Battlesight zero in context of counter UAV engagement

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Abstract:

Introduction/purpose: This paper explores the optimal zeroing distance for an assault rifle on the modern battlefield. Traditionally, armies have used sight settings that align the projectile's trajectory with the line of sight at distances of 25 m and 300 m. This configuration is well suited for assault rifles chambered in 7 mm to 8 mm calibers when fired from the prone position at an approaching figure target. However, with the increasing use of smaller-caliber ammunition (5 mm to 6 mm) and evolving battlefield threats, including drones, it is necessary to reassess this traditional approach. This study investigates the optimal first zeroing distance when engaging both drone-type targets and standard NATO Type E figure targets. All tests and configurations were conducted using the BREN 2 assault rifle used by the Czech Army.

Methods: This study uses probability-of-hit simulation methods. The parameters of the BREN 2 weapon under investigation were experimentally verified.

Results: The probability of hitting a point target depends significantly on the setting of the sight zeroing distance. The greater the deviation of the projectile trajectory from the line of sight, the lower the probability of hitting the target without distance adjustment.

Conclusion: The findings suggest that for engaging small, irregular targets such as UAVs, zeroing distances between 50 m and 100 m are more effective, without compromising combat effectiveness against standard figure targets.

Key words: hit probability, collimator sight, zeroing, point blank range, BREN 2.

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Introduction

The probability of hitting a target is one of the basic prerequisites for successful engagement by fire. Hit probability has been a concern of most armies in the past, whether for training plans, ammunition consumption norms, or tactical and logistical requirements. When firing a small arm, the critical factors affecting the probability of hitting a target are the dispersion characteristics of the weapon-shooter-ammunition system and knowledge of the range of fire. Historically, small arms (rifles, assault rifles, machine guns, and rarely pistols) were equipped with adjustable mechanical sights (Faust, 2021). Mechanical sights allowed the shooter to adjust the firing distance so that the bullet's mean flight path passed through the target. In practice, this meant that the shooter either estimated the distance and adjusted it on the gun before firing or fired with the setting he had been trained to and adjusted the aiming point. Some types of military weapons were equipped with so-called battle sight settings. The battle sight is used for a immediate firing at close targets, regardless of the distance. Rifles used in both WW I and WW II allowed for adjustments to extreme shooting distances, where the target was usually no longer visible. Lessons learned from WW II combat led to the development of a new type of assault weapon called the assault rifle. It was found that the firing range only exceptionally exceeded 300 m, and that most combat use took place at distances of less than 200 m (Hitchman, 1952). The use of full-size rifle ammunition at these distances was a waste of the potential of this ammunition, which also excessively burdens the shooter. Furthermore, the weight of ammunition limits the volume of ammunition carried. An assault rifle is defined as a select-fire long weapon with a detachable magazine using a reduced rifle cartridge. The effective aimed range of assault rifles is declared to be 300-400 m. Mechanical sights could usually be set up to 900 m. Assault rifles made extensive use of the battle sight or universal sight setting, which utilized a ballistic principle known as the point-blank range. The point-blank range is the distance over which the bullet's flight path does not overshoot the target. In practice, this means that a target of a given size can be shot without changing the sight setting, and at this distance the bullet's flight path will pass through at least part of the target.

The point-blank range was usually related to the specific target. In the case of the AK-47, it was the height of the human figure, and the point-blank range was considered to be 300 m (Chivers, 2010). With the transition to the micro-caliber ammunition used in modern assault rifles, the trend of using point-blank range has become even more pronounced. The modern 5.56x45 NATO or 5.45x39 ammunition has a significantly flatter trajectory at the start of the flight path than the 6-8 mm caliber ammunition used previously. A further contributing factor was the introduction of collimator sights, which generally cannot be easily and effectively reset to the desired range. Thus, they are usually set to the distance of the point-blank range (Blish, 2008).

Most infantry shooters conduct their fire in a "point-and-shoot" style of fire. This approach works well for firing at figure targets or at known targets at known ranges, where the shooter already knows from experience how to transfer fire (training shooting at a known range) (UNOB, 2024). On the modern battlefield, small unmanned aerial vehicles (UAVs) are appearing on a mass scale. In combat operations, it is sometimes necessary to shoot at these targets as well. It is therefore appropriate to revise the infantry weapons requirements so that they are able to engage these 'point targets'. The simplest cost-effective of an established assault rifle for firing at these types of targets is to change the weapon's rectification.

Zeroing of assault rifle

Rectification is an essential step in preparing a weapon for firing. The terms rectification and zeroing are very often used synonymously in shooting terminology. In fact, rectification is the broader term, as it is the general process of bringing the barrel bore axis to a defined position relative to a reference position (optical line of sight, level, gyrocompass etc.). Zeroing is a more specific term applied to direct-fire weapons, where the reference position is the optical line of sight. When zeroing small arms, the final step in the zeroing process is to verify the correctness of the zeroing by firing. The firing of the weapon is performed at a precisely known distance, usually at a rectification target. Firing during zeroing of the weapon is conducted from the most stable firing position e.g., the prone position with support or from a shooting bench (U.S. Army, 1981; USMC, 2001). Schematically, the flight path of the projectile is shown in Figure 1.

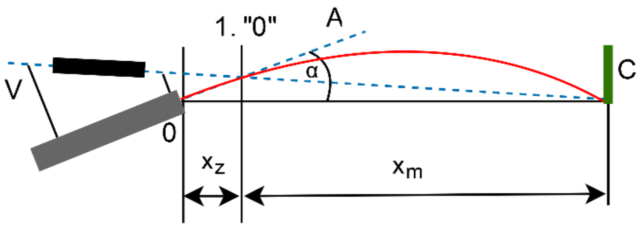


Figure 1 - Zeroing distance

It is clear from the figure that the bullet's flight path intersects the optical line of sight at two points (planes). For practical reasons, the so-called first zeroing plane (1."0") is most often used. In the figure, the first zeroing plane is shown at a distance x_z, which corresponds to the point-blank range for a human-sized target C up to distance x_m. This means that target C will be hit at any distance up to x_m when aiming at its lower edge.

The most common zeroing distances are 25, 50 and 100 m (Cooper, 2020; HogoNext, 2024). The 25 m range is often used for military applications and close combat situations. It is reported that the second zeroing distance is approximately at 250 m with this setting. This dogma is so firmly established in some militaries that it carries over to other types of weapons to which this rule does not fully apply. This traditionalism is one of the reasons for the implementation of this work (AČR, 2010).

The 50 m zeroing range is commonly regarded as a compromise for short and medium range shooting. The 100 m distance is used for sport shooting at a fixed, known target distance, or for competitive tactical shooting, where standard sized targets at known distances are used (Wohn, 2019; Clecker, 2020; Cooper, 2020).

One of the critical inputs determining the position of the first zeroing plane, apart from the actual ballistics of the projectile, is the position of the optical sight relative to the axis of the barrel bore. In modern assault rifles, the optical line of sight is determined by means of a collimator sight. This sight is either integrated into the weapon or, more usually, attached to the mounting interface on the weapon chassis above the barrel. The distance between the axis of the barrel bore and the line of sight is called parallax. This paper examines the Bren 2 assault rifle, which uses an Aimpoint collimator sight with a parallax of 8 cm (Česká zbrojovka, 2025).

Dispersion of fire

To calculate or model the probability of hitting a target, it is necessary to obtain information about the dispersion characteristics of a specific weapon system. For the BREN 2 assault rifle chambered in 5.56×45 mm NATO with SS109 ammunition, the dispersion data used in this work were obtained experimentally at the Department of Arms and Ammunition, University of Defence. The measurements were carried out during the international experimental shooting event Hard-Kill 2024 and can be considered indicative values.

Table 1 - Dispersion of Bren 2 rifle at 100m distance

Standing – free hand	Prone – with rest
σ_x =0.096 m σ_y =0.103 m	σ_x =0.026 m σ_y =0.030 m

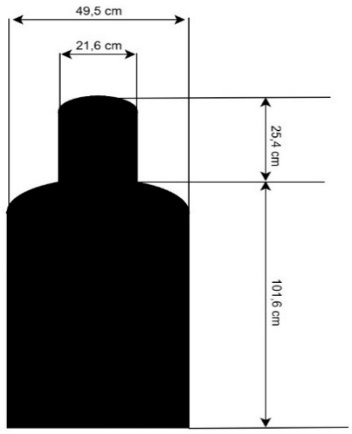
The characteristics used correspond to the dispersion of very good shooters. The obtained dispersion characteristics are listed in meters for a distance of 100 m. That is, at a distance of 100 m, the standard deviation σ_x is 0.096 m. The same applies to other standard deviations. By comparing the obtained dispersion characteristics with the known dispersions of weapons for which firing tables are available, it can be concluded that up to a distance of 400 m the dispersion characteristics can be linearized. Furthermore, from a comparison of the tabulated dispersion characteristics of the AK-74 rifle and the experimentally obtained dispersion characteristics of the BREN 2 rifle, it can be concluded that these characteristics are comparable (USSR, 1977). For the purposes of this work, no additional individual shooter or weapon error was considered. As a result, the obtained hit probabilities are very high compared to real-world experiences. During the Hard-Kill 2024 experimental shooting tests, shooters achieved hits on the drone silhouette with only 14% of their shots when firing from a standing position at a distance of 100 m. Simulated firing under the same conditions yielded a hit probability of 19% (UNOB, 2024).

Hit probability simulation

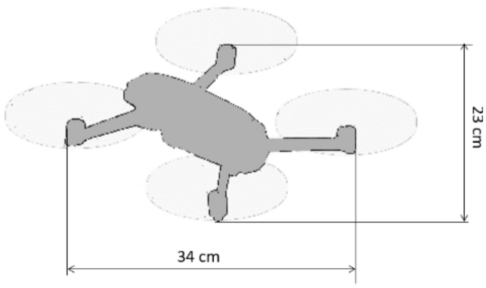
Two types of targets were chosen for the hit probability analysis. The first target is the standard NATO type E target widely used for practice shooting in many armed forces (U.S. Army, 2016). The second one is a self-designed "drone silhouette" target designed for use in previous publications (Pemčák et al., 2022).

The type E target represents a forward-facing running figure. This type of target is often used in scenarios with multiple figures appearing and representing attacking infantry. The “drone silhouette” target was developed for training purposes in anti-drone defense. The body of the drone is deliberately designed with low contrast against a white background, with a contrast of k=0.3. The probability of hitting a drone propeller has been examined in previous articles (Pemčák et al., 2023). When the rotor area is hit, the probability of striking the propeller is estimated to be approximately 0.15. Furthermore, a single hit to a propeller blade has a conditional probability of disabling the aircraft of only about

0.3. For this reason, the rotor areas shown on the target are not used to determine the probability of a drone hit.



NATO E-type



Drone silluethe

Figure 2 - Examined targets

The hit probability was determined using a stochastic simulation based on Monte Carlo principles. Shot dispersion was modeled using normally distributed random values, generated by a pseudorandom number generator based on the Mersenne Twister algorithm. The dispersion of shots is modeled as a two-dimensional normal distribution centered on the aim point. The standard deviation of the distribution, which reflects the accuracy of the weapon system, is based on empirical dispersion values listed in Table 1. The simulation was conducted over a range of distances from 0 to 400 m, with a step of 1 m. At each distance, 10,000 independent trials (shots) were simulated toward the target under investigation. This sample size ensures sufficient statistical reliability of the results. The simulation follows a binomial distribution, where only two outcomes are possible — hit or miss. For such binary events (e.g., success/failure), an approximate normal confidence interval can be applied when the number of trials is sufficiently large. The number of experiments is based on the classical interval estimation theory for the proportion in the Bernoulli distribution and relies on the central limit theorem (Gross, 2019). The number of experiments is then given by the relation:

$$n = \frac{z^2 \cdot p(1-p)}{\varepsilon^2} \tag{1}$$

z is quantile of normal distribution (for 95%, z = 1.96)

ε is the desired maximum estimation error (half the width of the confidence interval)

p is probability of success of experiment

Calculating for 95% confidence of the estimate with a maximum error of ε=1% we get:

$$n = \frac{1.96^2 \cdot 0.5 \cdot 0.5}{0.01^2} \approx 9604$$

The realized number of experiments (shots) in each step, n = 10,000, exceeds the minimum required sample size of 9,604 trials to achieve a 95% confidence level with a maximum margin of error of 1%. For the generation of hit probability the experimentally obtained dispersion characteristics of the Bren 2 assault rifle are used. Simulated shots are generated in accordance with a normal distribution, with the mean value positioned point of aim. For the E-type target, the point of aim was placed at the center mass of the torso (the upper third of the target height). The point of aim for the drone target was at the geometric center of the target.

Two firing positions are considered in this paper. The first is the standing firing position without weapon support. The second firing position is the prone position with support. These are two very different yet widely used positions. The standing position is a tactical posture used by the shooter during brief halts in combat. It is one of the least stable positions but it allows for rapid movement and transfer of fire. On the other hand, the prone position with support is the most stable shooting position and is used for precision fire, for example, in defensive positions.

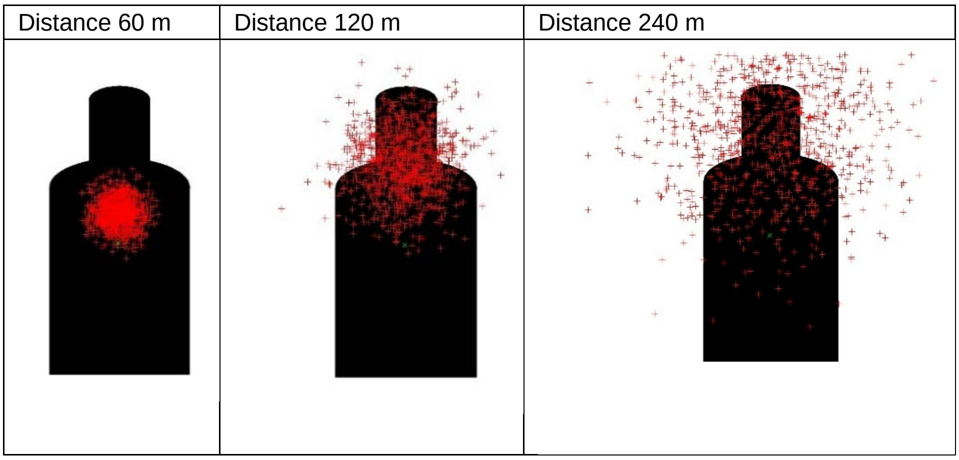


Figure 3 - Difference in size and position of hit pattern

Firing at a single target at distances from 0 to 400 m was simulated using the described model. For illustration, Figure 3 shows simulations of firing at NATO type E target at three different distances, with the first zeroing distance set at 20 m.

The effect of increasing distance is clearly visible in the figure. A shift in the center of the hit pattern is observed, assuming constant aiming at the center of the target. There is also an increase in the dispersion pattern as the distance increases. Each simulation configuration (target, range, target type) was generated for different sight zeroing ranges. The zeroing distances (first zeroing range) were set in the range of 20 to 50 m with 5 m increments, with an additional setting at 100 m.

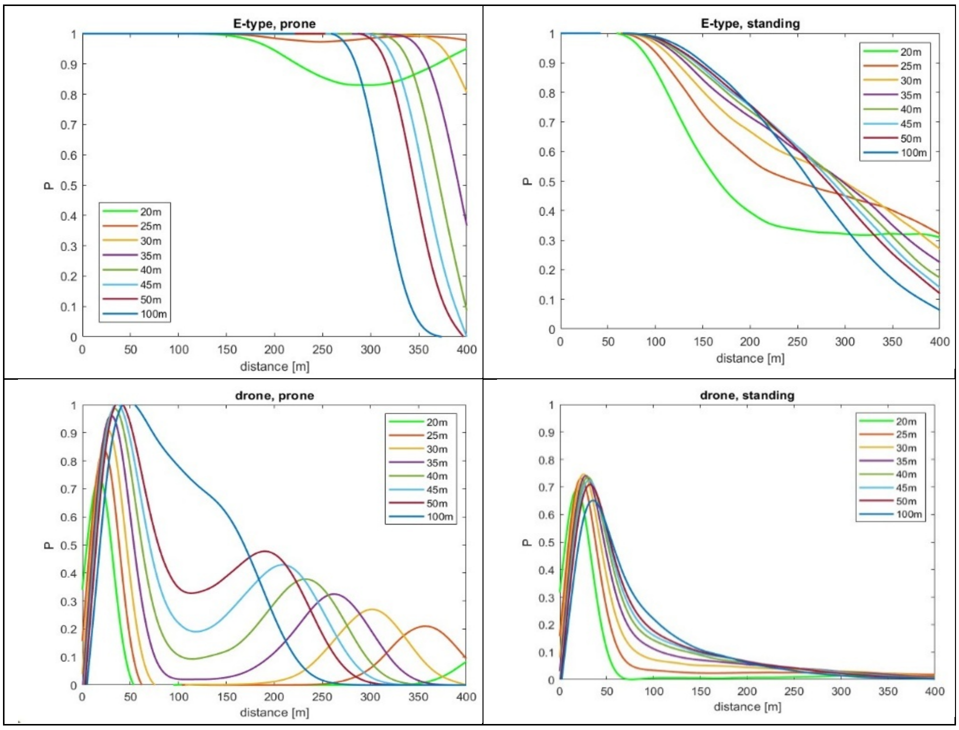


Figure 4 - Hit probabilities

It is usually assumed that the probability of hitting a target decreases with increasing distance and consequently with increasing dispersion. The graphs showing the probability of hitting a target when shooting from the standing position are consistent with this assumption. However, graphs of the probability of hitting a target when shooting from the prone position (i.e., precision aiming) show an uncharacteristic decrease and subsequent increase in hit probability for some settings of first zeroing distance settings. This phenomenon is caused by the elevation and depression of the projectile's flight path compared to the optical line of sight, when on the downward portion of the trajectory, sufficiently small projectile dispersion is maintained. Furthermore, it can be observed that when shooting at a drone, the probability curve starts at zero and then sharply increases to its maximum value. This effect is caused by the parallax of the optical sight and the axis of the barrel bore, where the parallax exceeds the distance of the aiming point from the edge of the target.

The magnitude of the elevation (or decrease) of the projectile's flight path compared to the optical line of sight is shown in Figure 5 for each considered sight setting.

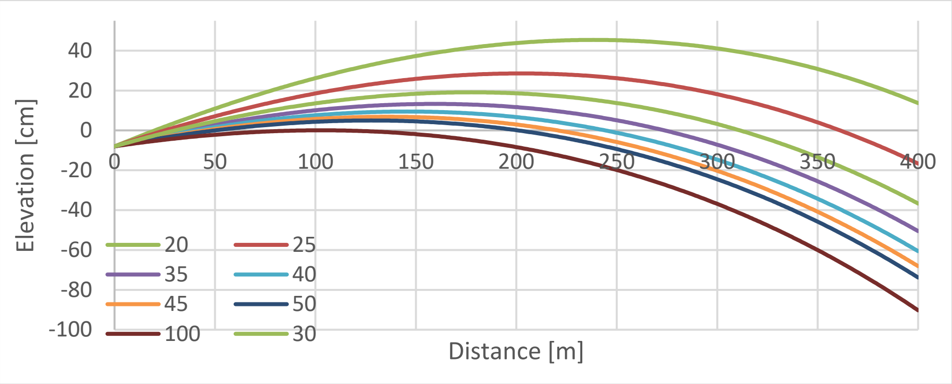


Figure 5 - Bullet flight path

Bullet trajectories were calculated using a freely available ballistic software tool that implements a standard external ballistic model based on Newtonian mechanics. The model accounts for aerodynamic drag using the G1 drag function. The equations of motion were solved numerically based on specified initial conditions, including muzzle velocity, ballistic coefficient, and environmental parameters. The weapon and ammunition parameters used in the analysis are listed below.

Cartridge:	5,56 x 45 NATO
Projectile weight:	4 g / 62 grs
Projectile type:	SS109
Ballistic coefficient G1	0,35
Initial projectile velocity	855 m/s

Parallax of optical sight 8 cm

The parameters of a normal atmosphere (200 m AMSL, 20°C, 0 m/s wind) have been used.

These parameters correspond to the BREN 2 assault rifle with an Aimpoint collimator and standard full-metal jacketed ammunition used by NATO forces. The mean bullet trajectory, and especially the elevation above the optical sight, were experimentally verified for 25 m and 50 m settings at the outdoor firing range of the Weapons and Munitions Department of the University of Defence (Čermák, 2025).

Optimalization

The process of evaluating the effectiveness of a shooting is generally assessed against one type of target. For assault rifles, the running-figure target is very frequently used, although individual armies may have slightly different shapes and target designations. For example, the U.S. Army refers to this target as Type E or L-7, while in the Czech Army this type of target is referred to as target No. 8. These targets are used because of their shape similarity to the expected target on the battlefield. In addition, the target's shape similarity to the expected enemy silhouette helps soldiers to train the muscle memory of shooting and suppresses the moral block of shooting at another person (Marshall, 2011). In assessing the suitability of a sight for universal use, hit probabilities for each sight setting will be compared across all examined targets. Therefore, the effectiveness of fire against both the drone-sized target and the type-E target will be studied at the same time. The expected maximal ranges and shooting conditions are given in Table 2. To evaluate shooting efficiency, a dimensionless unit is used, which can be referred to as the cumulative hit probability over a given range of distances. This unit is defined as:

$$C_i = \int_{d_{max}}^{0} P_i(x)dx \qquad (2)$$

Where C is cumulative probability of i-th setting of collimator sight with probability function Pi over distance from 0 to d_{max}, and where d_{max} is the maximum distance of simulated firing described in Table 2.

The cumulative probability represents the area under the function of the hit probability versus distance. For the examined targets, the value of the cumulative probability is calculated over only limited ranges, rather than over the entire interval under study. The ranges over which the C is calculated are depicted in Table 2. The drone-type target is considered to be engaged at ranges of up to 100 m from the standing position and up to 150 m when firing from the prone position. Firing from the prone position (or from a supported position) can be expected most often during police operations. It is unlikely that a soldier conducting combat operations would be able to detect and identify a drone-sized target at such distances, but this cannot be ruled out. Firing at a forward-running figure (E-type target) at a distance of 300 m (300 yards is also cited in the literature) is considered a basic shooting task. As already mentioned, this task is based on the lessons learned from WW II and the Vietnam War. On today's battlefields, this type of firing task may not be as common as it was in the past. Therefore, the long-established rules of weapon rectification in military use require re-evaluation. At the same time, it should be emphasized that at the time when 300 m was established as the optimal second firing plane, collimator sights were not yet massively employed. Thus, it was not possible to effectively "over-aim" over the target to compensate for the drop in the bullet trajectory at longer ranges. It was only possible to lower the aiming point on closer targets. When a collimator sight is applied to an assault rifle, the target is not obscured even when over-aiming. When firing at a figure target from the prone position, the sight setting does not affect the probability of a hit up to a distance of 250 m. Exceptions are sight settings with the first zeroing distance set to 20 m and 25 m, where the hit probability already decreases at these distances. For standing firing, the distance over which shooting results are not affected by the sight setting is up to 50 m.

Table 2 - Maximal distances of engagement

Target	Shooting position	dmax
Dron	Standing	100
	Prone with rest	150
Type-E	Standing	300
	Prone with rest	400

For the purpose of comparing the results, the measured C values were normalized. The normalized values of the cumulative probability C_n are calculated according to Eq:

$$C_n = \frac{C_i}{C_{max}} \tag{3}$$

Where C_i are the individual cumulative probabilities for a given shooting position and a given target and C_{max} is the highest value in the set of cumulative probabilities for a given shooting position and a given target.

Table 3 shows the zeroing distances that achieve the highest normalized cumulative hit probability for the examined firing positions and targets. Values 0.95 - 1 are marked in green and represent the ideal zeroing distance from the examined options for a given combination of dispersion and target shape. The table illustrates one of the reasons why most Western armies adopted in the past the 1st zeroing plane at 25 m or 30 m. Most military trials and weapons testing are conducted from the prone position at known distances. In this position (for a given dispersion of fire), the sight setting for the first firing plane at 25 m or 30 m shows the best results. However, the other tasks examined show significantly better results at longer ranges of the 1st zeroing plane. The nature of contemporary conflicts must be taken into account, as it can be expected that shooting at shorter ranges will be more frequent (especially in urban combat) than in past conflicts. At the same time, it can be assumed that when engaging targets at longer ranges, the shooter will have sufficient time to transfer the point of aim to the targets. With this assumption in mind, the calculation of the cumulative probability of firing from the prone position at a figure target has been modified so that if the target is at a distance greater than 200 m, the shooter will not aim at the center mass of the body but at the upper part of the figure (the head). The graph of the hit probability with this condition and for firing from the prone position at a figure target is shown in Figure 6.

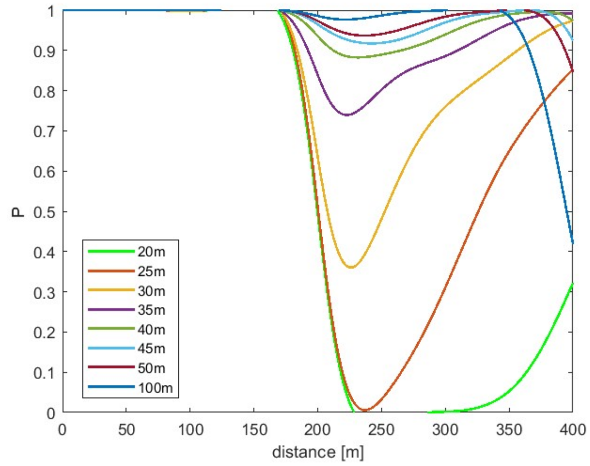


Figure 6 - Hit probability (prone, E-type) with aim point shift at 200 m

A significant drop in the hit probability can be observed for settings with a short 1st zeroing distance after the point of aim has been shifted at 200 m. Obviously, for these sight settings it is more advantageous not to transfer the aiming point. After incorporating the newly obtained cumulative probability into Table 3, a significant shift can be observed. The results indicate that the higher distances of the 1-shot plane are more advantageous.

The following criteria were chosen to evaluate the suitability of each setting for engaging different targets and different maximum distances. The cumulative probabilities for each shooting target and position are summed, where one sum includes firing from the prone position without aimpoint transfer, denoted as Σ^1. The sum including aimpoint transfer at 200 m is denoted as Σ^2. The sight setting with the highest sum of cumulative probabilities is considered the most suitable for all examined positions. The most suitable universal firing distance appears to be 100 m, regardless of whether the aiming point is transferred.

Table 3 - Normalized cumulative probabilities

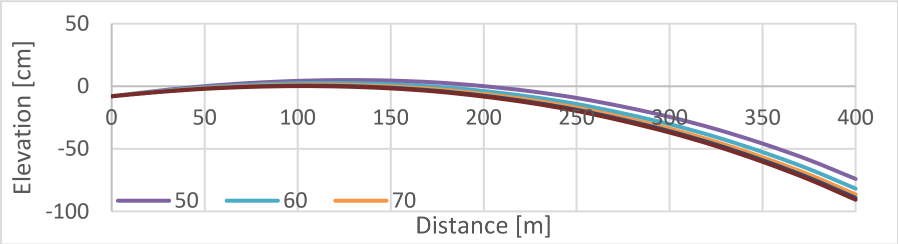
		Normalized cumulative probability Cn							
Target	1st zeroing distance	20	25	30	35	40	45	50	100
Dron	Standing	0,59	0,73	0,85	0,93	0,97	1	1	0,98
	Prone with rest	0,20	0,26	0,32	0,40	0,51	0,63	0,74	1
Type-E	Standing	0,77	0,90	0,96	0.99	1	1	1	0,98
	Prone with rest 1	0,94	1	1	0,97	0,93	0,90	0,87	0,79
	Prone with rest 2 (point of aim shifted at 200m)	0,52	0,69	0,86	0,95	0,99	1	1	0,98
	Σ1	2,5	2,89	3,13	3,29	3,41	3,53	3,61	3,75
	Σ2	2,08	2,58	2,99	3,27	3,47	3,63	3,74	3,94

Discussion

Initially, it was expected that the established rectification distance of 30 m would be at least partially confirmed, with a possibility that a 50 m zeroing distance might also prove promising. However, the results indicate that the optimal distance lies between 50 m and 100 m. For this reason, it seems appropriate to investigate the suitability of the use of shooting distances between 50 m and 100 m that were not previously considered. As expected, there is less elevation of the projectile's path above the optical intent at distances of up to 100 m, with the disadvantage of a more pronounced projectile drop at longer distances.

The bullet trajectories are significantly more similar to each other than those corresponding to shorter zeroing distances. With this setup, probability curves were again generated for first zeroing distances from 50 m to 100 m in 10 m incerements. Next, integral evaluation and normalization were performed to obtain the cumulative probability over the examined distance, as in the previous case. The normalization was performed only among the 6 newly generated cumulative probabilities; therefore, these results are not comparable with the previously processed experiment. From the graphs, it can be observed that, as expected, the probability curves of the hits are not significantly different from each other.

Table 4 - Bullet flight path



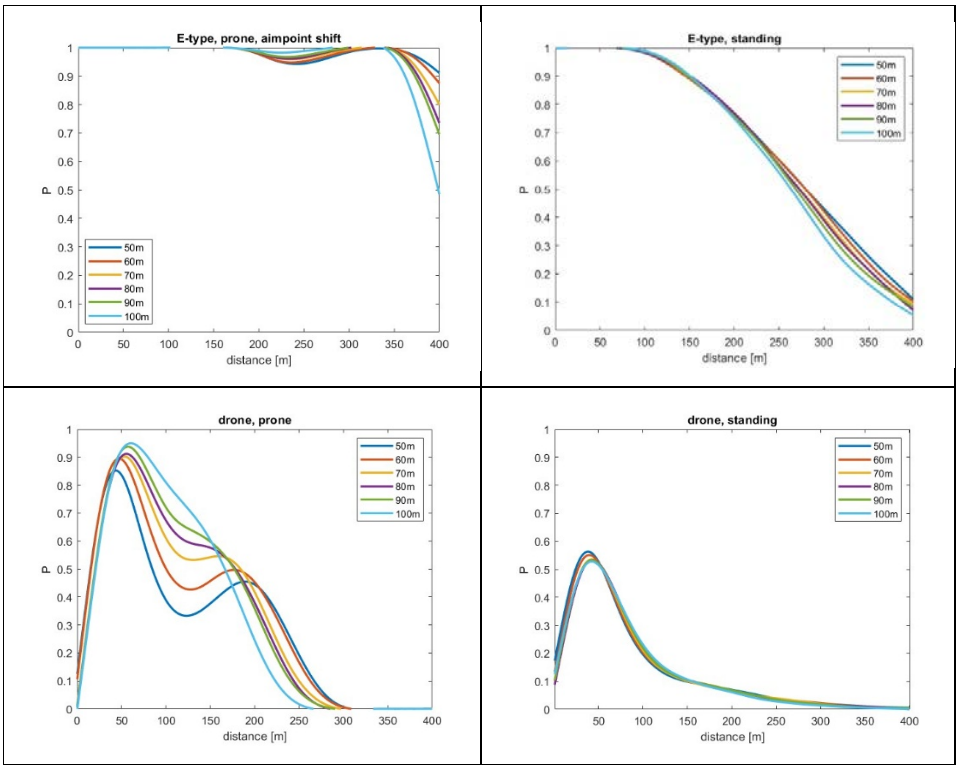


Figure 7 - Hit probabilities

Only when shooting at a small target (drone) with relatively high accuracy do the differences between the curves become more pronounced. It can be observed that the curve for 100 m shows the highest probability of all at a distance of approximately 100 - 150 m, but it is the lowest in the 150 - 200 m section.

Using the same procedure as for the analysis of the previous shot distances, the cumulative probabilities for the settings under study were calculated. The maximum firing distances are consistent with the previous example and are listed in Table 2. The cumulative probability sums are denoted as Σ^1 without the use of the aim point shift, and Σ^2 with the aim point shift for the prone position at a distance of 200 m. The results are presented in Table 5.

Table 5 - Normalized cumulative probabilities

		Normalized cumulative probability Cn					
Target	First zeroing distance	50	60	70	80	90	100
Dron	Standing	1	0,98	0,96	0,96	0,96	0,98
	Prone with rest	0,73	0,79	0,87	0,91	0,93	1
Type-E	Standing	1	1	0,99	0,98	0,98	0,96
	Prone with rest 1	1	0,99	0,96	0.95	0,94	0,9
	Prone with rest 2 (point of aim transitioned at 200m)	1	1	1	1	1	0,98
	Σ1	3,73	3,76	3,78	3,8	3,81	3,84
	Σ2	3,73	3,77	3,82	3,85	3,87	3,92

In this case, the best values of the individual cumulative probabilities for a given shooting task are not highlighted as was done in the previous table due to their similarity. The cumulative totals are again shown for both the variants without and with transfer of the aim point. The values are indicated using a color scale, with green representing the most appropriate setting. It is important to note that the settings do not differ significantly from one another.

Conclusion

This paper discusses sight settings for an assault rifle with respect to ammunition properties and contemporary tactical use. The work demonstrates methods for determining the optimal distance of the first firing plane with regard to small drone-type targets. The results indicate that the previously preferred 30 m (sometimes 30 yards) firing distance is only advantageous when firing from the prone position at distances of up to 300 m. For shooting at a figure target from the standing position, it is more advantageous to use a 100 m zeroing distance. The same applies when engaging small drone-type targets. In this case, it is more advantageous to use a 50m first zeroing distance for the considered firing distances of up to 100 m or 150 m.

For this reason, the optimal settings for an optimal solution to all tested shooting tasks within the settings range of 50 m to 100 m were further investigated. The analysis showed only minor differences between the settings. However, it was also confirmed that the 100 m shooting distance is the most effective. Among the assessed shooting tasks, the shooting of the drone target from the prone position with support was also included, which was the only task that exhibited a lower success rate at the first plane setting of 50 m. When this shooting task is excluded, the best rectification distance is 50 m.

Setting the fisrt zeroing plane to 100 m or 50 m significantly increases shooting effectiveness on the contemporary battlefield compared to the previously used ranges of 25 m to 30 m. Furthermore, when firing from a stable shooting position (prone), it is advantageous to transfer the aiming point when engaging a figure target at a distance greater than 200 m. In conclusion, it must be emphasized that without sufficient marksmanship training, high-quality shooting results cannot be expected. At the same time, the best sight setup is the one with which the shooter regularly trains and which is adapted to the expected combat mission.

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Bojni nišan nula u kontekstu dejstva na bespilotne letelice

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OBLAST: vojne nauke, konstrukcija naoružanja
KATEGORIJA (TIP) CLANKA: originalni naučni rad

Sažetak:

Uvod/cilj: Ovaj rad razmatra optimalnu daljinu upucavanja automatske puške na savremenom bojištu. Tradicionalno, oružane snage koriste nišanska podešavanja koja usklađuju putanju projektila sa linijom *nišanjenja na razdaljinama od 25 m i 300 m. Ovakva konfiguracija je pogodna za automatske puške kalibra od 7 mm do 8 mm pri dejstvu iz ležećeg stava na cilj oblika figure u prilasku. Međutim, sa sve većom upotrebom municije manjeg kalibra (5 mm do 6 mm) i razvojem pretnji na bojištu, potrebno je preispitati ovaj tradicionalni pristup. U radu se ispituje optimalna početna razdaljina upucavanja pri dejstvu kako na cljeve tipa dron tako i na standardne NATO figuralne ciljeve tipa E. Sva ispitivanja i podešavanja sprovedena su upotrebom automatske puške BREN 2 koja se koristi u Oružanim snagama Češke Republike.*

Metode: U radu su primenjene metode simulacije verovatnoće pogotka. Podešavanja ispitivanog naoružanja BREN 2 su ekperimentalno verifikovana.

Rezultati: Verovatnoća pogotka tačkastog cilja u značajnoj meri zavisi od podešavanja daljine upucavanja nišana. Što je veće odstupanje putanje projektila od linije nišanjenja, manja je verovatnoća pogađanja cilja bez korekcije razdaljine.

Zaključak: Rezultati istraživanja ukazuju da su pri dejstvu na male i nepravilne ciljeve kao što su bespilotne letelice daljine upucavanja između 50 m i 100 m efikasnije, pri čemu se ne narušava borbena efikasnost protiv standardnih ciljeva u obliku figure.

Ključne reči: verovatnoća pogotka, kolimatorski nišan, upucavanje, daljina direktnog hica, BREN 2.

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