



SPORT PISTOL SHOOTING

BASICS AND IMPROVEMENT IN 10m AIR PISTOL

By: Gennady Solodovnikov
Abdulla Al-Naemi
Anna Kalinina

Photos: <https://issf-sports.org/>

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10-METER AIR PISTOL AND THE BASICS OF PRECISION PISTOL SHOOTING

The 10 meters competitions are the most popular precision events in shooting championships. The reasons for this are the relative harmlessness of air guns, the ease of arrangements for the range installations and inexpensive shooting equipment.

The air pistol competition as a shooting sport event was first introduced at the 1968 European Championships and it was included to the program of the 1970 World Championships. The air rifle shooting appeared in international competitions earlier. This is the merit of the designers who have created quality guns for high-level competitions. The air rifle competition was introduced at 1984 Olympic Games, earlier than the air pistol which have started as an Olympic event since 1988.

The dimensions of the 10-meter pistol target were chosen so that the aiming deviation allowing the projectile to touch the line of “ten” from the outside should be approximately 1.5 times greater than in 50-meter pistol shooting and 1.5 times less than at 25 meters. The minimum trigger pull weight was also chosen over these two small bore events. There are no limits for the trigger pull in the free pistol shooting but at 25 meters it is 1 kg, so for air pistol it is 0.5 kg.

The sizes of the air pistol target were reduced in 1989 to improve the decimal calculation of scores in finals but this change was minor and didn't affect the actual level of scoring.

The air pistol shooting is a fairly simple, good for beginners. In the same time it is included in the Olympic program. This is why we are going to cover the general basics with this kind of pistol shooting as an example.

The Shooting Position

By the term “Shooting Position” I mean all actions, efforts and decisions taken by the shooter in order to obtain the most accurate aiming of the pistol at the target and reduce the movements of the pistol while aiming.

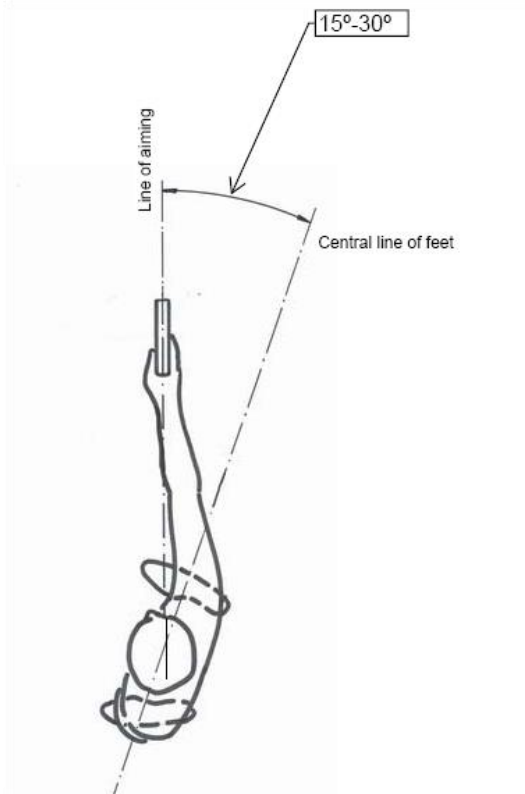
When choosing a posture for pistol shooting the following rule should be taken into consideration:

Tension of only one muscle or one muscle group is possible with conscious control of this tension. If parallel actions are performed and attention weakens, the tension subconsciously begins to spread to other muscles, starting with the nearest. It is impossible, for example, to strain only the shoulder of the right hand. The tension will soon spread to the muscles in the neck and forearms.

The possibility of the conscious control on different parts of position should be observed. For example:

The most rational shooting stance

The most comfortable and energy-efficient aiming will be in a stance with approximately equal, minimal tension of adjacent components: the neck turned towards the target, the shoulder and the hand with the pistol. The elbow of the hand is extended to the limit, the body is naturally leaned back, compensating for the weight of the hand with the pistol. The center of gravity is above the support zone, bounded by the feet, closer to its center. The feet are turned from the line of sight about 15-30 degrees clockwise. Assuming the pistol is held in the right hand, it will look like this from above:

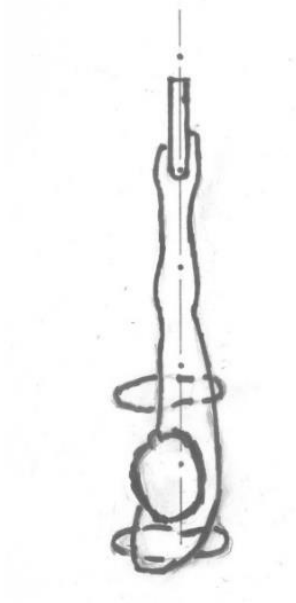


Pic. 1

The shooter tries to relax all muscles that are not involved in holding the gun. However, to the surprise of many experts, this position is not the most popular in slow shooting.

The most popular shooting stance.

Most of the shooters prefer to place both feet perpendicular to the direction of shooting or close to this position. The right side is turned to the target more than it should be in rational way. Like this:



Pic. 2

This posture is more tense and the holding of the pistol is more forceful. The reasons why most shooters choose to use force to hold the pistol are clear enough. The first reason:

The forceful holding of the pistol allows to minimize the loss of points caused by technical errors during shooting. You have to hold your hand firmly! The wish to hold the hand firmly is reflected in an enforced posture.

The second reason why this type of posture is popular is the following:

Muscle activities help to reduce the amount of adrenaline and other stress hormones in the blood. A person feels this subconsciously, and when signs of stress appear, he/she has a need for muscle activity, which can change the hormonal background. Of course, the real effect of this on static muscle tension is doubtful, but it allows the shooter to feel more confident, and this is important.

Usually, it is difficult for a person to sit still when he is worried, and shooting competitions are quite nervous. So, you want to tighten your muscles within acceptable limits in the hope that increasing muscle tone will help reduce the effect of nervous tension on immobilized muscles. It's just following a natural wish but it helps create the feeling of a *reliable* shooting stance.

There are other technical advantages to the sideways shooting pose. In this position, the wrist with the pistol is straightened as much as possible, which makes it easier to keep the aligned front sight in the rear sight. The recoil from the shot is better absorbed by the body and the pistol moves almost vertically upward, which is important for rapid fire. But now it is not about that. Now it is about the air pistol and in this kind of shooting the recoil is not considerable.

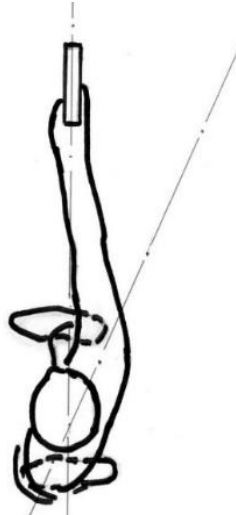
However, it should be remembered that strengthening the shooting stance can be a positive quality only up to a certain limit. Shooting is a delicate matter and fine muscle sensations are very important in shooting. It is very important not to cross this line. So, since the need to use force is determined not only by the physiology, but also by the psychology of athletes, we can confidently say that this should be decided individually.

The search for efficient control over the shooting stance

The pistol stance is a very complex system with many anatomical components. Conscious control over the holding of the entire shooting stance is impossible.

It is human nature to seek for rational solutions, and signs of such searches can be found in the shooting positions of various athletes. If you feel the need to strengthen some joint hold, for example your right shoulder, while

you in a rational pistol stance, then you have to consciously tighten the muscles around the joint. Not everyone likes it. *It is easier to move the joint to a less loose position and hold it that way. The muscles that shift the joint contract and the antagonists stretch. A stretched muscle does not feel relaxed, but controllably tense. This creates the feeling of a strong joint.* So, we can see the raised shoulders of the hand with a pistol, or vice versa, lowered and even shifted forward. Why consciously fix the ankle, if you can move the center of gravity of the body forward, and the weight of the body, transferred to the toes of the feet, will strain the lower legs, preventing the body from swaying? In the same way, they try to fix the hip joints, back, muscles of the right side of the torso. Such stance does not require conscious control over the tensed muscles and, therefore, constant attention. It will consist of several "nodes" that the shooter checks before starting aiming, alternately switching attention from one to another. The shape of the posture becomes as follows:



Pic. 3

The feet remain in a position perpendicular to the aiming line, but the shoulder line moves clockwise, the body "twists". Examples of "twisted" shooting stances can be found in high-level athletes, as in the photo below. I want to call such versions "the seek for supports points inside of their own bodies".



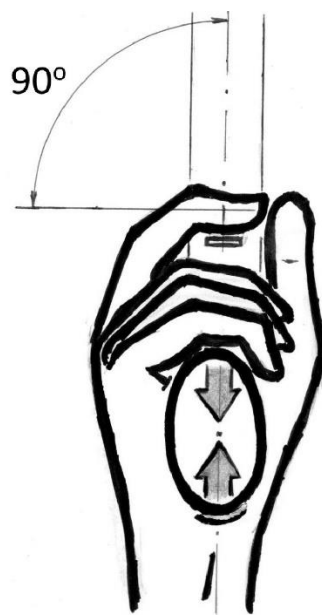
Photo 4



Photo 5

The gripping, the palm and the wrist

This element of the pistol technique is of particular importance because it combines static pistol holding, sights alignment, and dynamic action on completion of the shot - pulling the trigger. *In order to avoid mechanical interference from finger efforts when firing, all forces applied to the pistol grip and trigger should be directed along the barrel.* It is shown in the picture:



Pic. 6

It is absolutely necessary to fix the wrist of the hand with the gun during shooting. This axiom does not require proof. However, in everyday life, a person never performs this action, as when shooting. There are no life circumstances that force us to fix the wrist in the same way as when holding a gun. This is an unusual action for us and its physiological mechanism is complex. *If you ask shooters how they do it, in many cases you will not get a*

clear answer. This should be understood by each shooter on his own with training. It must be gained as an acquired skill. Practicing to create this skill is of great importance from the very beginning of a sports career.

Movements in the wrist joint are possible in all directions, but the degree of freedom (or permissible range of motion) of these movements in different directions is different. The gripping palm, according to medical terminology, is in the "adducted" position in relation to the forearm. I. e., the palm slightly "dropped down" (photos 7 and 8). It is easier to aim in this position than in the natural wrist position. Further downward movement of the joint is limited. The ligaments and tendons of the wrist become a *soft support* for the shooter when aligning the front sight in the rear sight. The more the wrist drops, the firmer that support becomes.



Photo 7
This is quite normal holding hand position.



Photo 8
Placing the forearm horizontally makes it easier to see how the wrist is "dropped".

Different balances of pistols require different adductions of the grip. As the center of gravity of the pistol is more displaced from the trigger forward, the more "drop" of the wrist is required for a comfortable aiming.

The hand that holds the pistol grip is a special part of the shooting stance. The trigger finger is part of this hand. So, muscles that control the aiming and muscles that control the trigger release are very close to each other. When the wrist is in the extreme "dropped down" position, the muscle ligaments and nerves passing through the wrist to the hand are compressed, their paths are deformed, which causes difficulty in the movement of the index finger. Thus, the front sight freezes in the rear sight, but pulling the trigger is not so easy.

It has long been noticed that if the hand with the pistol is slightly supinated (turned clockwise, as the shooter sees it), then the maximum amplitude of the downward movement decreases, and the position of the "dropped wrist" does not greatly affect the work of the index finger. Even a few degrees of supination have a positive effect on holding the pistol - the wrist seems to find its vertical axis, and the front sight moves straight down when the wrist is relaxing. With a normal, non-supinated hold, front sight usually goes down and to the left, and all shots with errors of the wrist fixation go to 7 or 8 o'clock directions. And as more the shoulder line is deviated from the aiming line to the right as farther this mistake takes the shots.

The designer of the TOZ-35 free pistol, Dr. Efim Khaidurov, had explained that the grip holder is welded to the left side of the pistol receiver in order to provide possibility of the supination of the hand for gripmaker. According to his idea, the lower part of the palm should almost reach the vertical plane passing through the aiming line.



Photo 9



Photo 10

The shutter lever of the TOZ-35 pistol is shifted to the left not for ease of loading with the left hand, but for possible supination of the hand in the grip.

The poster issued in Switzerland after the victory of Moritz Minder in the free pistol competition at the 1978 World Championship provides evidence that this reasoning has practical implications (Photo 11). It shows how far Mr. Minder has gone in his quest for optimal right arm supination. It is regarded by many as an extreme, but it didn't ruin main things - a world record was set. Besides, 577 in Free Pistol is a good score for winner of the world championships even in 2022 or 2023.

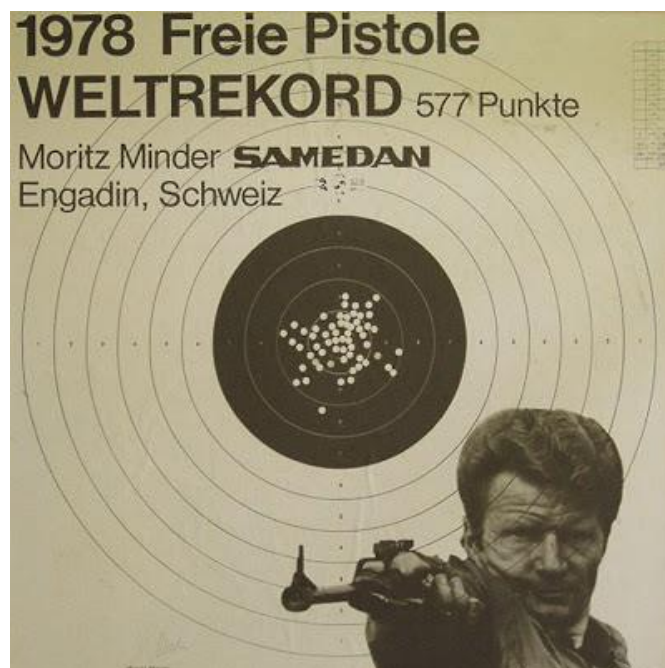


Photo 11

The grip should be held by pressing the middle phalanges of the three holding fingers back against the area below the “U” between the thumb and forefinger. This pressing is indicated in blue in photo 12.

However, the soft tissues of the palm are not so reliable support, so the opportunity to find something more solid should not be missed. Attention should be paid to the contact of the middle finger with the part of the grip under the trigger guard and the proximal part of the palm with the end of the palm rest. These places are marked in red in photo 12. It is also advisable to get contact with the protrusion of the grip above the thumb and forefinger - green arrow in photo.

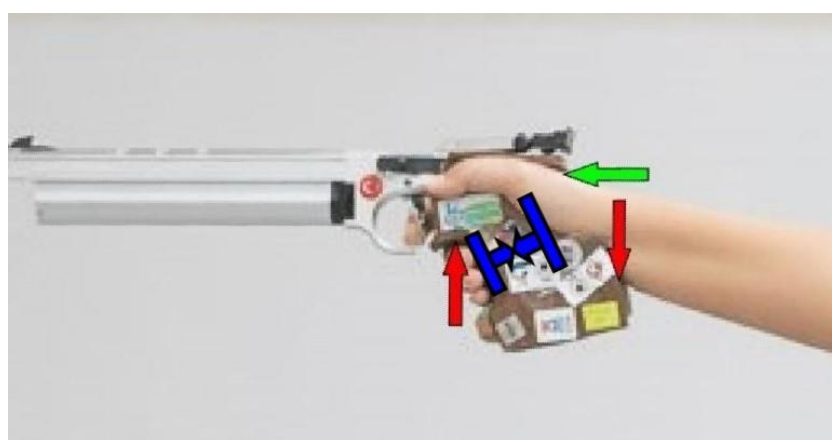


Photo 12

The index finger should not touch the grip or pistol with anything other than the last phalanx on the trigger blade. The blade should be in the middle of the phalanx or slightly closer to its joint.

In this regard I would like to draw your attention to the grip. Wooden grip. What is a good grip?

The grip must be made in such a way that the direction of pulling of the trigger blade points as close as possible to the center of application of forces holding the pistol (Photo 13).



Photo 13

Please remember that the grip should be held by pressing the middle joints of the three holding fingers back to the area under the thumb and forefinger. If the vector of pulling is too far from this center, it can cause a pair (mechanical system of forces) and deflect the pistol while confident triggering. For example, this can happen if the grip is made with a spherical thickening in the middle and this "ball" is the main hold area. At first glance, it is a very comfortable grip, it is filling the palm well but it will be difficult to shoot with it.

Special attention should be paid to conical parts of the grip. It is obvious that when the hand is squeezing a cone, it is squeezed out in the direction opposite to the wide base. Special anti-slip surface doesn't always help. The palm's skin and flesh are soft enough to allow some variation in hand position as the grip force changes. So, designer of the grip should take this into account. The conical fragments should be appropriately balanced in order to maintain consistent gripping during long shooting sessions.

The grip should help shooter to maintain uniform gripping for each shot. However, any grip can be taken different way occasionally. Grips that replicate the shooter's palm down to the last detail and are replete with 'highlights' such as indentations for each finger, deepening for folds of skin and protrusion that fills the center of the palm are easier to catch consistently. However, gripping errors in this case can lead to more serious consequences than with smoothly shaped grips.



Photos 14-16 Pistol grips

How can you check if the grip is fit for you? First, make sure it is of size of your hand and is comfortable to hold. It shouldn't be tight in areas designed for additional support, just touch. The surface under the thumb and forefinger should be evenly controlled. The index finger should be free and nothing should interfere with its movement. If it is observed, take aim and close your

eyes. Open after 10 seconds and notice where the front sight is. If it's in the center, then good. Take aim again and relax your wrist. Pay attention to where the front sight is moving. If vertically down, then good. If down and sideways, the gripping is not correct.

The gripmakers shape their products according to their ideas how it should work. If shooter considerably alters the grip, this scheme may be destroyed and he/she will be responsible for that. Please respect the experience of the gripmakers. It is better to request manufacturers to adjust their grips, if necessary.

Visual aiming.

The shooter has three items for aiming: front sight, rear sight and target. Two of them relate to the pistol: the front sight and rear sight are pistol sights. All items are located at different distances from the eye and it is impossible to see them equally clearly. Something will inevitably be out of focus. Since small errors in the position of the front sight can cause large deviations of the shot from the center of the target, *the eye should be focused on the pistol sights. The front sight is best suited to this in terms of the mutual positioning of all three items.*



Pic. 17-a **CORRECT**



Pic. 17-b **INCORRECT**

These three items create two visual sighting elements. The first is the pistol sights. The second aiming element is the position of the pistol sights in the aiming area of target. That is, how it should be taken by the shooter: put in order the near element and then you can pay attention to the distant one.

If we compare these two elements as indicators giving us information, so it is obvious that the indicator "position of the pistol under the "bull's-eye"" is larger, brighter and easier to read compared to the indicator "pistol sights". Our subconsciousness works so, that effectively framed, promptly delivered information seems to be more important. The uncontrollable movements of the pistol in the aiming area seem to the shooter more dangerous than the movements of the front sight in the rear sight. So, there are reasons provoking shooter to shift eye focus to the target and pay more attention to the position of pistol at it. These reasons are so serious that the mistake of incorrect

distribution of attention may appear even with correct focusing of vision. This possibility was indicated in experiments with artificial near-sightedness. Athletes with normal vision were shooting with "reading glasses" with lenses ranging from +0.5 to +1.5. But even if the shooter cannot change the focus of his vision, signs of "target chasing" have sometimes been noticed. The concentration of attention cannot be achieved only by focusing the vision.

Developing the shooting stance.

The techniques of the world's leading shooters should not be copied without proper study. When looking at the pictures illustrating the "twisted" postured (photos 4 and 5), the medical term "thoracic kyphosis" is immediately remembered. This is what these athletes are at risk of acquiring, in addition to many medals, and what we should try to avoid. Prolonged exposure to unnatural positions can cause spine deformations changing the natural shape of its curves. *The first requirement for finding the correct shooting posture is a correct torso position.* Is this possible when looking for an efficient shooting stance? Why not? Look at the photos:



Photo 18



Photo 19

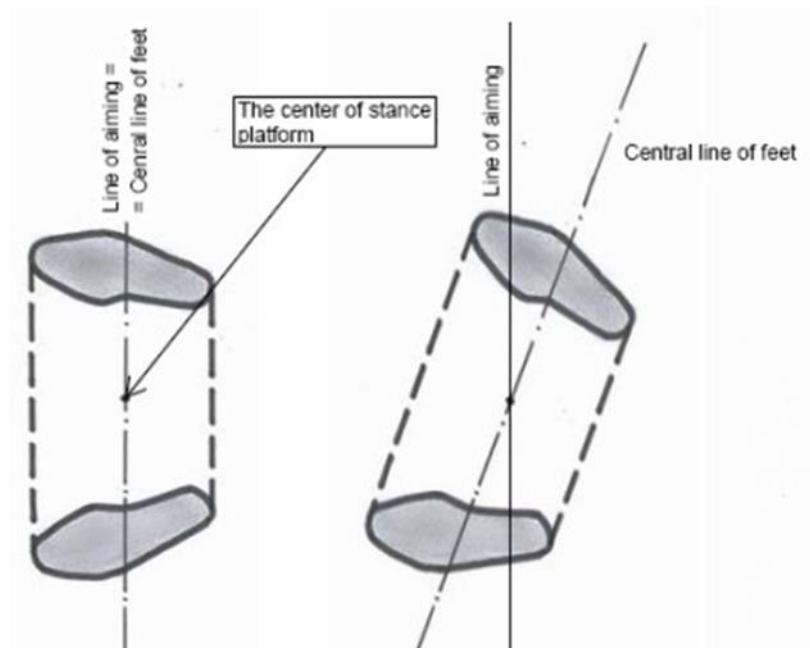
The most energy-efficient option shown in picture 1 is the best suited for the beginning of practice. It does not provoke slouching. It is suggested to start with this, and correct it, if necessary, in the future. The reasons, besides the correct position of the spine, are as follows:

First. Maybe this particular beginner is one of those who can sit quietly on a chair in a stressful situation. *Not everyone needs to flex the muscles to prove himself in shooting.* There are examples of high-ranking athletes who prefer to relax as much as possible all the muscles that are not directly involved in holding the pistol. For example, read the books of Mr. Ragnar Skanaker.

Second. In the most popular pose (Picture 2), the neck is turned and more tensed but the *tension in the neck is a very sensitive part of the stance.*

An inappropriate head position can impede the blood supply to the brain, which in turn can cause fatigue and other non-obvious symptoms. The risk isn't obvious, but it's best to avoid it. In addition, an extreme turn of the head can affect the work of the vestibular apparatus - these are completely unnecessary difficulties for a shooter.

It is recommended to check the orientation of the shooting stance using this well-known method: the athlete aims the pistol at the target and closes both eyes for 15-20 seconds. During this time, the shooter simulates pulling the trigger. Then he opens eyes and checks if the pistol is still aimed at the target. If any deviation is found, the orientation of the posture should be corrected by moving the feet around the center of the support area.



Pic. 20

A comfortable aiming posture comes with practice just like any other skill. It just takes a little patience. The most comfortable position is one in which the athlete practices for sufficient time improving the scores. Likewise, the pistol grip becomes more comfortable and controllable over time. Perseverance and work will make you improve it little by little. Some adjustments can be made during the process of training according to the needs of the shooter.

If there is a need to tense the shooting stance, to strain the muscles more, you can find ways other than changing your torso orientation. Keeping in mind that *muscle tension subconsciously begins to spread to other muscles when performing parallel actions*, you should choose the right "ignition" for this strengthening. The grip and wrist are easy to keep under conscious

control, so it is recommended to start there: palm - wrist - shoulder - upper torso.

A slight tilt of the shooting stance in the frontal direction will shift the weight of the body onto the toes. This will cause muscle tension in the ankles, hips and lower back. This position will stabilize the body and help control parallel sideways movements.

In the same time, you have to remember that over-tension can kill the muscle control and reinforcement is good up to some reasonable level. With all efforts to hold the pistol firmly, you have to be able to keep the non-shooting hand relaxed. The left shoulder (if you shoot with right hand) should be relaxed and dropped down.

Routine.

So, here we go. The athlete is on the firing line and checks the correct position of the feet. If the grip has been severely loosened during the break, the pistol should be held by the barrel with the non-firing hand (left hand if you are right-handed) and the right hand should find a good grip position. The pistol is then returned to the table. Now the ankles, hips, lower back, torso and head are brought into the shooting position, the muscle tone is as desired, and together with the beginning of a deep breath, up to three-quarters of the lungs, the right hand with the pistol moves up.

There are two ways to approach the aiming area: bring the pistol from above or from below. The most popular way is the lowering of the hand with the pistol from above. So, the pistol goes much higher than the target level, stops and, with the beginning of exhalation, starts slow descent towards the target. During this movement, the sights of the pistol should be aligned, the trigger finger is moving back and forth several times to ensure that the wrist is locked, and the trigger movement will be performed separately from the other muscles of the arm. The desired result of these movements is to feel the moving finger and simultaneously watch the frozen pistol sights. By this time, breathing is held, it shouldn't disturb to the aiming. This is the main purpose of controlling the breath - it should not disturb the aiming.

It is enough to hold the breath for 10-15 seconds to complete a shot. It is not difficult for a healthy person. Such pauses in breathing cannot cause a lack of oxygen in the human body if they alternate with moderate ventilation of the lungs during the event.

The rest of the downward travel of the pistol can vary. Some shooters make final preparations on the last leg of the movement, some upon arrival to the sighting area. Also, it is possible to stop the gun slightly higher or lower and proceed to the desired destination after determining readiness.

Approaching the target from below is not the most popular, but still used option. Its advantage is that the shooter can see the target with peripheral vision when approaching. The breath can be held on inhaling or exhaling. Inhalation is an active action, and exhalation is a passive one. Holding the breath while inhaling is a more active approach to the shot. If the shooter is not going to stay in the aiming area for a long time, it is understandable why it is important to see the target when approaching.

Trigger control.

The efforts of the shooters to have the control over the movements of the pistol, to stabilize it and take an accurate aim are similar to a diligent fundraising for the acquisition of something desired. So, release of trigger it is a use of collected resources. You can contact a trusted seller and receive a product with a guarantee, suspecting that you are overpaying. Or you can try to be smart, get tempted by a lucrative offer, with the risk of being deceived. In any case, it is very likely to feel that you lost something hard-earned.

The travel of the trigger pull of the air pistol usually consists of two stages: the first stage is long but easy, and the second stage is short but stiff. The pull weight of the first stage takes from 30% to 60% from the overall weight, which is minimum 500 gr. Such division is arranged in order to give warning to the shooter – when the second stage is started, around half of the pulling is done. Everything what will be said further about the trigger control is related to the second stage. The first stage is not relevant for us – it's taken and forgotten.

The first advice on the shooting technique for the beginners sounds something like this:

– Look at the front sight, hold it aligned in the rear sight and simultaneously pull the trigger, not paying attention to small movements of the pistol. Pull it so slowly that the shot comes suddenly for you.

This is the best advice. The hand with the pistol is the only thing that a beginner can control when shooting. However, this advice requires to do two things simultaneously: aiming and pulling. Attention: *a human can diligently perform one action, it is easy; he/she can perform two actions at the same time, but this is not easy; diligently performing three actions at the same time is impossible.* The advice above loads the beginner to the limit. Nothing else can be added. He cannot do more than this.

So, the shooter is advised to shoot "unconsciously". A pistol should shoot, not an athlete. From a psychological point of view, this is wise way. It is not because the technical capabilities of the beginner are in doubt. Although it is so. "Unconscious" shooting can protect the athlete from the unnecessary

stress of chasing scores and results, while he/she should concentrate on technical performance.

The difference between “unconscious” and “conscious” shooting is shown on the charts below:

THE CHART OF THE "UNCONSCIOUS" TRIGGER CONTROL

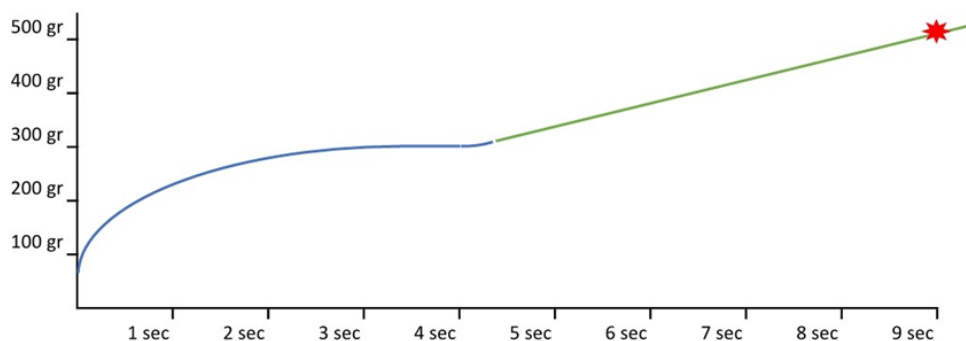


Chart 21

The shooter increases the pressure on the trigger slowly and gradually, and the shot is “unexpected”.

THE CHART OF THE "CONSCIOUS" TRIGGER CONTROL

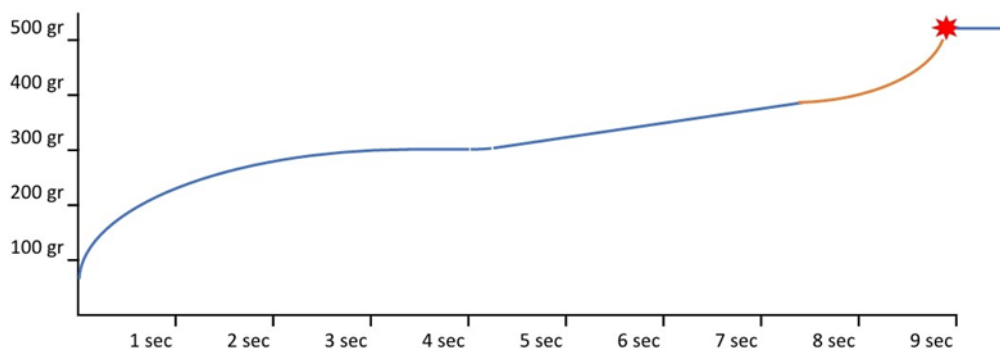


Chart 22

The shooter selects a favorable aiming moment and accelerates the pull of the trigger. This technique is called "jerk".

The basics of the trigger control for the beginner can be defined as follows:

- the forefinger is the only moving part of the hand with the pistol, the rest of the hand is motionlessly holding the grip;
- the pulling of the second stage of the trigger should take from 4 to 8 seconds, this is the definition of “slow pulling”;
- the speed of pulling should be the same throughout the second stage; after the shot, the forefinger should not stop;
- the pulling should go on once initiated; if the finger stops, the hand with pistol should go down, it is not recommended to resume the pulling;

The beginner can easily follow these rules if he/she is motivated for improvement in our sport. However, improving the aiming stability of the pistol may cause wish to complete the shot “consciously”. Should this urge be resisted?

To answer this question, we should clarify that any shooter who has not yet achieved top results, but wants to enter the elite of our sport, should care not only about today's scores, but also contribute to his/her future results. The performance should have main features of the top scorers which are not exposed easily in timing or tracing the aiming pistol. So I would like to say that the best condition for everyday practice is to strive for stable period of aiming long enough to complete the triggering without undue haste. The aiming is not stable enough or stable for short time? It can be improved. But the other elements of technique should be good.

The excellent scoring in shooting is a matter of discipline. Do everything uniformly with care and all shots will gather in small spot. Desire to shoot at certain point or at certain time destroys consistency of performance, shots won't be similar. Even if it leads to tactical success, the strategic battle will be lost. So, triggering technique should always be “unconscious” in some way.

The further rules which should support a tendency to "unconscious" shooting:

The urge to end the triggering during a favorable aiming period can be defeated if the shooter is sure that the aiming will not be destroyed in the next few moments. In other words, if he/she is confident in the reliability of his/her shooting position.

This confidence is gained through regular training. Exercises of special and general physical training can accelerate the improvement.

The study of the relationship between aiming and triggering of young athletes has shown that in most cases the movement of the pistol during aiming deteriorates with the beginning of the triggering. The reasons for this are psychological. Hence another rule based on shooting experience:

If the aiming becomes so good that you want to shoot at this moment, then it is already too late to start triggering. The triggering should be started before the aiming is perfect.

Follow through.

Since the good scoring is a matter of discipline, the first reason for extending the technique after the shot can be identified by the school rule: “the bell at the end of the lesson is for the teacher, not for the students”. And the teacher, probably, is the one who determines finally value of the shot. So if you are good boy/girl, your score will be good.

Of course, the above reason can not be taken seriously but it is no worse than usual statement from tutors that the bullet needs a time to leave the barrel. The bullet is throwing out with exact time of a quality machine. A human being can not operate with such precision and his/her acquired skills work with much greater range of errors. If shooter have gained a habit to stop the completion just as soon as he/she sees the sights moved by recoil and hears sound of a propelling charge, be sure that sometimes controls will be stopped just before firing. Just because of the human's range of errors. So the technique should be stopped when the shooter has evaluated quality of the completed technical cycle. This is a guarantee that he is out of dangerous range.

The moment when the shot is fired is an important, emotional moment. As with any exciting moment, the subconscious of the shooter can do all sorts of unexpected tricks. In addition, the release of the trigger mechanism and recoil of the pistol disrupt fine sensations. These are mechanical interferences and they cannot be avoided. So, how can the shooter figure out what happened at this critical moment, or how can be sure that nothing bad happened? It can be done by following the technique through the shot and comparing the feeling "before" and "after". If the trigger finger moves in the same way after the shot as before, then everything is in order with the trigger. If the sensations in the muscles are the same, and the recoil is clear, then the stance is in order. Your impressions and feelings after the shot are valuable evidence of what has happened. When you put pistol down, many materials for the analysis will be destroyed. So analyze it when you have most of the evidence in your hands! *The work can be considered as complete after evaluating what has been done, identifying mistakes if they were obvious, and collecting evidences of happenings if there was a bad score in the absence of obvious errors.*

Let's list this in more detail. Everything must be checked from end to beginning. First, the sight picture should be recalled, and focus of the eye should be noted. Then the movement of the triggering finger: is it still moving? Then the body reaction to recoil should be thought over and the pistol should be returned back to the sighting area. Control upon the shooting stance should be regained. Then the location of this hit in the target should be estimated. After that look at a monitor or through a telescope and compare this estimation with the actual hit. If you didn't feel the recoil of the pistol, the trigger finger was inactive after the shot, the aiming eye saw the pellet fly towards the target, and regaining control of the stance required a change in muscle tension or body movement, you are probably in for an unpleasant

surprise at the target. It can only be worse if you blinked at the moment of shot.

As opposite, if the recoil was soft and felt not only by the hand, but also by the upper part of the body, the finger continued to press the trigger blade, you clearly recorded a slight movement of the sights, caused only by the recoil, and the body returned to its original position by itself, without your conscious correction. The shot is sure to go where you were aiming.

The follow through is very important for the improvement of the athletes in many aspects, but it is most important for the stance control. The recoil of air pistol is light, it is not serious to talk about violation of the posture due to recoil. However, recoil can teach. The shooting stance is a multi-linked system which cannot be controlled consciously as a whole. Acquiring correct skills is very important. Repeatedly returning the pistol displaced by recoil into sight, assuming the initial shooting posture, you can bring this action to skill and be only a witness to how the body itself returns to its initial place after the push of the pistol. Like a spring. The small-bore pistols (free pistol, standard pistol) are better suited for such learning.

The arbitrary attention in shooting technique.

It is important how the athlete manages his/her attention during the shooting. The efficiency of performance depends on this management. The shooting practice requires maximum concentration. There are some things that need to be checked before lifting the pistol, there are others that need to be carefully followed for an accurate performance.

When the athlete starts to prepare the next shot, attention shifts from one element to another. This check list should be repeated from shot to shot. The most important is not to forget anything. Such shift in attention should be maintained with athlete's improvement. As the shooter acquires skills and abilities, some elements no longer require special attention. Other elements of a higher level take their places. But there will be always something that needs attention.

However, switching is not the only property of attention which we can note in shooting techniques. When a shooter starts the triggering, the attention should be distributed. Distribution of attention between triggering and some elements of shooting position (gripping, aiming, feeling of the various muscles) is necessary.

The shooter is advised for simultaneous control of the triggering and some elements of the shooting position from the very beginning of practice. This usually starts with pulling the trigger and the positioning of the front sight in the rear sight. The composition of the controls and the controlled elements

can be changed, but in general this scheme will be preserved – the shooter should pay attention to the trigger control and to something from the system “shooting position”.

Theoretically, the management of arbitrary attention during shooting looks simply. It's enough to find a technical element that requires constant conscious control, and keep your eye on it throughout the entire performance cycle. In practice, however, it is not so simple. There are things that inevitably attract the shooter and destroy the attentive control. And these attractions become stronger the more the shooter is motivated to achieve the goal. I can name two factors. The first is the brightest and most readable part of the sighting picture: the position of the pistol's sights on the target. The second is the trigger point, which is associated in consciousness with the movement of the pulling finger. In addition to the undeniable importance of the moment of the shot, the sensation of the trigger pulling differs from the other muscular sensations of the shooter because *it is a movement*. It is incomparable: bright feeling of important movement is coming from the triggering finger and just subtle static signals are emitted from other muscles. The classical shooting technique tries to close these paths of attention drain: the focus of the aiming eye and attention is advised to concentrate on the front sight, without being distracted by the target; the movement of the finger should be slow and organized in such a way that the shot occurs unconsciously. This is an attempt not only to reduce the psychological stress on the athlete, but also to reduce the perception of the mentioned distractions.

So, what happens if the “drainage paths” of shooter’s attention are not closed enough or in the other words, he/she is insufficiently concentrated on the recommended elements? These are problems all shooters are familiar with. The finger stiffens on the trigger blade and the release becomes extremely difficult. It is also the cause group of another errors called "jerking", "flinching" and so on.

So, the following conclusion is suggested: *the shooting technique will be most reliable if the shooter performs two parallel, independent actions: one is to aim, keeping the pistol as stable as possible, and the second is to pull the trigger. The overlap in consciousness of the goals of these actions creates the potential risk of failure.*

Of course, it is impossible to implement this hypothesis. But it can guide efforts to improve the reliability or stability of an athlete's performance.

There is a popular controversy among shooters: what is the main thing in shooting? Weapon stability when aiming or skills in triggering? In my opinion, this dispute does not make sense. You can save up a huge amount, but throw everything in the trash can, without being able to spend it. You can

also be very clever in investments, but not have a penny to heart. So, these skills are equal in value. However, *if we compare the availability of current information about the state of these two components of technique, we can find that in order to distribute the control efforts equally between them, more attention must be deliberately paid to the shooting stance.* Attention will run away to the pressing finger by itself. Vague sensations from the holding muscles cannot be compared with the vivid, psychologically significant sensation of a finger moving towards the trigger point.

Another property of voluntary attention that must be taken into account when constructing a pistol shooting technique is the impossibility of its prolonged concentration, the so-called "fluctuation". The maximum duration of concentration depends on many reasons, including the current motivation. *It should be kept in mind that a technique that involves the distribution and concentration of attention for 10 seconds or more cannot be reliable because it is on the verge of human capabilities.* It is very likely that in most shots a shooter using this technical model will lose the ability to distribute and concentrate by the time of the shot due to fatigue, unless there are extraordinary reasons that motivate him/her to success. On the other hand, if the shooter's technique involves distributing attention for just a few seconds, this raises doubts on the possibility of an "unconscious" completion of the shot. You have to choose.

IMPROVEMENT OF THE SHOOTING TECHNIQUE.

Elements of shooting technique that required attention and control at the beginning of shooting practice, become acquired skills over time. But they are going to be replaced by other elements which again require attention and control. Mastery is skill-based, but always requires conscious contribution. Some topics related to athlete improvement are worth discussing.

Visual aiming. Some may ask, "Is there anything about visual aiming that could be improved?". Yes, this is an important element and should not be underestimated. Visual aiming is an indicator of the stability of the pistol while aiming. The shooter should learn how to read this indicator and understand it correctly. This is important for evaluating the performance and matching "call of shot" and actual hit.

The SCATT system is very effective in generating a correct estimation of pistol movements while aiming. It provides immediate and reliable information. But we cannot obtain such information during competitions. However, the condition of the athlete significantly affects the perception of movements. The stability of the pistol seems to the stressed athlete worse

than it really is. The psychological state is changed and perception of the same movements is more "pessimistic" than before.

An example is a situation familiar to many experienced shooters. The beginning of the competition qualification is always stressing, it is considered to be challenging period of the competition. So, when the first series or two have been successfully done, the excitement has subsided and the visual stability of the pistol has improved, the shooter starts scoring "nines" instead of "tens". This is caused by the athlete's nervous system changing from sympathetic to parasympathetic state. Adrenaline and other stress hormones diminish. Speed of reaction also decreases and the shooter simply stops noticing sight movements that seemed significant ten shots earlier. The trouble came when it was not expected.

Many experts consider the stability of a pistol when aiming in two categories: general stability and stability in the period close to the moment of the shot. In the SCATT simulator's software, the second category is indicated by a short segment of the trajectory adjacent to the trigger release. The simulator provides general assessment and allows to compare with other factors. But this applies to practice on the device. To improve effectively, the shooter should be able to notice particularities of performance without it. Transfer of experience to competitive shooting is of paramount importance.

"Aggressive" struggling for stability when aiming can be an example of a wrong reaction from a shooter who is dissatisfied with the visual stability of the pistol. Forgetting the importance of the final aiming stage can lead to errors such as accelerating the trigger and trying to correct the aim at the last moment. If it is noticed, the shooter should be advised to re-evaluate the risks and think about "unconscious" technique as best care of stability in period close to the shot.

Shooting position – this is a complex system, the improvement of it is laborious due to the large number of its components. *The shooting position should provide accurate orientation, reliable holding and stability of pistol when shooting.*

There are well-known special physical exercises that accelerate the improvement of the shooting stance: holding dumbbells or stretching elastic bands. However, such exercises can harm the normal development of shooting technique because they destroy the fine feelings of the muscles. In addition, prolonged holding of weights is unacceptable for athletes under 18 years of age. It is better to train with a pistol and the hold time should not exceed one minute.

An element of special physical training is present every time when the shooter raises the pistol. Even if athlete didn't shoot, dissatisfied with something, small brick was added in a large structure of the future stance.

What is most important when improving your shooting position? The first priority is to learn how to lock the wrist joint. Next is the consistency of forces on the pistol grip and the associated autonomous movement of the finger on the trigger. Wrist lock can be acquired as a skill over time, but making the trigger pull an acquired skill is not so easy. It is too psychologically significant an action for the shooter.

Actually, the gripping and wrist are the special elements in the shooting position structure. Some experts claim that these elements account for more than half of all the errors that occur in pistol shooting. I do not know how this can be calculated, but any experienced shooter could confirm that there are indeed many mistakes. This part of the shooting position primarily requires attention of shooter.

It is important how the shooter organizes arbitrary attention to control performance. From the very beginning of pistol shooting practice, shooters are advised to distribute their attention between two elements of the technique: trigger control and aiming, which is a part of the shooting position. Distribution of attention continues to be an important task throughout the improvement process. Indeed, in addition to creating the best stability of the gun when aiming, *the good shooting stance should give the shooter confidence that good stability will last long enough and nothing threatens an accurate shot*. There should be a feeling of control over the hold, feeling that can give confidence that the aiming is reliable. To achieve it, a share of the attention should be paid to the muscles holding the position. A skilled shooter pulls the trigger aiming and also controlling the position. Of course, not entire position but some part of it. The first experience of that kind can be the control over the muscles holding the grip and simultaneous control over the triggering finger.

It should be noted that the sensations received from the muscles of the posture are not "vivid" and athlete is subconsciously pushed to consider them as less important, compared to the movements of the sight on the target and triggering. Conscious efforts are required to maintain focus on the tone of muscles during shooting. These efforts are important because attention subconsciously tends to the sights and trigger point. However, these efforts are a way of gaining confidence in stable and reliable aiming.

The follow through helps to gain an efficient control over the shooting stance. It should be ended after the shooter's body absorbs the recoil, returns to its initial position and the technique has been analyzed. To work out the correct reaction to recoil, the shooter should return the sights back to the

sighting area after each shot. This skill will be acquired over time and the body will be regaining its initial position after each recoil without conscious control, like a spring. Experience in 25-meter standard pistol shooting can help. The pairs of shots in 150 second series or entire 20 second series can get a feel how to control the stance most efficiently. Recoil is a good tool for checking the shooting position's skills. Experience in 25 and 50-meter events helps to gain good shooting technique also in 10-meter air pistol, which is almost recoilless.

It is recommended to transfer the position control experience from one shooting event to another. It makes no sense to radically change the position, going from range to range and from target to target. It can destroy the gained skills and gained schemes of control. Below are examples of the rational use of their own experience by qualified shooters.



Pic. 23

This athlete definitely likes the rapid fire shooting. He is world champion in junior category. His shooting position is typical for that shooting event. However, he earned an Olympic quota place for his country in the air pistol event at the World Championship in Changwon.



Pic. 24



Pic.25

The shooting position of this athlete is not typical for the rapid fire shooters: the right shoulder is lowered, there are no signs of significant efforts to counteract the recoil. He has to be good at slow shooting, and he is. However, he is the winner of the rapid fire pistol event at the Olympic Games in Rio 2016.

Trigger control. The triggering movement itself shouldn't be difficult for a healthy person. Moving the trigger with finger with one-kilo force is not a problem. The significance of this action can affect the athlete psychologically, so the reasons for the difficulties in triggering are psychological. Accordingly, improving trigger control should not be about reinforcing the finger, but about defining its role, choosing the most favorable method and coordinating the trigger with other elements of the technique.

"Unconscious" shooting is considered to be effective when looking at average values. Even if some "conscious" shots are successful, such technique cannot be accepted as a basic one because it increases risks and pressure on the athlete. On the other hand, it is not serious to say that every shot should be sudden for the shooter. How many times can you walk through the same dark room stumbling down the steps in front of the door? I think a limited number of times. Therefore, it is logical that in order to cope with psychological disturbances, psychological solutions should be found. The shooter should not wait for the shot, should not anticipate it, should not be afraid of failure and should take reasonable risks. Accordingly, it is necessary to select a triggering style that would allow the shooter to create desired attitude.

It was said above, that if desired aiming has already been achieved, it is too late to *start* triggering. Good sighting picture should be a sign that process is close to completion. Overtimed aiming isn't that good either. The athlete's concentration deteriorates, muscles and eyes get tired, and so on. The shot should be fired at a time when all involved systems are in best conditions. Thus, ways to improve triggering can be found in determining the start time,

duration, pulling speed, etc., while trying to create favorable conditions for the accuracy of the shot at this time.

A good tip for trigger control improvement is - not to "squeeze the trigger" but to "bend the finger". That is, to reorient the trigger control from the tactile receptors of the skin to the feeling of movement of the muscles flexing the finger. Of course, it is impossible to completely get rid of tactile sensations, but switching some of the attention to the muscles can help to gain control over the movement. It will be clearer when the finger is moving and when it is stuck. In turn, this will help to create a complex feeling of the grip-holding hand and the autonomy of the finger moving the trigger.

Training tasks with limited time spent in the aiming area are useful. For example, a shot must be fired no later than 4-5 seconds after the pistol arrives on the aiming area, or even faster, but the triggering rhythm must remain the same.

In the rapid fire, the shooter should try to shoot immediately after arriving at the aiming area or even at the moment of arrival, with smooth, gradual triggering without accelerations. Training tasks like these are good for improving the shooting technique and developing triggering skills.

Reviewing your own competitive experience is very important. It is obvious that the athlete is working out the technique for the competition. However, you should pay attention to which techniques bring success and which are difficult to implement. There is no point in training something that cannot be used in competition. First of all, it concerns the triggering style. Analyzing performances at competitions, athlete should choose the most effective style and improve it in training. It is a waste of time to develop methods that give excellent results in training, but are unreliable in stressful conditions.

"Dry shooting" (simulation of shooting without ammunition) is very valuable kind of training. There is no psychological pressure caused by shot and its result. There is no mechanical disturbance to the shooter caused by release of propelling charge throwing out a pellet. Comparing to real shooting "dry shooting" is simplified in a way. However, part of athlete's mental resources is released and may be used in other areas. Technical tasks set for "dry training" can be more complicated than those for shooting practice. The coordination between different elements of technique is the best to develop and improve in "dry training". In some periods, most effective training program may contain several times more "dry training" than shooting. However, the necessary condition for effective training without ammunition is motivation of an athlete to improve his/her technique. The quality of technical performance shouldn't be lost.

PREPARATION PLANNING AND TRAINING LOG.

The main goal of planning in sport is to set training objectives and priorities in the right order. Achievable short-term goals help to improve the shooting skills. Planning long-term training in periods can help avoid overtraining, physical and mental exhaustion. A detailed plan for each training session and a performance report in the shooting diary helps to correct technical issues and improves self-discipline. It is the most important, because the result in shooting is a matter of self-discipline: repeat it correctly every time and the hits will be grouped close to each other.

Ideally, the planned periods and cycles should coincide with the natural psychophysiological processes in the athlete's body and correspond to the individual characteristics. The most effective training is when one wants to shoot and the most successful tournament is when one wants to compete. The athlete should take part in planning because he or she has to implement it later.

Rational planning should prolong the athlete's shooting career. You can do a lot in life if you don't overexert yourself. In general, the full cycle looks quite simple: rest - gaining strength - acquiring skills - competition - rest again ... Accordingly: rest period - preparatory period - pre-competition period - competition period - rest period, and so on. This cycle should be repeated as many times as there are significant competitions in the calendar, with the necessary amendments.

Rest period. This is not only a period of active and passive rest, but also the time to resolve the accumulated issues: a medical examination, a new pistol, a new grip, selection of ammunition, etc. During this period, it is better to start active physical training in order to be in good shape for the preparatory period, when training with pistol begins.

Preparatory period. During this period, the athlete needs to improve the qualities that will be required to improve the competition results in the upcoming season. Active physical exercises should be continued. Only during this period large loads of special physical training are advisable. Attention should be paid to general and specific endurance. During this period, training to exhaustion is acceptable, if necessary.

Pre-competition period. During this period, all issues related to participation in the upcoming competition should be resolved. The load of general physical fitness should be moderate: fine sensations in the muscles are very important. Special physical preparation should also be reduced. It is enough to practice for 2-3 hours per day, if there are no serious reasons to

exercise longer. *Remember that unlike other types of shooting, the pistol shooter holds the pistol outstretched without any support. This is a significant muscle strain, and overtraining can have serious consequences.* There should be a sufficient number of rest days, the athlete has to enter the competition psychologically fresh. Certain technical points should be identified: what should be constantly monitored, what should be periodically checked, what tactics should be followed. An appropriate psychological attitude should be formed.

The content of the training sessions of the pre-competition period should be considered carefully. Psychologically intense shooting is necessary for the shooter in the pre-competition period. If it is not provided, the change in conditions will be severe and the success of the competition may be jeopardized. Of course, the atmosphere of serious competitions cannot be simulated in training but you have to try.

However, training should not only consist of competition simulations. There should be time for “free practice” when the athlete can shoot on his own and analyze recent shooting errors.

Also, it shouldn't be forgotten that it is easier for the shooter to act from scratch, and not repeat some past achievements. If competition task consists of certain number of points, this creates additional pressure. Frequent repetition of the competition program in the period close to the competition should be avoided.

Training log as a method of improvement and planning. Sports log disciplines the athlete. Written assessments of actions differ greatly in the level of responsibility compared to unspoken thoughts or a few phrases said during training. Taking a relatively short time, the marks and grades in the shooting log provide a lot of information for the coach to analyze.

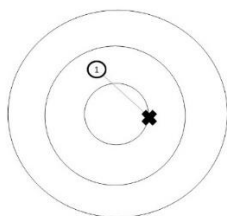
There is information that simply needs to be saved. For example, the brand and batch of cartridges or pellets used. The precision test, of course, is a very reliable selection criteria, but it still happens sometimes that the cartridges selected by testing are scoring worse than others that were not noticed during the selection.

It is also necessary to record information related to the shooter's well-being and some aspects of the shooter's mood, such as the desire to train and compete. Analysis of this information can help in planning.

It is necessary to record the results of shooting sessions with a maximum score guideline. This is an important indicator of the overall growth of a shooter's mastership. Analyzing the scores, athlete can see what was achieved and what he/she should strive for. Frequent tests according to the program of the competition are not necessary for that. The athlete can calculate the

average for all games, tournaments, tasks completions and depict it as a conditional result, or even one shot. For example, an average of 9.5 corresponds to 570 points out of 60 shots, and 9.7 corresponds to 582.

It is advisable to constantly mark the calls of the shots. This provides invaluable experience in evaluating errors. The quality indicator is the distance between the provisional mark and the place of the actual hit. An example of how to do this in the log can be found in Pic. 31. After the shot, the shooter marks the predicted hit point on the drawing of target with a cross. After that, he/she looks at the monitor or through the spotting scope and puts a small circle where the hit is actually located. The circle is numbered according to the shot number. Then the marks should be connected with a line. So, the first couple looks like this:



Pic.26

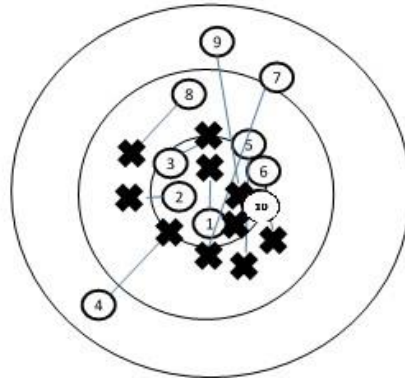
The following scheme is recommended to record the performance of training tasks:

The shooter writes to the log the contents of the tasks and the accompanying elements. He draws a table with the number of columns by the number of shots and the number of rows by the number of reporting items. After each shot, he marks the call for that shot and gives a grade for each element. An example of such a table is shown in the picture below:

EXAMPLE OF DATA ENTRIES ON THE PERFORMANCE TASKs IN THE ATHLETE'S LOG

1. Have you controlled position of the front sight in the rear sight until the very end of aiming? (x - yes; - - no; o - uncertain)
2. Did you feel in control of the grip and trigger after the shot? (x - yes; - - no; o - uncertain)
3. Are you satisfied with the feeling of recoil? (x - yes; - - no; o - I didn't paid attention to it)
4. Have you started the triggering in time (x - yes; - - no; o - uncertain)

	1	2	3	4	5	6	7	8	9	10	
1	X	X	X	X	O	X	X	X	O	X	
2	X	X	X	O	X	O	O	O	O	X	
3	X	O	X	O	O	O	O	—	O	X	
4	X	O	X	—	O	—	O	O	—	X	
SCORE	10	10	10	8	10	10	9	9	8	10	94



Pic.27

24.01.2023