has a number of minor variations.

The Crossed-Legs Position

The shooter sits facing about 30 degrees to the right of the target with his legs crossed. The outside of each foot rests against the ground, and each knee rests against the inside of the foot and ankle of the opposite leg. The shooter places the rifle to his shoulder and bends forward, placing his elbows on or near his knees. The weight of the rifle helps to pull the body forward. The elbows support the body. The sling prevents the forearm and rifle from falling forward. Generally, the sling must be placed high on the arm and must be fairly short. Slight changes in elevation can be made by crossing the right leg over the left, or the left over the right.

In this position, the rifle will almost always be below the head. The further the rifle is below the head, the more the head must be tilted down to the sights. Since the position is based on a large support area, tilting the head will not cause the body to sway. However, there are other considerations. Excessive head tilt causes the eye to look directly under the brow. This quickly fatigues the muscles that control the movement of the eyes. Therefore, the rifle should be kept as high as possible without disturbing the stability of the position. If the head must be tilted, the shooter may minimize eye strain by shooting rapidly and finishing his string quickly.

The Crossed-Ankles Position

This position is similar to the crossed-legs position, except that the ankles are crossed in front of the shooter. The shooter may face almost directly toward the target if he so desires. Slight changes in elevation can be made by crossing the left ankle over the right, or the right ankle over the left. Major changes in elevation can be made by moving the feet toward or away from the body. The toes of the boots may be crossed to help lock the legs in one position. The same considerations apply to head tilt in building the position.

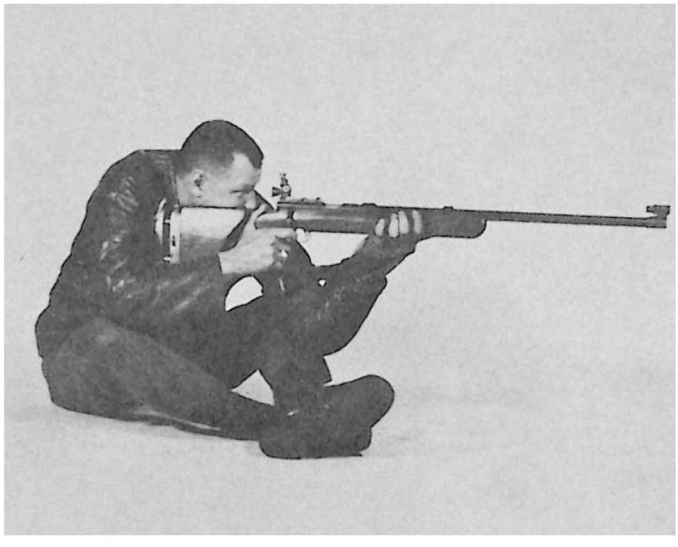
The Open-Legs Position

In this position, the shooter sits on the mat with his right foot to his right front, the left foot to his left front. The knees are several inches or more from the ground. The left elbow rests on or below the left knee, the right elbow rests on or above the right knee. This position is the least stable of the three variations, but some shooters cannot get into the other positions because of body conformation.







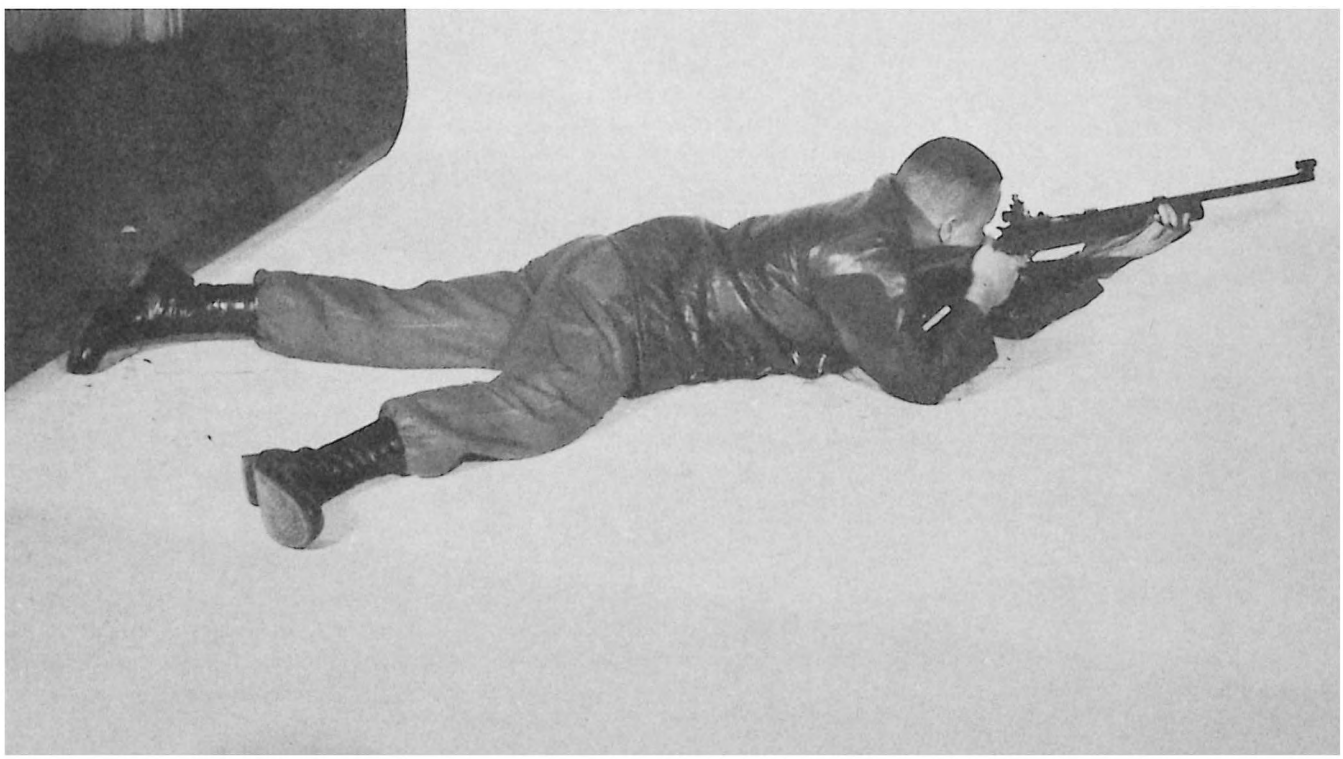












THE PRONE POSITION

There is intense competition in the prone position, and every shooter should train for high prone scores. However, he should not practice the position more than is necessary, especially if his other positions are weak. A good guide for the position shooter is that about 10 to 15 per cent of his practice time should be devoted to prone (see chapter on coaching).

Prone differs from the higher positions in several respects. First, it is so steady that conscious body control may become a negligible factor. For the same reason, any mistakes in trigger control or wind reading will affect scores adversely. (A mistake of trigger control or wind reading may help in the standing position, because the shot does not always break in the center of the 10-ring. The wind will about half the time blow the bullet into the 10-ring, and the effects of wind are somewhat cancelled out. In the prone position, however, the shot usually does break in the center of the 10-ring. Any effects, then, will move the bullet out of the 10-ring, because they cannot move it in.) In the prone position the shooter's concentration will probably be on wind or trigger control. There will be an exception mentioned later.

Incidentally, wind reading ability is something the shooter must develop through experience. It is possible to develop the ability to detect wind changes with exposed parts of the body, such as the face and hands. Using this method, it is relatively easy to detect shifts in wind direction, and sensitivity may be developed even further to detect changes in wind velocity. The method of estimating the angle of a wind flag and applying a formula to determine sight settings is useful in some types of shooting, but is virtually useless with the free-rifle.

The basic prone position is described as follows.

1. The shooter lies facing almost directly toward the target. Most good shooters face slightly to the right between 5 and 15 degrees.

2. The body is not twisted, but is stretched out and relaxed; the spine is straight.

3. The left leg is roughly parallel to the spine, with the toes pointing in. The left heel does not have to touch the ground.

4. The right leg is angled away from the spine. This angle may be slight or pronounced. The leg may be straight, but most shooters bend the knee. The more the knee is bent, the more the body weight is rolled to the left side. It is desirable to roll the body over a certain amount to make breathing easier and to bring the right shoulder closer to the center of the position. However, too much roll twists and cramps the body. The individual must experiment to find how much knee bend is desirable in his own case.

5. The left elbow should be directly under or slightly left of the rifle. If the elbow is to the right of the rifle the muscles of the upper torso become twisted and cramped.

6. The left hand and wrist should be comfortable when holding the rifle. Some shooters place the rifle on the heel of the hand; others place it on the base of the fingers. It is possible to transmit pulsebeat through the hand, and the shooter must experiment to find the best position for his own hand.

7. The sling may be high or low on the upper left arm. It is adjusted correctly if the fore-end stop presses snugly (but not painfully) against the left hand. The fore-end stop should in all cases be against the hand. The sling on the arm is the most frequent source of pulsebeat. The sling can be moved about on the arm to find the point of minimum pulse. Pulsebeat can also be minimized to an extent by conditioning the arm to the pressure of the sling.

8. The butt plate should rest snugly against the shoulder. As a general rule, it should be placed in close to, or on, the collar bone; however, some shooters have developed other techniques peculiar to their own positions. We feel that this should be left up to the judgement of the individual.

9. The right hand may grip the stock loosely or with a comfortable degree of pressure. The trigger finger should not apply pressure to the stock when pressure is applied to the trigger.

Most shooters feel that they have slight tension in various muscle groups when in the prone position. They do not necessarily agree, however, as to where they create this tension. Some create a slight tension in the left arm; others create tension in the right arm; others create it in shoulder muscles, or in various combinations of muscles or muscle groups. A few shooters say that they concentrate on maintaining tension in a specific muscle or muscle group through the delivery of a shot. This is the exception noted above in reference to concentration in the prone position.

Even when a shooter does maintain tension in various muscles, the rifle should not move in any direction when this tension is released. If it does move, it is an indication that the rifle is being muscled into the 10-ring.

The prone position is so steady that it may be said to have a single point of aim. The position should be oriented so the natural point of aim is directly in the 10-ring. Small changes in the point of aim can be affected in several ways. Small horizontal changes may be made by moving the right foot to the right or left. Vertical changes can be made by digging in the toes of both feet and pushing the body forward or pulling it back. Very fine elevation changes can and should be made by breath control. Major changes, of course, should be made by reorienting the entire position or readjusting the sling, fore-end stop, and butt plate. As in any other position, changes and experiments should be conducted carefully, and their effects carefully noted. Experience will enable a shooter to "feel" when his position is right, and he will come to rely heavily upon this factor in his shooting.

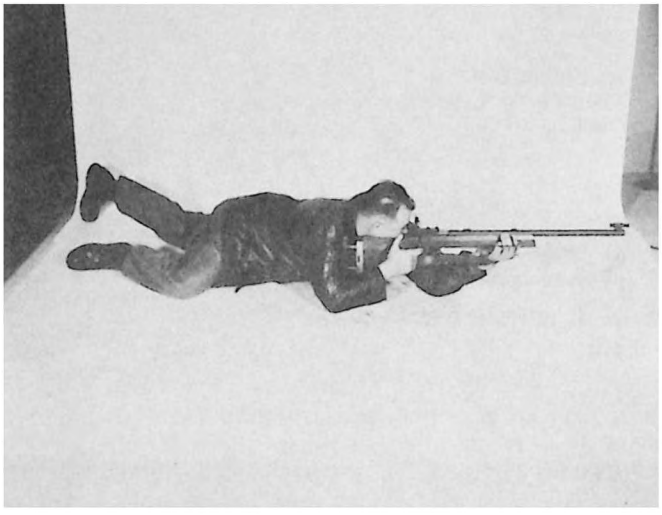
ISU rules require a high prone position. The left wrist must be a minimum of 6 inches from the shooting mat. We advocate the high position for all types of shooting for two reasons:

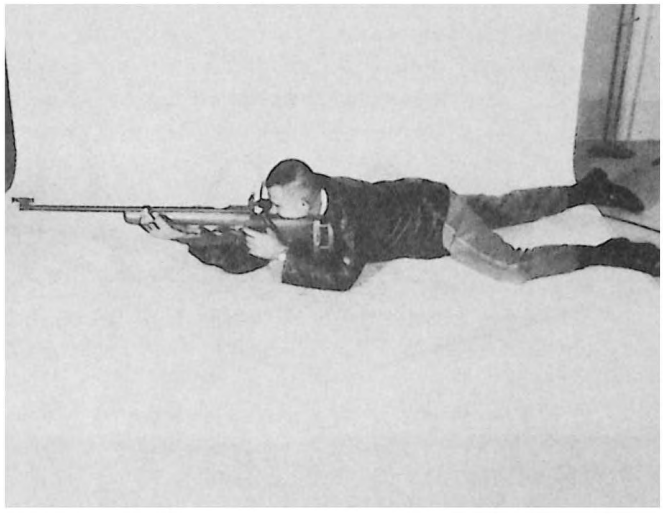
1. The position is just as stable as a lower position except in unusually windy conditions.

2. The position allows for a more upright head position, thus eliminating strain in the neck and eye muscles. This is especially important in a long course of fire.

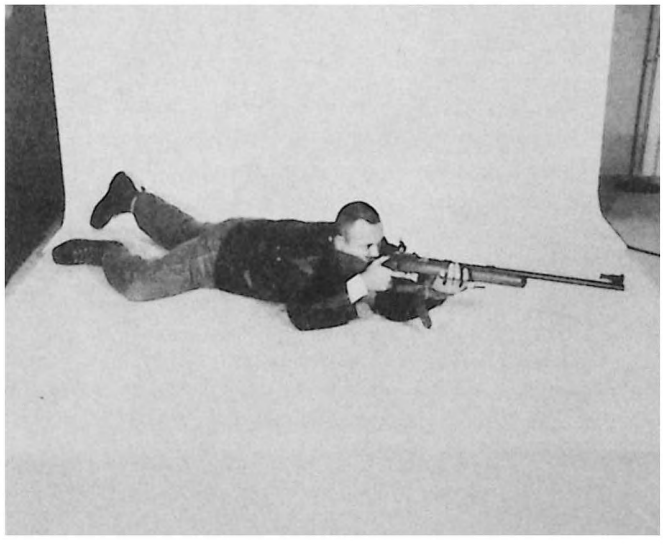
A shooter should work constantly to refine his position and improve his hold. Very slight changes or adjustments in the position can have a noticeable effect. A good method of checking movement in the position (usually from pulse beat) is to use a rifle scope. Some shooters can keep the crosshairs on a bullet hole at 100 yards.

One mistake that beginning shooters frequently make is to place the spotting scope in an unfavorable position. This may occur in any position, but is more marked in prone. The scope should be placed so that only a slight movement of the head is necessary to bring the eye to the scope. If the shooter must raise or move his body to see through the scope, he will change the position for his next shot. This can change the natural point or aim, or head position, and can move the point of impact.







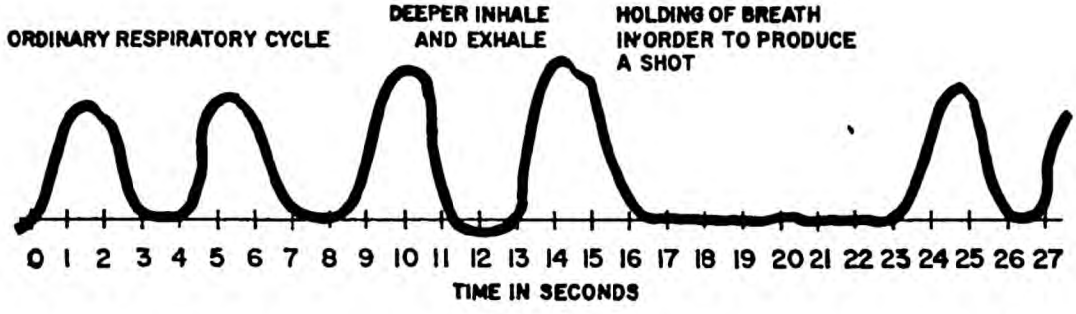


BREATH CONTROL

The breathing process provides the body with oxygen and eliminates waste from the blood. Correct breathing is essential to proper body functioning.

A respiratory cycle lasts 4-5 seconds. Inhalation and exhalation require only about 2 seconds. Thus between each respiratory cycle there is a pause of 2-3 seconds. This pause can be extended to 12-15 seconds without any special labor or unpleasant sensations. It is during an extended pause between breaths that the rifleman should fire the shot. The reason: during the respiratory pause the breathing muscles are relaxed; the shooter thus avoids strain upon the diaphragm.

A shooter should assume his position and breathe naturally until his hold begins to settle. Many shooters then take a slightly deeper breath; exhale; and pause, expecting to fire the shot during the pause. If the hold does not settle sufficiently to allow the shot to be fired, the shooter resumes normal breathing and repeats the process. The technique is graphically portrayed below.



The respiratory pause should never feel unnatural. If the pause is extended for too long a period, the body suffers from oxygen deficiency and sends out signals to resume breathing. These signals produce slight involuntary movements in the diaphragm and interfere with the shooter's ability to concentrate. Generally speaking, 8-10 seconds is the maximum safe period for the respiratory pause.

THE EYE AND THE SIGHT SYSTEM

The Eye

There is no need for a shooter to concern himself with a scientific knowledge of the eye. But he should be concerned that his eyes are healthy; that he can see clearly; and that he uses his eyes properly while shooting.

A layman should never attempt to prescribe or administer treatment to defective or injured eyes. A shooter (or anyone) with eye problems should immediately consult a medical specialist. Glasses in no way impair a shooter's ability, for some of the world's best marksman wear corrective lenses.

A person with no eye defects normally has 20/20 vision. Twenty/twenty does not denote "perfect" vision. It is simply an arbitrary standard of measurement applied to visual acuity. It denotes the ability to read alphabetic letters 8.7 milimeters high at twenty feet. This constitutes reading letters contained within 5 minutes of angle. There are many cases of individuals being able to read within 3 minutes of angle, and in some cases, within less than 2 minutes of angle. Weak or defective eyes can in most cases be corrected to 20/20 strength by prescription lenses.

Human eyes are as difficult from one another as, say, human hands. This is true even of eyes that score 20/20 vision. Some eyes see sight pictures best in brilliant light. Others perform best in soft light. Some eyes have great perception of depth and perspective. Others do not. The list of differing characteristics could be made quite long. The important consideration is that two different people are likely to have different eye characteristics, even if they have 20/20 vision. A particular set of sights that provides maximum clarity to one shooter's eyes may not provide the same clarity to another shooter's eyes. Each shooter must select the components of his sight system to fit the characteristics of his own eyes. This rarely involves the purchase of special equipment.

Use of the Eyes

While shooting, an individual should remember two cardinal principles in the use of his eyes:

1. Look as straight forward as possible out of the eye socket. If the head position causes the shooter to look across the bridge of his nose or out from under his eyebrow, the eye muscles will be strained. This strain will produce involuntary eye movements which reduce the reliability of vision. This will not only affect performance, but the inability to see will also have a damaging psychological effect upon the shooter (see chapter on coaching). The eyes will function best in its natural, forward position.

2. Do not fix vision on the sight picture for more than several seconds. When the eyes are focused on a single image for a time, the image is "burned" into the area of perception. This can be illustrated by staring at a black spot on a piece of paper for 20-30 seconds and then shifting the eyes to a white wall or ceiling. A ghost image of the black spot will appear, with a corresponding loss of visual acuity in the area of the image. This effect upon the shooter's eyes is quite important. A burned in sight picture will dull visual acuity in the critical area of perception; and this image may possibly be mistaken for a true sight picture. Either effect will seriously damage performance.

Focus of the Eye

Clarity of vision at a specific distance is dependent upon the focus of the eye. This can be illustrated by the following experiment. Hold up one finger about 12 inches in front of the eye.

(Only one eye should be open, since we are concerned only with perception in the shooting eye, regardless of whether the individual shoots with both eyes open.) When vision is focused on the finger, perception of objects in the distance is blurred. Conversely, when the eye is focused on objects in the distance, perception of the finger is blurred.

The above experiment illustrates the principle of distance focus. This principle requires that within a certain distance from the eye, the eye must change its focus in order to clearly perceive objects at varying distances.

Beyond a certain distance from the eye, however, eye focus does not change. The eye is then said to be focused at infinity. When the eye is focused at infinity, objects at a minimum distance of (for practical purposes) 20 feet to a maximum distance of infinity are perceived clearly. We see from this that distance focus of the eye can be at infinity.

Another principle is illustrated by infinity focus: the principle of depth of field. Depth of field refers to the maximum and minimum range within which objects are clearly perceived when the eye is focused at a single point. In the above illustration, the eye is focused at infinity. The depth of field extends from 20 feet to infinity.

Depth of field applies not only to focus at infinity, but to specific distance focus as well. To illustrate this, place a book on a table an arm's length away. Then, with one eye closed, focus on a finger held several inches in front of the eye. The print in the book will be blurred. Now gradually move the finger toward the book, keeping the eye focused on the finger. The print will become more and more clear until at a certain point--when the finger is still several inches away from the book--the print becomes clear and readable. The eye is focused on a point several inches in front of the book, but the print is clear because it is within the depth of field of that focus of the eye. If the focus is shifted to the print, the perception of the finger will remain clear if it remains within the depth of field of that focus of the eye.

Depth of field increases as the distance between the eye and the point of focus increases. If the eye is focused at a point 4 feet away, depth of field will be relatively shallow. If the eye is focused at a point 18 feet away, depth of field will be relatively deep. In most instances, when the eye is focused at 18 feet, the depth of field extends beyond the point where infinity focus begins (20 feet). Depth of field, in this case, includes infinity focus. Consequently, all objects beyond 16 feet (for example) are perceived clearly. Note that focus just short of infinity--but with a depth of field that overlaps infinity focus--provides a greater depth of field than does infinity focus. (These figures are based upon practical clinical standards, and are intended as examples only.)

The experiment in which the finger is moved between the eye and the book illustrates another important principle--that of relative clarity. Note that as the finger is moved closer and closer to the book, perception of the print becomes gradually more clear until it is brought into sharp focus. Clear perception, then, is limited to the depth of field. But clarity does not diminish altogether outside the depth of field. It declines gradually as the object moves away from the point of focus. Outside the depth of field there exist varying degrees of relative clarity.

One final experiment will illustrate an important additional principle of focus. Repeat the experiment with the finger and the book, but this time look through a pinhole punched in a piece of cardboard. When looking through a pinhole, we note that even though we focus on the finger held only a few inches in front of the eyes, we can perceive the print with greatly increased clarity. The depth of field has been greatly extended by the small aperture. If we look through the pinhole and focus at infinity, we find that the depth of field has been brought back to within a few feet of the eye: certainly much closer than the previous distance. Objects only two or three feet away can be perceived with a useful degree of clarity.

The depth of field was increased by the use of a small aperture. The smaller the aperture, the greater the depth of field. (A point of diminishing returns is reached, however, when the aperture becomes so small that vision is blurred. There is then a practical limitation to the minimum size of the aperture.) The same results could be achieved by reducing the size of the pupil of the eye. When looking through an aperture, the depth of field will be increased only if the aperture is smaller than the pupil of the eye. An aperture that is larger than the pupil of the eye will have no effect upon the depth of field.

It is obvious that if the rear sight aperture of a rifle is small enough, depth of field can be extended to include both the bull and the front sight; or at least to provide relatively clear perception of the front sight when the bull is brought into focus. Using this technique, there is no requirement for the shooter to shift his focus while shooting: he will perceive the front sight and the bull clearly and simultaneously.

Some shooters contend that the point of focus should be on the front sight. This is true, with sight systems such as those used on the standard service rifle, for the following reasons: first, the large rear aperture does not increase the depth of field and allow the shooter to clearly perceive the bull and front sight simultaneously; and second, the large rear aperture makes it necessary to have the front sight in clear focus in order to detect errors in sight alignment. When this type of sight is used, bringing the front sight into focus will usually cause the bull to appear slightly blurred. There is a difference between focusing on the front sight and bringing the front sight into focus--that is, within the depth of field.

With an adjustable rear aperture--such as the Anschutz iris disc--the front sight and bull can be brought into focus at the same time. Under these circumstances, the shooter can simply concentrate on the sight picture and disregard focus. Our experience bears out that for most people, this is the best method of focusing the eye in shooting the free-rifle.

The Front Sight

The universally accepted front sight consists of a tubular mount containing a removeable insert. The most frequently used inserts are the post and the aperture.

1. The Aperture.

The aperture is the more popular insert. The most common error is the use of an aperture that is too small. Generally speaking, the diameter of the aperture should appear to be about 1 1/2 times the diameter of the bull. But this is only a guide. The optimum size aperture is one that revelas a wide line of white around the bull and allows the bull to stand out in clear definition against this white background.

The optimim size will change under different conditions of light. An aperture selected under one light condition may, under a different light, form a halo around the bull or make the bull appear indistinct or oblong. A different aperture size will help to correct these aberrations. Each shooter must select the aperture size that meets the requirements of his own eyes under the prevailing light conditions.

2. The Post.

The post should appear to be the same width as the bull. The post should approach the bull from 6 o'clock. If the rifle is canted, the insert should be altered to compensate for the angle of cant so that the post still approaches the bull from 6 o'clock. There are two methods of using the post: (1) the 6 o'clock tangent hold, in which the bull appears to rest on the top of the post; and (2) the 6 o'clock line-of-white hold, in which a narrow line of white is visible between the top of the post and the bottom of the bull. Both methods are in general use, and the

choice of method appears to be based on individual preference. Both the tangent and line-of-white methods require extremely keen eyesight. Most good shooters who use a post have better than 20/20 vision (natural or corrected) and a shooter should consider his visual acuity in making a choice between aperture and post.

3. Other Inserts.

The disc insert is not in popular use, but is preferred by some shooters. The insert consists of a clear or transluscent plastic disc with a center aperture. Most discs now being used are amber in color, although other colors are occasionally used. The disc should conform to the same general standards applied to the metal aperture. The opening in the disc should be round, clearly defined, and easily visible. It should be large enough to allow a wide band of white around the bull, and the size of the aperture should deliver maximum contrast of bull against background. If a shooter prefers a disc aperture and achieves good results with one, there is no reason why he should not use it.

4. Combinations of Inserts.

There is no indication that combinations of the above sight inserts contribute to a better mechanical sight system. The shooter may use a combination because of preference; but by all indications, he is only adding to the amount of equipment he must care for and gains nothing in terms of mechanical advantage.

The Rear Sight

Mechanically the rear sight should be rugged, tight, and firmly attached. It should be capable of finely graduated adjustments (1/4 or 1/8 minutes of angle). The adjustment mechanism should be free of slack and should move precisely the same distance with each click of adjustment.

The rear aperture size should be selected to (1) allow easy sight alignment and to (2) create a clearly defined sight picture.

Most shooters feel that a tight rear aperture (one that allows only a narrow line of white to be visible around the front sight hood) provides for the easiest sight alignment. Slight deviations in alignment are easily noticeable, and sight alignment becomes practically automatic.

Some shooters prefer a large rear aperture (one that allows a wide line of white to be visible around the front sight hood). The large aperture can produce good results. However, because of the large area visible around the front sight, misalignment of the sights is less noticeable. The shooter must therefore consciously watch for errors in alignment. It is felt that this is a responsibility the shooter can avoid through the use of a tight rear aperture, which takes better advantage of the mechanical system in providing for easy alignment.

The most important consideration in choosing a rear aperture is visual clarity. By adjusting the size of the rear aperture, the shooter can control the amount of light entering the eye. He can thus affect contrast in the sight picture, or contrast between the black bull and white background. Strong contrast and sharp, clearly defined edges are extremely desireable. While this is in part controlled by front sight aperture size (but not by post size), the size of the rear aperture is more critical in controlling definition. We strongly recommend the use of an adjustable rear aperture.

Eye Relief

Eye relief is the distance between the eye and the rear sight. There is no measured distance that is correct eye relief for all shooters. In many cases it is controlled by the construction of the equipment. Eye relief can best be evaluated by these two standards:

1. The position of the sight should result in the shooter assuming a natural upright head position. The sight should be adjusted to the head position, and not the head position to the sight. The importance of head position will be discussed in later chapters.

2. Eye relief should feel comfortable to the shooter. The rear sight should not be so close to the eye that the shooter worries about recoil; and it should not be so far from the eye that he must strain to receive a clear sight picture. Some shooters prefer close eye relief, others distant relief. Average eye relief is about 2--inches. Each shooter must adjust eye relief to fit his own eye characteristics.

The Telescopic Sight

Good target telescopes have adjustments for distance focus, reticle focus, and parallax. Correct adjustments are absolutely necessary. Every scope user should read the manual that comes with a scope and learn how to make all adjustments correctly. Scopes should be adjusted to the shooter's eyes, and not to those of a friend or gunsmith.

Shooting Glasses

There are two general types of shooting glasses: those with standard frames and large lenses; and those with normal size lenses and jointed, adjustable frames. Both types are widely used. The chief advantage of shooting glasses is that they allow the shooter to look through a central portion of the lens without interference from the frame. Individuals with corrected vision will find these glasses extremely useful. Colored or tinted shooting glasses are available to aid in adjusting to varied light conditions. Dark green, smoke, or blue lenses are normally used in bright light, and amber lenses are used in dull light. However, some shooters prefer to use one color under all conditions. An additional advantage of shooting glasses is that they protect the eye from gas blowback in case of a ruptured primer or cartridge case.

RECOIL AND THE ANGLE OF JUMP

Everyone is familiar with the recoil of a rifle. Simply stated, recoil occurs because expanding powder gases propel the bullet and the cartridge case in opposite directions. The bullet of course travels straight out through the bore. The force applied to the base of the cartridge case is transmitted back through the bolt.

If the rear of the bolt and action were placed squarely against a solid support, the recoil of the barrel and action would be straight to the rear. However, normally the barrel and action rest on top of a wooden stock; in addition, the butt of the stock drops considerably below the axis of the barrel. Consequently, the rearward motion of the barrel and action tends to ride back over top of the stock, causing the muzzle to be pivoted upward. This upward movement in recoil is called jump. The exact degrees of an arc subscribed by the muzzle is called the angle of jump. If the barrel jumped from perfectly horizontal to perfectly vertical the angle of jump would be 90 degrees.

The angle and the direction of jump can be affected by external pressures on the rifle. A tight sling exerts a downward force on the muzzle of the rifle and lessens the angle of jump. In addition, the jump can be deflected to one side by a pressure exerted against the opposite side of the stock.

There are many technical considerations that should be accounted for in recoil. However, for purposes of discussion we say that recoil commences as the bullet starts to move. The gas pressures that cause recoil cease the instant the bullet leaves the barrel. (No account is taken here of gas pressures on the muzzle face, or of the effects of inertia.) It may be seen, then, that since the bullet is still in the barrel during recoil, a change in the angle of jump will place the muzzle at a different point, and thus move the trajectory (and point of impact) of the bullet. This occurs even though the sights are perfectly aligned on the bull. A shooter should be concerned, then, that the angle of jump of the rifle remains constant throughout a shooting string. Otherwise, he will experience a change in zero.

In the standing position, slight changes in the angle of jump can be brought about by changes in the adjustment of the palm rest. These changes are usually very minor. However, in the other positions, changes in sling tension or changes in the position of the left hand can have a noticeable effect upon the angle of jump, and cause considerable changes in zero.

In all positions, a change in the position of the butt plate against the shoulder can cause a major change in zero.

Cheek pressure is also critical in affecting the angle of jump. If the cheek is moved forward or back on the stock, or if cheek pressure is increased or decreased on the stock, there will be a noticeable change in the point of impact. This can occur in any position, and it occurs even though each shot may break with the sights in perfect alignment on the bull.

The shooter should take care to apply the exact same cheek pressure to the exact same point on the stock throughout a series of shots. Most good shooters rest the head naturally against the stock. They do not attempt to increase or decrease this natural pressure by use of the neck muscles. Experience will teach the shooter to feel unintentional changes in head position or cheek pressure.

Broadly speaking, the shooter should attempt to hold the rifle in exactly the same way each time he fires during a string. If he must readjust the position or the rifle, he should immediately go to his sighter bull to test for a change in zero.

COACHING

> A coach exists for the benefit of his shooters, and not the shooters for the benefit of the coach. The coach's job is to direct the shooter in his own development. His most important function is to make the shooter think.

Coaching clinics have revealed that very few individuals are familiar with the principles involed in coaching a free-rifle shooter.

This chapter is not written for the direct benefit of the shooter, but rather for the benefit of those many individuals who find themselves suddenly thrown into coaching positions with little or no background to draw upon. This chapter should also be of value to those persons who are in a position to appoint coaches.

First we must recognize that the basic principles and fundamentals of marksmanship do not change. However, the application of those principles and fundamentals will differ from shooter to shooter, and from one weapon to the next. We must recognize also that the style and techniques of coaching will differ as we move from service-rifle and pistol to the more individualistic free-rifle. This is because the free-rifle shooter is trained for individual performance; he never fires as a team member in the same sense that service-rifle and pistol shooters do. Consequently, one of the foremost responsibilities a free-rifle coach is to instill self-reliance (confidence) in his shooters.

The champion is like some sharp instrument that cuts through the bounds of human performance. The coach is the tool that hones this instrument and keeps it razor sharp. It is the coach who keeps the shooter continually striving to break the existing records. The score that equals or falls just short of a previous record is never good enough for the year to come.

A difficult coaching task is to create an atmosphere in which each individual shooter can experiment with and refine his own techniques. The progress made by a shooter in advancing his score is in direct proportion to his thinking about and analyzing his own performance. He must have, as well, the desire to be a world or Olympic champion.

Many of the shooter's ideas must be influenced by personal and individual coaching. In general, positive influences can best be made by an individual in whom the shooter has a great deal of confidence.

The coach is aided in creating confidence in the team as a whole if he carefully uses the performance of his shooters for purposes of research and analysis. He should constantly watch the performance of those shooters who are "on top", and he should seek the advice and counsel of those top shooters. Then, armed with a knowledge of the techniques employed by the best shooters, he should acquaint the new shooter with these techniques and teach him to select those that work best for him, and to discard those that do not. The coach must be careful to prevent his shooters from using "gimmecks"--easy solutions in the form of new equipment or trick techniques--because inevitably the shooters will begin to rely on gimmecks and fail to concentrate on their performance. The use of gimmecks then becomes the basis for the development of a phethora of alibis, and excuses will then become the rule, rather than the exception, for poor performance, and confidence will dwindle away. On the other hand, if the coach keeps his shooters concentrating on performance, and aids their progress by displaying a sound knowledge of shooting techniques, then he is building confidence. A coach bears the responsibility of creating the right amount or maximum of confidence in each shooter.

All successful coaches, in any form of shooting, have one thing in common; they have something in their personality--incisiveness, perspicuity, and perceptiveness--that induces excellence of performance from those under their guidance. Minor shortcomings of personality do not negate this art. Of course there are no perfect coaches because there are no perfect men; but because of this fact, we are accustomed to overlooking minor flaws in one who possesses true leadership abilities. A coach or a shooter is only parading his own inferiority if he scorns or refuses to cooperate with any of his teammates because of some small personality trait. If a coach is not compatible with the members of his team he can only be a source of friction, no matter how much knowledge or talent he may possess. The ability to get along with people is not an inherited talent; it must be cultivated. The person who fails to get along with others fails to try to get along. In each coach there must be a strong trait of humanism--human understanding, tolerance and patience. A coach must be temperate in all things. He must have the will power, the intestinal fortitude and the character to deny himself those things that will compromise his standing as a leader. The members of his team will respect him as a coach only if they can respect him as a man.

It is not necessary for a coach himself to be a champion shooter; indeed, in many instances a champion may possess too strong a drive toward personal achievement to be able to coax achievement out of others. There are, of course, exceptions to this rule. A good coach must not necessarily be the equal of a champion in his ability to shoot high scores, but he must be the equal of a champion in the depth of his shooting knowledge.

A coach must be dedicated to his work. He must keep constantly in mind that his job is to get the maximum performance of his shooters, and he must be willing to make personal sacrifices to that end. He must at all times and in all things exercise patience and self-control. Irrepairable damage can be done if a coach allows his temper to antagonize a shooter: he will erect an unbreachable wall between them, and further coaching will be severely impaired or made impossible. For this reason, it is wise to have one individual in charge of the team to execute disciplinary measures, and another individual to act as coach. In this way the coach avoids friction between himself and the shooters.

Patience, tolerance, and self-control must extend not only to problems of discipline, but to problems of performance as well. A coach may point out to a shooter some error in his performance, only to see the shooter continue to repeat that same error again and again. To become discouraged or dismayed at this point would solve nothing; it would only destroy the shooter's confidence and desire. The coach must work patiently and display a confidence in the shooter's ability to overcome his problem. When the problem is solved, then it is the coach's duty to give the shooter credit for his success. Unselfishness is necessary in match performance, also; the coach must remember that even if the shooters could not have won the match without him, still it is they who should receive the credit for winning. He himself must be content to blend into a background of anonymity. If he accepts the laurels for himself, he will thereafter get only a grudging performance from his team.

A coach must inspire a shooter with confidence in his ability to analyze his own performance. He does this by showing a respect for the individual's intelligence and by paying due attention to his ideas. To do this, a coach must maintain an open and progressive mind. He must accept new ideas, and must remember that most new ideas will come from the shooters themselves. Complacency with old techniques is fatal to progress. However, all new ideas are not good ones and after due consideration, a coach must firmly reject ideas that are worthless or harmful. He must also be alert to recognize the difference between a shooter's conducting a useful experiment and a shooter's adopting a gimmeck.

A coach must at all times be objective and observant. Many times he will be able to detect irregularities that affect performance even before the shooter is aware of them. One of

the coach's responsibilities is to establish a routine for his shooters. He must then learn how this routine is upset by matches on unfamiliar ranges, and by match conditions themselves, and how a change in routine upsets the individual shooters. He must then train his shooters to accept and adjust to such irregularities.

During practice, a coach must set exacting standards for himself and for his shooters. He must demand that each individual exert as much effort in practice as he exerts in an actual match. The concentration and determination required to produce a winning score cannot be turned on and off at will; it must be developed, and it can be developed only through training and practice.

It is in this area of practice that the coach will have his greatest difficulty. Shooters invariably feel that practice performance is not as important as match performance, and therefore does not require as much effort. They must be made to recognize that practice is not only a physical exercise, but also an exercise of the will.

Practice sessions are also the time to teach the shooter to rely upon himself to analyze and critique his own performance. He must learn to diagnose a symptom and prescribe a treatment. This training is necessary preparation for that time when the shooter is firing a match and must be his own coach.

A coach should at all times be alert for a bad rifle. He must recognize and accept that occasionally a rifle will be the cause of a seemingly poor performance. Most good shooters are reluctant to blame a rifle for a poor score. The coach, however, must constantly consider this possibility and take action to see that the rifle is maintained to maximum performance.

Never, under any circumstance, should a man be allowed to shoot a rifle that is not performing properly. A poor rifle will immediately destroy a shooter's confidence in himself, or become an excuse for a poor performance. However, detecting bad rifles and correcting them is the responsibility solely of the coach; otherwise, shooters will become amateur gunsmiths and unintentionally destroy the accuracy of seemingly good rifles.

The coach should keep a constant check on the condition of all equipment and rifles. This need not be a formal, organized inspection, but rather, can best be done in the course of discussing another point. Setting a standard of maintenance not only helps to preserve equipment, it also gives the shooter confidence in the reliability of his equipment. Never allow a shooter to arrive at a match site with faulty equipment. Even if a replacement item is available, the shooter is still entering the match with an unfamiliar item.

A coach must never be satisfied with an average performance from a shooter, nor should he allow the shooter to be satisfied. He should inspire the shooter to strive for perfection at all times. However, standards of performance must be flexible enough to comply with the abilities of both the novice and the expert. When each shooter has reached the level of performance set for him, the coach must convince the shooter to set a new, higher standard for himself. It must be remembered that behind any poor performance there must be a valid reason. Identification and correction is the only solution to preventing repeats, and this must be worked out by proper rapport between the coach and shooter.

A training program must be designed to meet the requirements of each individual rather than the requirements of uniformity. Training requirements will normally vary from one individual to the next because of difference in physical conditions, shooting experience, etc.

Training must be planned, scheduled and supervised. Simply publishing a training schedule is not enough. Supervision is necessary to insure that standards of performance are met for

each individual. The coach must be objective in the evaluation of his training program, and he must be prepared to modify his program if it is not achieving the desired results.

In order to remain objective about each shooter's performance, some sort of record must be maintained. Most coaches prefer a graph scale. Generally, an examination of such a scale will reveal things that neither the coach nor the shooter was aware of. It will serve as an indicator of progress, enabling the coach to evaluate the state of training, and it will point out difficiencies in training. It is best to keep a graph of each position, and an aggregate graph; this is the best way to evaluate over-all progress and to detect specific weaknesses. Never must the shooter or the coach rely on memory for recollection of performance statistics over a period of time--to do this would negate much of the effort, and cause improper emphasis to be placed in certain areas.

Generally, a coach's duties during a match will differ greatly from his duties during practice. In training, he will have stressed self-reliance and will have forced the shooters to analyze and correct their own performances. This self-reliance must continue during a match, but the coach must remember that during competition a shooter is under tremendous pressures and stresses.

During this time, the shooter will be helped immeasurably by the knowledge that his coach is nearby to help, should help be needed. The coach's presence will exercise a profound influence on the morale, attitude, enthusiasm and confidence of a shooter. He may even help in the physical preparation for the match. This will help him feel that everything possible is being done to create the best conditions for his performance.

During the match the coach must be constantly alert for irregularities in procedure or match conditions that will affect the shooters. He must intercede in the stead of a shooter in any argument, and protest in his behalf when any rule infraction occurs. The shooter's only responsibility should be to perform as best he can.

A good deal of coaching should always occur immediately after a match. Simply telling the shooters they did not do well is not enough. The coach must make them realize that there are reasons for both good and bad performances, and he must help them determine the reasons why their own performances were good or bad, as the case may be. If a shooter discovers the reasons for a poor performance, then that performance was not an entirely wasted effort. Listed below are a few of the more frequent reasons for poor performance.

(1) Lack of knowledge. The shooter with this difficulty is blindly groping for an answer by constantly changing equipment and looking for new techniques.

(2) Lack of incentive. The individual is satisfied with a mediocre performance and has no desire to be a champion.

(3) Lack of team spirit. The individual with this difficulty may be dissatisfied with the team because of personal differences with other team members.

(4) Inability to make corrections. This individual cannot admit that he could be making a mistake but is always ready to make an excuse for poor performance.

(5) Lack of proper guidance. The individual has the ability, but is handicapped by overconfidence or pessimism. He needs to be more objective.

(6) Lack of ability. This reason is the most difficult for a shooter to accept.

We have by design refrained from giving specific solutions to hypothetical or actual problems. We feel that solutions will come of themselves with the development of an individual coaching style and technique. While shooters A and B have identical problems, their solutions will be approached in different manners by various coaches. Both may obtain good results by hard work on the part of themselves and their shooter. The coach who knows as much as possible about fundamentals and basic principles, who persuades his shooters to employ these fundamentals with enthusiasm, and who does not alienate himself from his shooters--that coach has the qualifications for success.

SHOOTING CLOTHES

Clothing is important to a shooter because it aids him in attaining stability and eliminating pulsebeat. The following types of clothing are recommended as being useful while at the same time meeting the requirements of the International Shooting Union. In International matches conducted by the NRA, ISU restrictions on clothing do not apply if so stated in the program.

Footwear

Boots, of the standard Army issue or a similar type, are recommended. The soles of the boots should be flat, and not curled up at the toes. The use of shoe trees will prevent curling. The boots should lace snugly around the ankle to provide support and, to some extent, stability. However, the boots must not be too tight or they will cut off circulation in the feet. In the kneeling position, the laces of the right boot may be loosened to aid circulation. Two or more pairs of socks will provide more comfort.

Some shooters use ski boots, primarily to gain better support for body weight in the kneeling position. This is entirely a matter of individual preference. It should be pointed out that the "high" kneeling position refers to the upright position of the torso. It does not refer to the distance of the buttocks from the ground. In theory, the closer the buttocks to the ground, the lower the center of gravity of the entire position, and the greater the chances for stability.

Pants

Almost any kind of pants are suitable for shooting, so long as they are comfortable. Many shooters wear a set of sweat-pants along with their regular clothing. The sweat-pants provide extra padding and more comfort in the kneeling position. Sweat-pants are legal in ISU events.

Sweat-Shirts

ISU rules permit the wearing of two sweat-shirts. Their use greatly decreases the effects of pulse beat and single muscle tremors that would otherwise be transmitted to the rifle.

Shooting Coat

A leather shooting coat gives the shooter some body support in all positions. They are especially helpful in the standing position. Legal leather coats are available from American and European manufacturers. Though expensive, they are considered a worthwhile piece of equipment for the serious shooter. ISU rules permit the use of a leather jacket that is not more than 20 millimeters thick when measured in a doubled layer. (For other specifications, see ISU rulebook.)

Sling

The ISU sling must not be more than 40 millimeters (1-9/16 inches) in width. More time is required to condition the arm to the pressure of the narrow sling, but it nevertheless provides adequate support. A shooter who intends to participate in ISU events should use a narrow sling exclusively to keep his arm conditioned.

Shooting Glove

The ISU shooting glove must not be more than 10 millimeters thick, doubled. More time is required to condition the hand to the pressures of the fore-end stop and sling when the thin glove is used. The glove must not extend up the wrist more than 5 millimeters from the hand.

THE INTERNATIONAL MATCH

The ISU (International Shooting Union) type of match is the "National Match Course" in the majority of shooting nations. It is also the standard type of match in all world-championship free-rifle events. Headquarters for the International Shooting Union is located at Webergasse 7, Wiesbaden, West Germany.

ISU matches are conducted in the United States under the auspices of the National Rifle Association, located at 1600 Rhode Island Avenue N. W., Washington, D. C. 20036. ISU rules are usually modified to allow the use of NRA approved equipment. Registration of ISU type matches at local, state, and regional levels can be made with the NRA in the regular manner.

The NRA also conducts, under strict ISU rules, the United States National International Championships. The best international shooters in the U. S. compete for awards in military, civilian, junior, and women categories. This match is usually conducted simultaneously with the Interservice International Championships, an annual event between the different branches of the Armed Forces. The combined matches consist of (in addition to a practice day for each event) 3 full courses of smallbore position, 3 courses of smallbore prone, and 3 courses of 300 meter firing. Spectators at these matches find an opportunity to watch the performance of some of the best international shooters in the world.

In addition to U. S. international matches, American shooters are primarily concerned with 3 prestigious international events: the Olympics, the World Championships, and the Pan-American Games. The latter event is, as the name implies, a contest between nations of the American continents. The other two are open to all nations in the world. Each event is held once every four years, and they are so spaced that two do not fall on the same year. American shooters captured first place in each of these events in 1962, 1963, and 1964.

Perhaps because of U. S. domination in the sport, interest in ISU type shooting is rapidly increasing in the U. S. The purpose of this chapter is to aid interested NRA clubs and individuals in planning and conducting ISU matches.

Standard NRA ranges and facilities can easily be converted to accommodate ISU matches. (The NRA publishes a pamphlet, "Safety Ranges and International-type Ranges." which may be useful to clubs who are interested in building a complete international range. Price of the pamphlet to NRA members is $1.00.) The ISU match is just as simple and easy to conduct as an NRA match.

Note that there are only four major differences between ISU and NRA type matches.

1. Time. NRA matches require the competitor to shoot his positions in a specified order and within a specified, limited amount of time. The NRA event, in a sense, measures the shooter's ability to perform within an artificial framework of time and position order.

In contrast, ISU matches give the competitor a block of time which he may use any way he wishes. He may fire positions in any order, and he does not have to complete firing one position before changing to another position. The time limit is adequate so that even the slowest competitor may finish if he makes reasonable use of his time. The ISU match, then, measures pure shooting ability without imposing the artificial variable of time and specified order of position.

2. Targets. The bull of the ISU target is larger than the NRA bull, and produces a sight picture that is much easier to see. However, the scoring rings on the ISU bull are considerably smaller than those on the NRA bull. Thus while the ISU bull is easier to see, it is more demanding upon the shooter. It is a more descriminating measure of performance than the NRA bull.

3. Trigger. In an ISU match, there is no prescribed measure of weight upon the trigger pull. The individual may adjust the trigger pull to his own liking. The only limitation is that the trigger must be safe, as adjudged by the jury. Trigger pull is usually measured in ounces instead of pounds (most NRA matches arbitrarily impose a minimum trigger pull of 3 pounds).

4. Firing Points. In ISU matches, firing points are covered and enclosed on three sides. The purpose of this is to protect the shooters from the elements. Also, all shooters are equally protected, this is not always true in NRA matches when trees or buildings behind an open firing line protect some shooters from wind, while other shooters go unprotected.

Before discussing the conduct of an ISU match on an NRA range, let's examine how a truly international match is conducted.

SQUADDING

Squadding is accomplished by drawing lots. Normally, the team captain from each country draws a team squadding ticket which gives him one firing point for each of his team members. He then assigns each shooter to a specific firing point. Where there are no team matches, however, lots are drawn to assign a specific shooter directly to a specific firing point. Individuals from the same country are normally not allowed to shoot next to each other.

OPENING THE FIRING LINE

The firing line is opened to competitors for a specified and announced time before the match begins. When the firing line is officially opened shooters may go to the line and set up equipment.

COMPETITION

Competition begins at the officially pre-determined time. The match officials customarily announce the beginning of the match. At this time, any individual desiring to fire fouling shots must request and receive permission to do so. He must shoot his fouling shots in accordance with instructions given him by the line officer. After firing his fouling shots, the competitor begins the match, and all further shots are recorded by the register keeper (score keeper).

There are three types of ISU matches of interest to us. They are as follows:

1. The 50 meter, smallbore 3 position match. Time for this match is 4 1/2 hours.

2. The 300 meter, 3 position match. Time for this match is 6 1/2 hours.

In either of these matches, the competitor fires a maximum of 10 sighting shots and 40 shots for match score in each position (prone, kneeling, standing). This makes a maximum total of 50 shots in each position and 150 shots for the match. All shots, including sighter shots, are "for record" and are recorded by the register keeper unless 1. the shooter was physically disturbed by another competitor, or 2. the rifle was benched when the shot occured.

Sighting shots are made at specified sighting bulls. They must be made before or between 10-shot strings for match score. In other words, once a shooter begins shooting for match score, he must complete a 10-shot string in that position before he can return to a sighter bull in that position. If an accidental shot occurs during a string for match score, it is counted as one shot of the 10-shot string. It may not be arbitrarily counted as a sighter shot. The competitor may fire any position at any time during the match. He can if he wishes change from one position to another in the middle of a 10-shot string for match score, in which case his targets will be changed accordingly. However, when he returns to his original position, he must complete the 10-shot string for match score in that position before he can call for a sighter bull.

3. The 50 meter, smallbore prone match (English match). Time limit for this match is 2 1/2 hours.

The competitor fires 60 shots for match score and 15 sighting shots. Sighting shots must be taken before or between 10-shot strings.

TARGET OPERATION

If pits and target operators are available at each firing point in smallbore matches, targets are changed after every shot so that only one shot is fired at each bull. It is the shooter's responsibility to see that he does not fire more than one shot on a bull. Before the match begins, each compititor's targets are clearly marked by position and numbered 1 through 40. Generally, as a 10-shot string is completed, the targets are delivered to the classing committee (stat office) for scoring. Sighter bulls, also clearly marked by position and numbered 1 through 10, are delivered--used or unused--to the classing committee at the completion of the firing of a position.

In 300 meter matches, 10 shots are usually fired at each target.

REGISTER KEEPER (SCORE KEEPER)

Behind each competitor is a register keeper (score keeper) equipped with a spotting scope. He is responsible to 1. signal the pit detail to change targets; 2. insure that the competitor does not fire more than the legal number of match score or sighting shots; and 3. record the value (as best he can) of each shot on a scoreboard for the benefit of spectators. His record of the number of shots fired is official. His record of the value of each shot fired is unofficial. The register keepter's record should be preserved, however, as it may be referred to by the jury of appeals in reviewing targets.

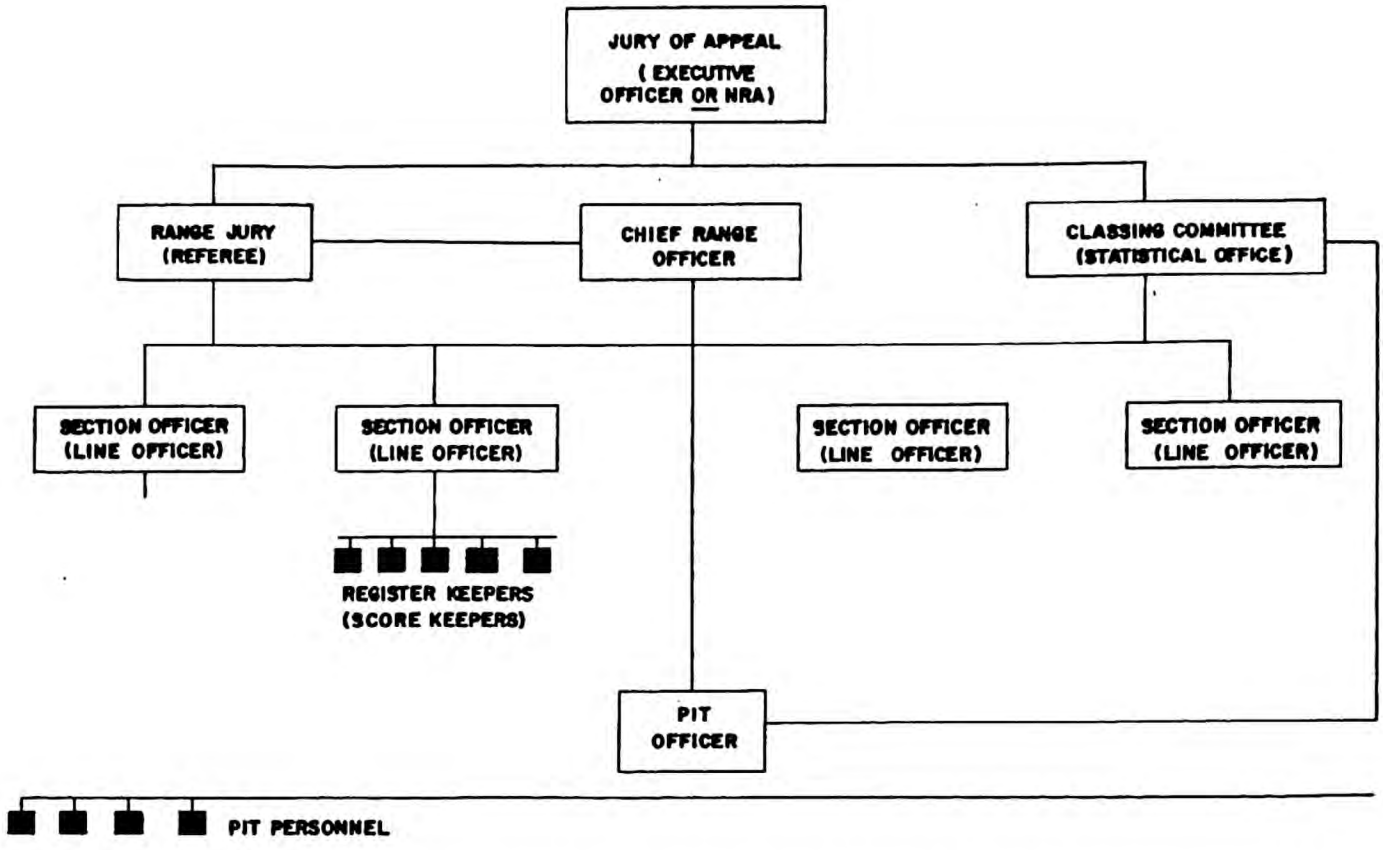
The position of register keeper is highly valued in European countries, where spectator interest in shooting events may be compared to spectator interest in baseball games in this country. Regulation ISU ranges have large areas reserved for spectators. During a match, the area behind a leading shooter is usually completely filled with spectators equipped with binoculars. Spectators are traditionally very courteous and sympathetic towards the shooters.

AWARDS CEREMONY

A traditional ceremony attends the completion of every ISU event. The first three place winners mount a 3-tierd pedestal and are presented with gold, silver, and bronze medals, for first, second, and third place. Then the first place winner is honored by the playing of his national anthem and the raising of his national flag. The completion of this ceremony marks the official close of the match.

In the following chart we see how the ISU match is organized. The terms enclosed in parenthesis are those normally used in NRA match organization. Notice that structurally, NRA and ISU match organizations are almost identical.

It is obvious that all aspects of the organization and conduct of an ISU match are designed to 1. provide an accurate discriminating means of measuring performance and 2. give every shooter an equal opportunity to deliver the best performance he is capable of. This spirit can prevail in an ISU match even though some aspects of its organization and conduct are modified to adapt it to less expensive facilities.



Many shooters will be interested in ISU matches in 50 foot indoor gallary ranges. Matches may be conducted with no modifications to existing range facilities. Half course and full course matches may be registered with the NRA.

Fifty meter international targets reduced for use at 50 feet are available through the NRA. These targets (A-36) have 12 bulls, two of these designated as sighting bulls. Only one shot should be fired at a match score bull. Any number of shots may be fired on a sighting bull, providing the total number of shots fired in a position does not exceed 10, and so long as sighting shots are taken only before and between 10 shot strings.

It is desirable to have a scorekeeper behind each shooter. The scorekeeper may change the shooter's targets if the shooter does not wish to get out of position. However, the scorekeeper may not coach or in any other way assist the shooter.

If there are not enough personnel available to provide each shooter with a scorekeeper, personnel should be made available to change targets. These individuals may also act as assistant range officers.

In gallary matches of this type, it is usually possible to give the shooters match time to use as they please (4 1.2 hours for a full course, 2 1/2 hours for a half course). Whenever the match must be halted (for example, to send personnel down range), shooters should be allowed two (2) sighter shots immediately after the cease-fire is lifted. These sighter shots are in addition to the 10 regular sighting shots allowed in each position. The targets containing these two extra sighting shots should be clearly marked to avoid penalties in scoring.

Many shooters will also be interested in outdoor smallbore matches. For these matches, sponsors will be primarily concerned with the preparation of the firing points on existing NRA ranges.

As stated before, the firing points must be covered and enclosed on three sides. We feel that this is essential to the proper conduct of an ISU type match. Preparing the firing points can be accomplished quite easily, especially if a roof already exists over the firing points.

The purpose of the enclosures is to protect the shooters from wind, rain, and sun. Any material, and any design of construction, which will serve this purpose, is adequate. The enclosure may be temporary or removable so that the range may be converted back to NRA match specifications.

Many clubs have found that 6-foot target frames can be erected to form enclosures. Others have used target cloth stretched on portable frames. Any material will serve which keeps out weather and direct sunlight.

Notice that two (2) firing points are enclosed together. The enclosure thus forms a booth which houses two shooters.

A single rear wall extends the length of the firing line. An aisle or doorway exists between the firing booths so that spectators and officials may walk up and down the firing line without interfering with shooters.

When pits and target operators are available, the match is conducted as described above. Usually, however, existing NRA ranges are not equipped with target pits. In this case, conduct of the match closely parallels the conduct of a regulation NRA type match. The match is fired in stages.

We recommend the use of a target containing 5 bulls, one of these bulls designated as a sighting bull. (There is one target for use at 50 meters, another for use at 50 yards if there is no 50 meter line.) The target sheets are the same size as NRA 50 yard target sheets, and fit standard target frames.

Practical requirements dictate that 5 shots be fired in each match score bull. This enables the shooters to fire 20 match score shots before changing targets. (The shooters change their own targets.) If a half course is fired, the shooter is allowed a total of 6 sighting shots in each position. If a full course is fired, the shooter is allowed a total of 12 sighting shots in each position. (The usual 10, plus 2 for the delay in changing targets.) Any unusual delays entitle the shooters to still 2 more additional sighting shots immediately after the cease-fire is lifted.

The match is shot in stages so that every shooter is given equal time in each position. The time is adequate. It is blocked out as follows (for each 20 shot series).

Prone -------- 30 minutes including sighters
Kneeling ------ 40 minutes including sighters
Standing ------ 50 minutes including sighters

Officials and shooters will find that matches conducted in such a manner will run just as smoothly as a regulation NRA type match, and perhaps more so because shooters are not rushed in changing targets or equipment.

Match officials are sometimes over-concerned with the shooters' equipment. Rarely is illegal equipment used intentionally. Many times the official rules do not cover certain situations or items of equipment. In such cases judgement must be rendered from the spirit of the competition rather than the rule book. Officials should not hesitate to call upon the advice of experienced ISU shooters in determining the admisibility of a specific piece of equipment.

Sponsors, match officials, and competitors are enjoined to become familiar with ISU rules. Copies of the rules may be obtained from the National Rifle Association.

Technical questions not answered in the rule book may be directed to the National Rifle Association.

The USAMTU will be glad to offer advice or assistance on practical matters whenever possible. Direct all inquiries to Head Coach, International Rifle Team, USAMTU, Fort Benning, Georgia 31905

We sincerely hope that you will shoot and enjoy ISU type matches. Perhaps you will be the one to fire an 1190.

DYNAMIC TENSION EXERCISES

Dynamic tension (isometric) exercises are used by the USAMTU free-rifle team as a warm-up before practice. Every man on the team considers them valuable, which is unusual considering the many different opinions held about other forms of exercises.

Dynamic tension consists of tensing a particular muscle or group of muscles for a sustained period. All of the exercises below are sustained for 10 seconds. The primary consideration in performing these exercises is effort. The performer should exert the maximum tension possible in performing each exercise. In one study, a group of men actually doubled their strength in a 60-day period by performing 2 sets of these exercises each day.

Ex # 1.

Place palms together in front of chest, fingers pointing up. Press palms together as hard as possible. Hold 10 seconds. (Hold all exercises 10 seconds)



Ex # 2.

Grip hands together in front of waist. Squeeze together as hard as possible.



Ex # 3.

Hold arms down at sides, palms front. Make a tight fist with each hand, and slowly bring hands up towards shoulder. Concentrate on tensing biceps.



Ex # 4.

Extend arms up and back as far as possible, leaning back as far as possible.



Ex # 5.

Raise arms straight over head. Try to touch ceiling.



Ex # 6

Extend arms in front of body. Try to touch opposite wall.



Ex # 7

Hands on hips, feet shoulder width apart. Tense arms, abdomen, and leg muscles.



Ex # 8

Sit on floor, legs crossed, arms at sides. Point toes outward, tense leg muscles.



Ex # 9.

Lie face down on floor. Try to touch heels with fingertips.



Ex # 10.

Stand with right side to wall, arms down. Try to push right hand through wall. Turn to left side and repeat.



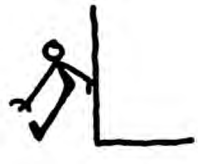
Ex # 11.

Stand with back to wall, fingertips touching collarbone. Push chin forward, holding shoulders back against wall.



Ex # 12.

Stand about 18 inches from wall, back to wall, one hand on wall for support. Curl toes up as far as possible, knees straight, touch floor with free hand.



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