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FIRE CONTROL ANALYSIS OF SELECTED CREW SERVED WEAPONS

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A study has been made of the accuracies that are achieved by using four different fire control systems on each of several small arms. It is based on data from the Ballistic Research Laboratory in Aberdeen, Maryland. A table of probabilities of hit which are based on these accuracies has been included.

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CONTENTS

INTRODUCTION

A study has been made of the accuracies that are attained by using four different fire control systems on each of several small arms. Its purpose is to get exact information about the relative advantages of these systems. The results of this study should, therefore, make it easier to decide intelligently what fire control system to provide for what weapon. Here, "accuracy" means the standard deviation of the angle, measured at the shooter, between the bullet's point of impact and the point that the shooter wants to hit.

In this study, it was assumed that no fire control system has a fixed bias, that the mean point of impact over a long period of time was the "bull's eye" in every case. It was then reasonable to model the probability density function of the bullet's angular dispersion as a two-dimensional normal distribution, the standard deviations of which are the bullet's accuracies in the horizontal and vertical directions. Probabilities of hit on a standard NATO target were then calculated for every fire control system, weapon, and range by a computer program that is based on this model (ref 1). The probabilities of hit (app A) were based on error budgets that were developed for quasi-combat conditions. The probability of hit is the ultimate figure of merit for a fire control system.

ANALYTICAL APPROACH

The different error sources were divided into occasion-to-occasion errors and round-to-round errors.

Occasion-to-occasion errors are errors which change so slowly that they can be considered to be constant throughout an engagement. The occasion-to-occasion errors that were calculated were errors in range to the target, wind speed and direction, muzzle velocity, air temperature, air density, boresighting, fire control solution and zeroing, together with failure to take account of the gun's cant, earth rate, site angle, reticle gradations and jump dispersion.

Ignorance or error about the target range or the wind velocity will clearly produce errors in aiming.

Muzzle velocity varies according to the temperature of the propellant. An error in muzzle velocity will, therefore, produce an error in aiming especially if the target is moving.

Air temperature determines propellant temperature, which in turn affects muzzle velocity.

The gun and sighting system must be optically aligned, that is to say, boresighted to provide accurate firing. Repeated firings and other vibration will cause deviations from this alignment. This is the boresight error.

The solution that is provided by the fire control system will contain some error because of approximations and tolerances in construction. This is the fire control solution error.

A gun is zeroed by shooting several times at a target that is a known distance from the gun and adjusting the fire control system so that these shots fall on the target. Atmospheric conditions will probably be nonstandard when this is done. Also, only a few shots are fired for zeroing; so there will probably be an error in zeroing.

Errors are introduced into the superelevation calculations when the vehicle is canted because of uneven terrain. The same sort of error occurs when the gun is handheld for it will probably not be held perfectly vertical. This is the cant error.

Earth rate errors are caused by not taking the Coriolis force into account. This error is quite small but it has been included in the analysis all the same. If the gun and target are not at the same elevation, the fact that the trajectory of a round is not rigid causes a site-angle error. The profile of the trajectory cannot simply be tilted to the target's elevation and keep its original shape. The amount of error is small at low ranges but becomes important as range increases.

A reticle is a set of lines or cross-hairs on a sight, each of which corresponds to a certain range and gives the correct superelevation for that range. But if the target's range is not one of those that are marked on the reticle, the shooter will have to estimate the superelevation. This error in doing so is the reticle error.

Jump dispersion error is the net result of unknown combinations of error which are present at all firings and are constant for a particular vehicle, gun, and ammunition lot. This is a fixed bias which is corrected in any fire control system. But there is a residual variable jump dispersion error which is one of the occasion-to-occasion errors.

It was assumed that all of the above sources of error were statistically independent and that the horizontal and vertical components of each source of error were statistically independent. Therefore, considering only horizontal components of error, the variance of the occasion-to-occasion error is the sum of the variances of all the sources of such error. The same holds for the variance of the vertical component of the occasion-to-occasion error. This is how the variances of both components of the occasion-to-occasion error were calculated.

In contrast to occasion-to-occasion errors, round-to-round errors change, as the name implies, from round to round. Round-to-round errors are random, taking on different values for every round so that no correction can be made by the fire control system. The round-to-round errors that were considered were ammunition dispersion and errors in aiming and resolution.

Ammunition dispersion is due to the number and size of the propellant grains in the projectile, the fit of the projectile to the case, the position of the round in the chamber, etc. It must be treated as a round-to-round error.

The resolution of an optical system is the smallest angle between two points which the system can still resolve, that is, recognize as two points rather than one. The resolution of the human eye is about 12 seconds of arc or 0.06 mil. This limited resolution of the eye is a source of error which, like the aiming error, varies from round to round.

There will be a randomly varying aiming error no matter how clearly the shooter sees the target. The point at which he aims is bound to wander a little.

As with the occasion-to-occasion errors, it was assumed that all sources of round-to-round error were statistically independent and that the horizontal and vertical components of each source of error were also statistically independent. The variances of the horizontal and vertical components of the round-to-round error were calculated by adding the variances of the horizontal and vertical components, respectively, of the error sources.

Naturally, most of these errors depend on range so it was necessary to make a separate calculation for every range to be considered. The ranges 200 m, 400 m, 600 m, and so on up to 2000 m were used in this study.

The computer program that calculates probability of hit is based on the following model (ref 1). For a given range, let the standard deviations of the horizontal and vertical components of the occasion-to-occasion error be SX and SY and of the round-to-round error be SXP and SYP. The program assumes that the impact points of the bullets have a two-dimensional normal distribution with standard deviations SXP and SYP and means mx and my. For their part, mx and my have a two-dimensional normal distribution with standard deviations SX and SY and means 0 and 0. This corresponds to the idea that we assume no fixed bias and that the temporary bias for one engagement is (mx, my), which is itself normally distributed. The program then calculates the probability of hit of a single bullet as the integral of this probability distribution over the target. The targets will be described in the next section.

EQUIPMENT STUDIED

The four fire control systems used in the analysis provided different amounts of compensation for system errors. They are described below in the order of increasing complexity.

System 1 consists of iron sights only. These are posts mounted on the barrel and breech of the weapon which are used to align the weapon and target. No other fire control instrument is employed. This system is the current level of equipment on the M2 and M60 machine guns.

System 2 consists of a telescopic sight, a stadia range finder and a ballistic reticle. The user of a stadia range finder must know the true size of the target. It may, for instance, be an enemy vehicle with which he is familiar. The stadia range finder then supplies the target's range from its angular size. Knowing the range to the target, the shooter can get the correct superelevation from the ballistic reticle.

System 3 consists of a telescopic sight, a laser range finder, and a ballistic reticle. A laser range finder is more accurate than a stadia range finder and so the user gets a better value of the superelevation from the ballistic reticle than he would with system 2.

System 4 consists of a telescopic sight, a laser range finder, a ballistic computer, and sensors for cross-wind speed, air pressure and air temperature, ammunition temperature, and weapon cant.

The ballistic computer calculates air density from the air pressure and temperature. The ammunition temperature is not precisely the temperature of the ammunition. It is the air temperature in the container where the ammunition is kept. Nonetheless, it is assumed that the error in muzzle velocity is reduced 40% by making use of this temperature. The cant of vehicle is rotation about a front-to-back axis. It is sometimes called trunnion roll.

The ammunitions studied are .50 cal M8 API (armor-piercing incendiary), the M20 API-T (armor-piercing incendiary-tracer), the M33 ball and the XM903 SLAP (sabot-launched, armor penetrating), all fired from the M2 machine gun; the 7.62 mm M80 ball and the XM948 SLAP, both fired from the M60 machine gun; and the M118 NM (national match) fired from the M21 and M24 sniper weapons.

The study assigned the NATO vehicle target, which is 2.3 m^2, to the AP and SLAP rounds. The target for the other rounds was a rectangle, 1 meter high and 1/2 meter wide, which represents a crouching man. It is similar to the NATO personnel target.

EXPLANATION OF ERROR BUDGETS

The error budgets list (app B) standard deviations of angular error. The unit for all of them is the Army mil, where 6400 Army mils = 360 degrees = 2π radians. The standard deviations of the horizontal and vertical components of error have been calculated separately and are listed separately under the column headings H and V. These horizontal and vertical components of error were calculated for every target range from 200 m to 2000 m at intervals of 200 m and are presented as a pair of H and V columns headed by the range. The rest of this section will be devoted to explaining the calculation of all the kinds of errors that appear in the error budgets.

Range Error

The error in a naked eye estimate of range is taken as 21%. Let R and E denote range and superelevation. Then the angular range error for system 1 is 0.21 R dE/dR (ref 2, pp. 32 - 33). The rate dE/dR depends on range and was calculated by Ballistic Research Laboratory (BRL) at the Aberdeen Proving Ground, MD (app C). This range error is in the vertical direction. The horizontal range error is zero for all systems.

The range error when using a stadia range finder is taken as 15%. It follows, using the same notation as above, that the range error for system 2 is 0.15 R dE/dR in the vertical direction.

System 3 and 4 have laser range finders for which the error is 10 m. So, for these systems, the vertical range error is 10 dE/dR.

Cant Error

Cant error is only in the horizontal direction. It was calculated from the formula CE = 0.001SC, where CE, S, and C are the cant error, superelevation and standard deviation of cant, all in mils (ref 2). The superelevation was calculated for each round and range by BRL (app C); C was 5 degrees for systems 1 through 3 for which there was no cant sensor and set at 0.5 degrees for system 4 which has a cant sensor.

Error Caused by Wind

The error caused by cross-range wind is entirely horizontal and is shown in the H column. On the other hand, the error caused by range wind is entirely vertical and so is shown in the V column. A mean value of 3.35 m/s was taken for both range and cross-range wind for systems 1, 2, and 3. The mean value of the range wind was also set at 3.35 m/s for system 4. But the cross-range wind was set at 1.75 m/s for system 4 since it has a sensor for cross-range wind. The error was found from the unit effects data at

the fixed range calculated by BRL (app A). For instance, let the round in question be the 7.62 mm ball M80. A 1 m/s range wind causes an increase of 0.0433 m in height at a range of 1000 m. So, a 3.35 m/s range wind causes an increase of 3.35 x 0.0433 m in height at the range, which is an angular error of 3.35 x 0.0433/1000 radians which is easily converted to mils.

Error in Velocity

The term velocity here refers to muzzle velocity. The angular deviation caused by an error in the muzzle velocity is in the vertical direction alone. The primary reason for variation in the muzzle velocity is variation in the temperature of the propellant. The mean error in the muzzle velocity was taken as 10 m/s in systems 1 through 3 and 2 m/s in system 4 which senses the temperature of the ammunition container.

The error was found from the unit effects data at a fixed range in the data from BRL. For instance, let E denote the change in height, measured in meters, which results from a 1 m/s change in velocity when the range is R. The mean angular error for systems 1 through 3 is then 10 E/R radians for systems 1 through 3.

Temperature Error

The temperature in question is air temperature. A change in air temperature will cause a change in propellant temperature, which in turn affects muzzle velocity, which, in turn, will affect the round's trajectory. Failure to take account of this results in a temperature error. This error is in the vertical direction.

The mean temperature error was taken as 5% of absolute temperature (Rankine or Kelvin temperature) for systems 1 through 3. The error was 1% of absolute temperature for system 4 which has a temperature sensor. This error is calculated from the data in appendix A, the same as the velocity error.

Air Density Error

A false value of air density will cause an angular error in the vertical direction. The mean air density error was taken as 5% of absolute air density for systems 1 through 3 and 1% of that for system 4, which senses air pressure and temperature.

This error is calculated from the data in appendix C, the same as the wind, velocity, and temperature errors.

Earth Rate

Because the earth is, in reality, a moving platform, firing a projectile from the earth introduces an error caused by Coriolis acceleration (moving bodies on moving frames of reference). The horizontal and vertical values for the error are:

$$X_E = -(\sin L)\,(\cos A)E$$

$$Y_E = -(\cos L)\,(\sin A)E$$

where

L is latitude (north, positive; south, negative)

A is azimuth (north, zero, clockwise)

E is Coriolis acceleration

$$E = \int_0^{t_p} \int_0^{t_p} 2\phi \times V/dt\, ds$$

where

ϕ is the earth's rotation vector (rad/s)

V is the shell's velocity vector (m/s)

t_p is the time of flight (sec)

While this integration looks forbidding, it can be accomplished graphically in a short time by plotting 2ϕ V against time and finding the area from zero to the time of flight for the range in question. Plotting this area against time and repeating the process yields the desired E.

In estimating the standard deviation, the placement of iand masses on the earth's surface suggests that the latitude readings will be biased toward the northern hemisphere while the azimuth is uniformly random in all directions. Since the azimuth is random and little more can be said about the likelihood of combat at any particular latitude, a value of 45 degrees has been chosen as OL and OA to minimize the error in both directions.

Consequently, the standard deviations of the horizontal and vertical components of the error are:

$$\sigma_{X_E} = |E| \text{ (sin 45 degrees cos 45 degrees)} = 0.5\ |E|$$

$$\sigma_{Y_E} = |E| \text{ (cos 45 degrees sin 45 degrees)} = 0.5\ |E|$$

Site Angle

Site angle error was calculated by the formula SAE = SE (1-COS T) where SAE, SE, and T denote site angle error, superelevation, and a terrain feature similar to cant, respectively. SAE and SE are in mils.

SE is part of the data in appendix A. T was set at 2 degrees for all fire control systems.

Reticle Error

It was decided that the mean range error, when using a reticle, was 20 m. The resulting angular error is then 20 dE/dR, where R is range in meters and E is superelevation in mils and dE/dR can be found in appendix A.

The method is the same as with range error.

Only systems 2 and 3 have reticle errors for only those systems have reticles. Reticle error is vertical.

Boresight, Fire Control Solution, Jump Dispersion, and Zeroing Error

All of these error sources are the same for all systems, all ranges, and both directions. The values assigned to boresight, fire control solution, jump dispersion, and zeroing error were 0.1 mil, 0.1 mil, 0.25 mil, and 0.3 mil, respectively.

Aiming Error

The vertical aiming error is based on 1/6th of the target's height. Similarly, the horizontal aiming error is based on 1/6th of the target's width. So if T is the appropriate target dimension and R is the range, then the aiming error is T/6R radians.

The target for the AP and SLAP rounds was a NATO vehicle target which is 2.3 m^2. The target for the other rounds was a rectangle 1 m high and 1.2 m wide which resembles the NATO personnel target.

Resolution

The value of 0.06 mil was used for the resolution error for all systems at all ranges and for both horizontal and vertical error.

Bullet Dispersion

The value of bullet dispersion is mils depends on the round and, in some cases, on direction. It is independent of system and range. These values were obtained from the appropriate ammunition authorities.

CONCLUSIONS

System 4 should be used with all weapons except the M21 and M24 sniper weapons for which it produces only a slight improvement over their present fire control systems.

REFERENCES

1. Cerrato, L. R. and Pfleger, K. R., "Multiple Round Hit Probabilities Associated with Combat Vehicle Fire Control Gun Systems," Report R-3001, Frankford Arsenal, PA, May 1971.

2. Pfleger, K. R. and Bibbero, R. J., "The Evaluation of Combat Vehicle Fire Control/ Gunnery Systems," Report R-1937. Technical Analysis Group, Frankford Arsenal, PA, September 1969.

APPENDIX A

TABLES OF PROBABILITY OF HIT

The seven tables that follow present probabilities of hit for every ammunition and fire control system and for every range from 200 m to 2000 m. All tables, except the last one, show the probability of at least one hit from five shots and from ten shots. The last ammunition is the 7.62 mm M118 National Match. This is used only in a sniper rifle so only single-shot hit probabilities have been calculated for it.

The NATO vehicle target, which is 2.3 m^2, was assigned to the AP and SLAP rounds. The target for the other rounds was a rectangle, 1-m high and 1/2-m wide, which represents a crouching man. It is similar to the NATO personnel target.

The reader can see how the probability of hit decreases with increasing range and how it increases as the fire control system improves.

.50 CAL M8 API

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	1.	1.	1.	1.	1.	1.	1.	1.
400	.9992	.9996	.9998	.9999	1.	1.	1.	1.
600	.9365	.9611	.9789	.993	.9842	.9938	.9974	.9999
800	.667	.7492	.8538	.9462	.8059	.8805	.946	.995
1000	.3714	.4562	.6473	.8374	.5058	.6106	.799	.9615
1200	.1844	.2401	.4495	.6904	.2727	.3522	.6114	.8767
1400	.0893	.1198	.2935	.5409	.1399	.187	.4333	.7506
1600	.044	.0599	.1821	.4098	.072	.0979	.2871	.6109
1800	.023	.0315	.1125	.3083	.0388	.0532	.186	.4857
2000	.013	.0179	.0708	.2333	.0225	.031	.1211	.3836

.50 CAL M20 APIT

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	1.	1.	1.	1.	1.	1.	1.	1.
400	.9992	.9996	.9998	.9999	1.	1.	1.	1.
600	.9355	.9602	.9781	.9929	.9838	.9935	.9972	.9999
800	.6596	.7425	.8495	.9452	.7989	.8749	.9429	.9947
1000	.363	.4469	.6392	.834	.4953	.5995	.7907	.9593
1200	.1782	.2324	.4402	.6845	.2639	.3414	.6001	.8711
1400	.0856	.115	.2853	.5335	.1342	.1797	.422	.7419
1600	.042	.0572	.1761	.4026	.0687	.0934	.278	.6012
1800	.0218	.0298	.1076	.3015	.0368	.0504	.1781	.4757
2000	.0001	.0168	.0667	.2266	.0211	.0291	.1142	.3732

.50 CAL M33 BALL

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	1.	1.	1.	1.	1.	1.	1.	1.
400	.9997	.9999	1.	1.	1.	1.	1.	1.
600	.9453	.9692	.9847	.9969	.9849	.9944	.9975	1.
800	.6774	.7609	.8649	.9589	.8075	.8821	.9461	.9963
1000	.3784	.4648	.6575	.8535	.509	.6142	.8004	.9657
1200	.1888	.2455	.4572	.705	.2765	.3566	.6146	.8835
1400	.092	.1233	.2994	.552	.1432	.1912	.4381	.7584
1600	.0445	.0607	.1857	.4178	.0725	.0986	.2909	.6182
1800	.0232	.0318	.1136	.3131	.039	.0535	.187	.4908
2000	.0131	.018	.0709	.2358	.0226	.0311	.121	.3865

7.62 MM M80 BALL

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	.9942	.9943	.9945	.9985	.9993	.9993	.9993	.9999
400	.6217	.6729	.7364	.8922	.7539	.8008	.8468	.9684
600	.1744	.2208	.3665	.6	.2528	.3174	.4992	.7748
800	.0417	.056	.149	.3356	.0665	.0892	.2309	.4987
1000	.0124	.017	.0583	.1816	.021	.0287	.0978	.2958
1200	.0046	.0063	.0251	.1018	.0081	.0112	.0442	.1757
1400	.002	.0027	.0118	.058	.0036	.005	.0214	.104
1600	.0009	.0013	.0059	.0331	.0017	.0024	.0108	.0608
1800	.0005	.0007	.003	.019	.0009	.0013	.0057	.0356
2000	.0003	.0004	.0016	.0109	.0005	.0007	.0031	.0207

7.62 MM SLAP XM948

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	1.	1.	1.	1.	1.	1.	1.	1.
400	1.	1.	1.	1.	1.	1.	1.	1.
600	.9566	.9741	.9817	.9994	.9819	.9904	.9928	.9999
800	.5572	.6598	.807	.972	.6388	.7425	.8615	.9891
1000	.1917	.2529	.5146	.8302	.2349	.3081	.5869	.8889
1200	.0618	.084	.2537	.6106	.0783	.1063	.3105	.6907
1400	.0242	.0331	.1179	.4218	.0314	.043	.1509	.503
1600	.0105	.0144	.0564	.2736	.0139	.0191	.0743	.3438
1800	.0052	.0071	.0282	.167	.007	.0096	.038	.2195
2000	.0027	.0037	.0145	.0969	.0038	.0052	.02	.132

.50 CALIBER SLAP XM903

RANGE (METERS)	PROBABILITY OF 1 OR MORE HITS IN 5 SHOTS				PROBABILITY OF 1 OR MORE HITS IN 10 SHOTS			
	SYS 1	SYS 2	SYS 3	SYS 4	SYS 1	SYS 2	SYS 3	SYS 4
200	1.	1.	1.	1.	1.	1.	1.	1.
400	1.	1.	1.	1.	1.	1.	1.	1.
600	.9986	.9996	.9999	1.	.9998	1.	1.	1.
800	.9572	.9826	.9953	.9992	.9824	.9956	.9993	1.
1000	.7974	.8825	.9638	.9934	.8701	.9405	.9875	.9993
1200	.572	.6871	.8834	.9747	.6652	.7837	.9407	.9951
1400	.376	.4787	.7636	.9356	.4605	.579	.8514	.9812
1600	.2375	.313	.6285	.8749	.3032	.3967	.7344	.9518
1800	.1482	.1994	.4974	.7962	.1958	.2624	.6087	.9036
2000	.0914	.1246	.3773	.7068	.1244	.1691	.4832	.8382

7.62 MM BALL M118 (MATCH)

SINGLE SHOT HIT PROBABABILITY
PALNH(1)

RANGE (METERS)	SYS 1	SYS 2	SYS 3	SYS 4
100	.9842	.9841	.9842	.9856
200	.8819	.8842	.8878	.9259
300	.6005	.6236	.6512	.7825
400	.3073	.3495	.4204	.6028
500	.1401	.1731	.2614	.4397
600	.0638	.0829	.1617	.3125
700	.0298	.0399	.0989	.2197
800	.0147	.0199	.0595	.1539
1000	.0041	.0057	.0213	.0759
1200	.0015	.0021	.0087	.0399
1400	.0006	.0009	.004	.0217
1600	.0003	.0004	.002	.0122
1800	.0002	.0002	.0011	.007
2000	.0001	.0001	.0006	.0041

APPENDIX B

ERROR BUDGETS

If there is only one number in a column, then the horizontal and vertical components of the error are both equal to this number.

.50 CALIBER M20 APIT - SYSTEM 1

	200 M V	400 M V	600 M V	800 M V	1000 M V	1200 M V	1400 M V	1600 M V	1800 M V	2000 M V
RANGE	0-.318	0-.743	0-1.313	0-.21	0-3.134	0-4.582	0-6.533	0-9.081	0-12.194	0-15.556
CANT	.116-0	.258-0	.418-0	.613-0	.853-0	1.138-0	1.484-0	1.911-0	2.436-0	3.049-0
WIND	.229-0	.477-.003	.756-.009	1.069-.018	1.421-.034	1.818-.061	2.264-.103	2.756-.17	3.24-.263	3.697-.382
VELOCITY	0-.031	0-.064	0-.107	0-.16	0-.225	0-.306	0-.409	0-.535	0-.669	0-.805
TEMPERATURE	0-0	0-0	0-.005	0-.013	0-.029	0-.052	0-.085	0-.118	0-.111	0-.056
DENSITY	0-.005	0-.024	0-.065	0-.138	0-.257	0-.444	0-.73	0-1.115	0-1.544	0-2.011
EARTH RATE	.009	.019	.031	.046	.063	.083	.106	.134	.164	.196
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.017	0-.021
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.237-2.508	1.553-1.981	1.53-2.141	1.712-2.668	2.019-3.539	2.426-4.882	2.931-6.776	3.536-9.303	4.205-12.41	4.921-15.79
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.488-.524	.683-.854	.959-1.383	1.301-2.151	1.71-3.181	2.186-4.634	2.741-6.602	3.382-9.178	4.078-12.32	4.814-15.72

.50 CALIBER M20 APIT - SYSTEM 2

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.227	0-.531	0-.938	0-1.5	0-2.239	0-3.273	0-4.667	0-6.486	0-8.71	0-11.111
CANT	.116-0	.258-0	.418-0	.613-0	.853-0	1.138-0	1.484-0	1.911-0	2.436-0	3.049-0
WIND	.229-0	.447-.003	.756-.009	1.069-.018	1.421-.034	1.818-.061	2.264-.103	2.756-.17	3.24-.263	3.697-.382
VELOCITY	0-.031	0-.064	0-.107	0-.16	0-.225	0-.306	0-.409	0-.535	0-.669	0-.805
TEMPERATURE	0-0	0-0	0-.005	0-.013	0-.029	0-.052	0-.085	0-.118	0-.111	0-.056
DENSITY	0-.005	0-.024	0-.065	0-.138	0-.257	0-.444	0-.73	0-1.115	0-1.544	0-2.011
EARTH RATE	.009	.019	.031	.046	.063	.083	.106	.134	.164	.196
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.017	0-.021
RETICLE	0-.152	0-.177	0-.208	0-.25	0-.299	0-.364	0-.444	0-.541	0-.645	0-.741
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.237-2.503	1.553-1.92	1.53-1.945	1.712-2.241	2.019-2.793	2.427-3.699	2.931-5.021	3.536-6.814	4.205-9.038	4.921-11.46
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.488-.498	.683-.701	.959-1.055	1.301-1.591	1.71-2.323	2.186-3.365	2.741-4.783	3.382-6.643	4.078-8.91	4.814-11.36

.50 CALIBER M20 APIT - SYSTEM 3

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.076	0-.088	0-.104	0-.125	0-.149	0-.182	0-.222	0-.27	0-.323	0-.37
CANT	.116-0	.258-0	.418-0	.613-0	.853-0	1.138-0	1.484-0	1.911-0	2.436-0	3.049-0
WIND	.229-0	.477-.003	.756-.009	1.069-.018	1.421-.034	1.818-.061	2.264-.103	2.756-.17	3.24-.263	3.697-.382
VELOCITY	0-.031	0-.064	0-.107	0-.16	0-.225	0-.306	0-.409	0-.535	0-.669	0-.805
TEMPERATURE	0-0	0-0	0-.005	0-.013	0-.029	0-.052	0-.085	0-.118	0-.111	0-.056
DENSITY	0-.005	0-.024	0-.065	0-.138	0-.257	0-.444	0-.73	0-1.115	0-1.544	0-2.011
EARTH RATE	.009	.019	.031	.046	.063	.083	.106	.134	.164	.196
SITE ANGLE	.001	.002	.003	.004	.006	.008	.01	.013	.017	.021
RETICLE	0-.152	0-.177	0-.208	0-.25	0-.299	0-.364	0-.444	0-.541	0-.645	0-.741
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.237-2.494	1.553-1.847	1.53-1.707	1.712-1.669	2.019-1.677	2.426-1.732	2.931-1.865	3.536-2.107	4.205-2.436	4.921-2.834
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.488-.45	.683-.465	.959-493	1.301-.546	1.71-.638	2.186-.801	2.741-1.072	3.382-1.459	4.078-1.906	4.814-2.396

.50 CALIBER M20 APIT - SYSTEM 4

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.076	0-.088	0-.104	0-.125	0-.149	0-.182	0-.222	0-.27	0-.323	0-.37
CANT	.012-0	.026-0	.042-0	.061-0	.085-0	.114-0	.148-0	.191-0	.244-0	.305-0
WIND	.12-0	.249-.003	.395-.009	.558-.018	.742-.034	.95-.061	1.183-.103	1.44-.17	1.693-.263	1.931-.382
VELOCITY	0-.006	0-.013	0-.021	0-.032	0-.045	0-.061	0-.082	0-.107	0-.134	0-.161
TEMPERATURE	0-0	0-0	0-.001	0-.003	0-.006	0-.01	0-.017	0-.024	0-.022	0-.011
DENSITY	0-.001	0-.005	0-.013	0-.028	0-.051	0-.089	0-.146	0-.223	0-.309	0-.402
EARTH RATE	.009	.019	.031	.046	.063	.083	.106	.134	.164	.196
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.017	0-.021
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.226-2.489	1.477-1.837	1.324-1.69	1.315-1.637	1.374-1.615	1.484-1.608	1.639-1.613	1.834-1.633	2.043-1.669	2.253-1.724
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.433-.422	.485-.425	.576-.43	.7-.439	.857-.452	1.046-.478	1.267-.522	1.517-.595	1.768-.698	2.008-.826

.50 CALIBER M8 API - SYSTEM 1

	200		400		600		800		1000		1200		1400		1600		1800		2000	
	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V
RANGE	0-.318		0-.743		0-1.313		0-2.074		0-.3088		0-4.5		0-6.391		0-8.842		0-11.813		0-15.	
CANT	.116-0		.258-0		.418-0		.614-0		.846-0		1.121-0		1.46-0		1.878-0		2.385-0		2.973-0	
WIND	.224-0		.467-.003		.74-.008		1.043-.017		1.382-.031		1.764-.056		2.196-.095		2.679-.157		3.15-.244		3.585-.355	
VELOCITY	0-.031		0-.064		0-.107		0-.158		0-.221		0-.3		0-.399		0-.523		0-.655		0-.783	
TEMPERATURE	0-0		0-.003		0-.008		0-.017		0-.032		0-.055		0-.091		0-.131		0-.126		0-.07	
DENSITY	0-.005		0-.024		0-.064		0-.133		0-.246		0-.424		0-.698		0-1.074		0-1.476		0-1.901	
EARTH RATE	.009		.019		.031		.045		.062		.082		.105		.132		.161		.192	
SITE ANGLE	0-.001		0-.002		0-.003		0-.004		0-.006		0-.008		0-.01		0-.013		0-.016		0-.02	
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	1.94-1.94		.97-.97		.647-.647		.485-.485		.388-.388		.323-.323		.277-.277		.243-.243		.216-.216		.194-.194	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5	
SYSTEM	2.237-2.508		1.55-1.981		1.522-2.141		1.697-2.647		1.989-3.497		2.378-4.802		2.867-6.635		3.458-9.064		4.106-12.03		4.79-15.227	
ROUND-TO-ROUND	2.183-2.453		1.394-1.787		1.193-1.635		1.113-1.578		1.074-1.551		1.053-1.536		1.039-1.527		1.031-1.521		1.025-1.517		1.02-1.514	
OCCASION-TO-OCCASION	.486-.524		.676-.854		.946-1.383		1.28-2.126		1.674-3.134		2.132-4.55		2.672-6.457		3.301-8.935		3.976-11.93		4.68-15.151	

.50 CALIBER M8 API - SYSTEM 2

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.227	0-.531	0-.938	0-1.481	0-2.206	0-3.214	0-4.565	0-6.316	0-8.438	0-10.714
CANT	.116-0	.258-0	.418-0	.614-0	.846-0	1.121-0	1.46-0	1.878-0	2.385-0	2.973-0
WIND	.224-0	.467-.003	.74-.008	1.043-.017	1.382-.031	1.764-.056	2.196-.095	2.679-.157	3.15-.244	3.585-.355
VELOCITY	0-.031	0-.064	0-.107	0-.158	0-.221	0-.3	0-.399	0-.523	0-.655	0-.783
TEMPERATURE	0-0	0-.003	0-.008	0-.017	0-.032	0-.055	0-.091	0-.131	0-.126	0-.07
DENSITY	0-.005	0-.024	0-.064	0-.133	0-.246	0-.424	0-.698	0-1.074	0-1.476	0-1.901
EARTH RATE	.009	.019	.031	.045	.062	.082	.105	.132	.161	.192
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.016	0-.02
RETICLE	0-.152	0-.177	0-.208	0-.247	0-.294	0-.357	0-.435	0-.526	0-.625	0-.714
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.237-2.503	1.55-1.92	1.522-1.945	1.697-2.227	1.989-2.765	2.378-3.643	2.867-4.92	3.458-6.644	4.106-8.762	4.79-11.053
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.486-.498	.676-.701	.946-1.055	1.28-1.572	1.674-2.289	2.132-3.303	2.672-4.677	3.301-6.467	3.976-8.63	4.68-10.948

.50 CALIBER M8 API - SYSTEM 3

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.076	0-.088	0-.104	0-.123	0-.147	0-.179	0-.217	0-.263	0-.313	0-.357
CANT	.116-0	.258-0	.418-0	.614-0	.846-0	1.121-0	1.46-0	1.878-0	2.385-0	2.973-0
WIND	.224-0	.467-.003	.74-.008	1.043-.017	1.382-.031	1.764-.056	2.196-.095	2.679-.157	3.15-.244	3.585-.355
VELOCITY	0-.031	0-.064	0-.107	0-.158	0-.221	0-.3	0-.399	0-.523	0-.655	0-.783
TEMPERATURE	0-0	0-.003	0-.008	0-.017	0-.032	0-.055	0-.091	0-.131	0-.126	0-.07
DENSITY	0-.005	0-.024	0-.064	0-.133	0-.246	0-.424	0-.698	0-1.074	0-1.476	0-1.901
EARTH RATE	.009	.019	.031	.045	.062	.082	.105	.132	.161	.192
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.016	0-.02
RETICLE	0-.152	0-.177	0-.208	0-.247	0-.294	0-.357	0-.435	0-.526	0-.625	0-.714
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
KEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.237-2.494	1.55-1.847	1.522-1.707	1.697-1.668	1.989-1.673	2.378-1.724	2.867-1.848	3.458-2.078	4.106-2.381	4.79-2.738
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-2.517	1.02-1.514
OCCASION-TO-OCCASION	.486-.45	.676-.465	.946-.493	1.28-.542	1.674-.629	2.132-.784	2.672-1.041	3.301-1.416	3.976-1.836	4.68-2.281

.50 CALIBER M8 API - SYSTEM 4

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.076	0-.088	0-.104	0-.123	0-.147	0-.179	0-.217	0-.263	0-.313	0-.357
CANT	.012-0	.026-0	.042-0	.061-0	.085-0	.112-0	.146-0	.188-0	.239-0	.297-0
WIND	.117-0	.244-.003	.387-.008	.545-.017	.722-.031	.921-.056	1.147-.095	1.399-.157	1.645-.244	1.873-.355
VELOCITY	0-.006	0-.013	0-.021	0-.032	0-.044	0-.06	0-.08	0-.105	0-.131	0-.157
TEMPERATURE	0-0	0-.001	0-.002	0-.003	0-.006	0-.011	0-.018	0-.026	0-.025	0-.014
DENSITY	0-.001	0-.005	0-.013	0-.027	0-.049	0-.085	0-.14	0-.215	0-.295	0-.38
EARTH RATE	.009	.019	.031	.045	.062	.082	.105	.132	.161	.192
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.016	0-.02
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94-1.94	.97-.97	.647-.647	.485-.485	.388-.388	.323-.323	.277-.277	.243-.243	.216-.216	.194-.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	2.226-2.489	1.476-1.837	1.322-1.69	1.309-1.637	1.363-1.615	1.466-1.607	1.613-1.611	1.801-1.629	2.003-1.662	2.202-1.71
ROUND-TO-ROUND	2.183-2.453	1.394-1.787	1.193-1.635	1.113-1.578	1.074-1.551	1.053-1.536	1.039-1.527	1.031-1.521	1.025-1.517	1.02-1.514
OCCASION-TO-OCCASION	.432-.422	.483-.425	.57-.43	.689-.438	.839-.451	1.02-.475	1.233-.516	1.477-.585	1.721-.679	1.951-.795

.50 CALIBER M33 BALL - SYSTEM 1

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.316	0-.737	0-1.299	0-2.049	0-3.043	0-4.421	0-6.255	0-8.842	0-11.813	0-15.
CANT	.116-0	.258-0	.418-0	.604-0	.836-0	1.111-0	1.44-0	1.849-0	2.356-0	2.933-0
WIND	.217-0	.456-.003	.722-.007	1.019-.015	1.352-.029	1.728-.053	2.155-.09	2.632-.15	3.111-.235	3.558-.345
VELOCITY	0-.031	0-.064	0-.107	0-.158	0-.222	0-.301	0-.402	0-.526	0-.664	0-.801
TEMPERATURE	0-0	0-.004	0-.009	0-.02	0-.037	0-.063	0-.103	0-.151	0-.164	0-.126
DENSITY	0-.005	0-.024	0-.062	0-.129	0-.24	0-.414	0-.682	0-1.057	0-1.477	0-1.923
EARTH RATE	.009	.019	.031	.045	.062	.081	.104	.131	.161	.192
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.016	0-.02
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	.424-.849	.212-.424	.141-.283	.106-.212	.085-.17	.071-.141	.061-.121	.053-.106	.047-.094	.042-.085
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	1.19-1.802	1.223-1.776	1.376-2.052	1.61-2.591	1.927-3.44	2.326-4.719	2.812-6.498	3.397-9.06	4.054-12.03	4.741-15.23
ROUND-TO-ROUND	1.088-1.725	1.024-1.56	1.012-1.528	1.007-1.516	1.005-1.511	1.004-1.508	1.004-1.506	1.003-1.505	1.003-1.504	1.003-1.504
OCCASION-TO-OCCASION	.483-.523	.669-.849	.932-1.37	1.256-2.101	1.644-3.09	2.097-4.471	2.627-6.321	3.246-8.934	3.928-11.94	4.634-15.16

.50 CALIBER M33 BALL - SYSTEM 2

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0-.226		0-.526		0-.928		0-1.463		0-2.174		0-3.158		0-4.468		0-6.316		0-8.438		0-10.714	
CANT	.116-0		.258-0		.418-0		.604-0		.836-0		1.111-0		1.44-0		1.849-0		2.356-0		2.933-0	
WIND	.217-0		.456-.003		.722-.007		1.019-.015		1.352-.029		1.728-.053		2.155-.09		2.632-.15		3.111-.235		3.558-.345	
VELOCITY	0-.031		0-.064		0-.107		0-.158		0-.222		0-.301		0-.402		0-.526		0-.664		0-.801	
TEMPERATURE	0-0		0-.004		0-.009		0-.02		0-.037		0-.063		0-.103		0-.151		0-.164		0-.126	
DENSITY	0-.005		0-.024		0-.062		0-.129		0-.24		0-.414		0-.682		0-1.057		0-1.477		0-1.923	
EARTH RATE	.009		.019		.031		.045		.062		.081		.104		.131		.161		.192	
SITE ANGLE	0-.001		0-.002		0-.003		0-.004		0-.006		0-.008		0-.01		0-.013		0-.016		0-.02	
RETICLE	0-.15		0-.175		0-.206		0-.244		0-.29		0-.351		0-.426		0-.526		0-.625		0-.714	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.170		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-.1.5		1.-1.5	
SYSTEM	1.19-1.795		1.223-1.708		1.376-1.851		1.61-2.172		1.927-2.716		2.326-3.58		2.812-4.821		3.397-6.638		4.054-8.761		4.741-11.06	
ROUND-TO-ROUND	1.088-1.725		1.024-1.56		1.012-1.528		1.007-1.516		1.005-1.511		1.004-1.508		1,004-1.506		1.003-1.505		1.003-1.504		1.003-1.504	
OCCASION-TO-OCCASION	.483-.497		.669-.696		.932-1.045		1.256-1.555		1.644-2.257		2.097-3.247		2.627-4.58		3.246-6.465		3.928-8.631		4.634-10.95	

.50 CALIBER M33 BALL - SYSTEM 3

	200		400		600		800		1000		1200		1400		1600		1800		2000	
	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V
RANGE	0-.075		0-.088		0-.103		0-.122		0-.145		0-.175		0-.213		0-.263		0-.313		0-.357	
CANT	.116-0		.258-0		.418-0		.604-0		.836-0		1.111-0		1.44-0		1.849-0		2.356-0		2.933-0	
WIND	.217-0		.456-.003		.722-.007		1.019-.015		1.352-.029		1.728-.053		2.155-.09		2.632-.15		3.111-.235		3.558-.345	
VELOCITY	0-.031		0-.064		0-.107		0-.158		0-.222		0-.301		0-.402		0-.526		0-.664		0-.801	
TEMPERATURE	0-0		0-.004		0-.009		0-.02		0-.037		0-.063		0-.103		0-.151		0-.164		0-.126	
DENSITY	0-.005		0-.024		0-.062		0-.129		0-.24		0-.414		0-.682		0-1.057		0-1.477		0-1.923	
EARTH RATE	.009		.019		.031		.045		.062		.081		.104		.131		.161		.192	
SITE ANGLE	0-.001		0-.002		0-.003		0-.004		0-.006		0-.008		0-.01		0-.013		0-.016		0-.02	
RETICLE	0-.15		0-.175		0-.206		0-.244		0-.29		0-.351		0-.426		0-.526		0-.625		0-.714	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.17		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5		1.-1.5	
SYSTEM	1.19-1.782		1.223-1.628		1.376-1.605		1.61-1.609		1.927-1.635		2.326-1.695		2.812-1.823		3.397-2.059		4.054-2.387		4.741-2.754	
ROUND-TO-ROUND	1.088-1.725		1.024-1.56		1.012-1.528		1.007-1.516		1.005-1.511		1.004-1.508		1.004-1.506		1.003-1.505		1.003-1.504		1.003-1.504	
OCCASION-TO-OCCASION	.483-.449		.669-.465		.932-.492		1.256-.54		1.644-.625		2.097-.775		2.627-1.027		3.246-1.405		3.928-1.842		4.634-2.307	

.50 CALIBER M33 BALL - SYSTEM 4

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.075	0-.088	0-.103	0-.122	0-.145	0-.175	0-.213	0-.263	0-.313	0-.357
CANT	.012-0	.026-0	.042-0	.06-0	.084-0	.111-0	.144-0	.185-0	.236-0	.293-0
WIND	.113-0	.238-.003	.377-.007	.532-.015	.706-.029	.903-.053	1.126-.09	1.375-.15	1.625-.235	1.859-.345
VELOCITY	0-.006	0-.013	0-.021	0-.032	0-.044	0-.06	0-.08	0-.105	0-.133	0-.16
TEMPERATURE	0-0	0-.001	0-.002	0-.004	0-.007	0-.013	0-.021	0-.03	0-.033	0-.025
DENSITY	0-.001	0-.005	0-.012	0-.026	0-.048	0-.083	0-.136	0-.211	0-.295	0-.385
EARTH RATE	.009	.019	.031	.045	.062	.081	.104	.131	.161	.192
SITE ANGLE	0-.001	0-.002	0-.003	0-.004	0-.006	0-.008	0-.01	0-.013	0-.016	0-.02
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	.424-.849	.212-.424	.141-.283	.106-.212	.085-.17	.071-.141	.061-.121	.053-.106	.047-.094	.042-.085
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5	1.-1.5
SYSTEM	1.17-1.775	1.131-1.617	1.158-1.587	1.215-1.578	1.301-1.577	1.42-1.58	1.574-1.591	1.767-1.613	1.975-1.649	2.181-1.7
ROUND-TO-ROUND	1.088-1.725	1.024-1.56	1.012-1.528	1.007-1.516	1.005-1.511	1.004-1.508	1.004-1.506	1.003-1.505	1.003-1.504	1.003-1.504
OCCASION-TO-OCCASION	.431-.422	.48-.425	.563-.43	.679-.437	.826-.45	1.003-.473	1.213-.512	1.454-.581	1.701-.677	1.937-.794

.50 CALIBER SLAP XM903 - SYSTEM 1

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0-.165		0-.356		0-.581		0-.848		0-1.16		0-1.537		0-1.986		0-2.526		0-3.176		0-4.	
CANT	.062-0		.133-0		.204-0		.293-0		.382-0		.48-0		.587-0		.711-0		.844-0		.996-0	
WIND	.084-0		.173-0		.27-.001		.374-.002		.487-.003		.611-.005		.745-.008		.891-.012		1.052-.018		1.23-.026	
VELOCITY	0-.01		0-.025		0-.041		0-.057		0-.076		0-.099		0-.124		0-.154		0-.189		0-.229	
TEMPERATURE	0-0		0-.003		0-.006		0-.012		0-.02		0-.032		0-.048		0-.069		0-.097		0-.134	
DENSITY	0-.003		0-.006		0-.015		0-.03		0-.052		0-.084		0-.128		0-.189		0-.271		0-.383	
EARTH RATE	.003		.007		.01		.015		.019		.024		.029		.035		.042		.05	
SITE ANGLE	0-0		0-.001		0-.001		0-.002		0-.003		0-.003		0-.004		0-.005		0-.006		0-.007	
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	1.94		.97		.647		.485		.388		.323		.277		.243		.216		.194	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.5		.5		.5		.5		.5		.5		.5		.5		.5		.5	
SYSTEM	2.05-2.054		1.19-1.223		.979-1.088		.942-1.177		.98-1.39		1.065-1.706		1.184-2.117		1.336-2.633		1.514-3.268		1.724-4.085	
ROUND-TO-ROUND	2.005		1.093		.82		.699		.636		.598		.574		.559		.548		.539	
OCCASION-TO-OCCASION	.428-.447		.469-.548		.536-.716		.631-.947		.746-1.236		.881-1.598		1.036-2.038		1.214-2.573		1.412-3.222		1.637-4.049	

.50 CALIBER SLAP XM903 - SYSTEM 2

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.118	0-.254	0-.415	0-.606	0-.829	0-1.098	0-1.419	0-1.805	0-2.269	0-2.857
CANT	.062-0	.133-0	.204-0	.293-0	.382-0	.48-0	.587-0	.711-0	.844-0	.996-0
WIND	.084-0	.173-0	.27-.001	.374-.002	.487-.003	.611-.005	.745-.008	.891-.012	1.052-.018	1.23-.026
VELOCITY	0-.01	0-.025	0-.041	0-.057	0-.076	0-.099	0-.124	0-.154	0-.189	0-.229
TEMPERATURE	0-0	0-.003	0-.006	0-.012	0-.02	0-.032	0-.048	0-.069	0-.097	0-.134
DENSITY	0-.003	0-.006	0-.015	0-.03	0-.052	0-.084	0-.128	0-.189	0-.271	0-.383
EARTH RATE	.003	.007	.01	.015	.019	.024	.029	.035	.042	.05
SITE ANGLE	0-0	0-.001	0-.001	0-.002	0-.003	0-.003	0-.004	0-.005	0-.006	0-.007
RETICLE	0-.078	0-.085	0-.092	0-.101	0-.11	0-.122	0-.135	0-.15	0-.168	0-.19
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94	.97	.647	.485	.388	.323	.277	.243	.216	.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
SYSTEM	2.05-2.052	1.19-1.2	.979-1.013	.942-1.021	.98-1.134	1.065-1.33	1.184-1.603	1.336-1.957	1.514-2.402	1.724-2.98
ROUND-TO-ROUND	2.005	1.093	.82	.699	.636	.598	.574	.559	.548	.539
OCCASION-TO-OCCASION	.428-.439	.469-.495	.536-.596	.631-.744	.746-.939	.881-1.188	1.036-1.496	1.214-1.876	1.412-2.339	1.637-2.931

.50 CALIBER SLAP XM903 - SYSTEM 3

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.039	0-.042	0-.046	0-.051	0-.055	0-.061	0-.068	0-.075	0-.084	0-.095
CANT	.062-0	.133-0	.204-0	.293-0	.382-0	.48-0	.587-0	.711-0	.844-0	.996-0
WIND	.084-0	.173-0	.27-.001	.374-.002	.487-.003	.611-.005	.745-.008	.891-.012	1.052-.018	1.23-.026
VELOCITY	0-.01	0-.025	0-.041	0-.057	0-.076	0-.099	0-.124	0-.154	0-.189	0-.229
TEMPERATURE	0-0	0-.003	0-.006	0-.012	0-.02	0-.032	0-.048	0-.069	0-.097	0-.134
DENSITY	0-.003	0-.006	0-.015	0-.03	0-.052	0-.084	0-.128	0-.189	0-.271	0-.383
EARTH RATE	.003	.007	.01	.015	.019	.024	.029	.035	.042	.05
SITE ANGLE	0-0	0-.001	0-.001	0-.002	0-.003	0-.003	0-.004	0-.005	0-.006	0-.007
RETICLE	0-.078	0-.085	0-.092	0-.101	0-.11	0-.122	0-.135	0-.15	0-.168	0-.19
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94	.97	.647	.485	.388	.323	.277	.243	.216	.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
SYSTEM	2.05-2.049	1.19 1.173	.979-.926	.942-.842	.98-.775	1.065-.754	1.184-.748	1.336-.76	1.514-.792	1.724-.854
ROUND-TO-ROUND	2.005	1.093	.82	.699	.636	.598	.574	.559	.548	.539
OCCASION-TO-OCCASION	.428-.424	.469-.427	.536-.43	.631-.436	.746-.444	.881-.458	1.036-.48	1.214-.516	1.412-.573	1.637-.662

.50 CALIBER SLAP XM903 - SYSTEM 4

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0	-.039	0	-.042	0	-.046	0	-.051	0	-.055	0	-.061	0	-.068	0	-.075	0	-.084	0	-.095
CANT	.006	-0	.013	-0	.02	-0	.029	-0	.038	-0	.048	-0	.059	-0	.071	-0	.084	-0	.1	-0
WIND	.044	-0	.09	-0	.141	-.001	.195	-.002	.255	-.003	.319	-.005	.389	-.008	.466	-.012	.55	-.018	.642	-.026
VELOCITY	0	-.002	0	-.005	0	-.008	0	-.011	0	-.015	0	-.02	0	-.025	0	-.031	0	-.038	0	-.046
TEMPERATURE	0	-0	0	-.001	0	-.001	0	-.002	0	-.004	0	-.006	0	-.01	0	-.014	0	-.019	0	-.027
DENSITY	0	-.001	0	-.001	0	-.003	0	-.006	0	-.01	0	-.017	0	-.026	0	-.038	0	-.054	0	-.077
EARTH RATE	.003		.007		.01		.015		.019		.024		.029		.035		.042		.05	
SITE ANGLE	0	-0	0	-.001	0	-.001	0	-.002	0	-.003	0	-.003	0	-.004	0	-.005	0	-.006	0	-.007
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	1.94		.97		.647		.485		.388		.323		.277		.243		.216		.194	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.5		.5		.5		.5		.5		.5		.5		.5		.5		.5	
SYSTEM	2.048	-2.048	1.173	-1.17	.93	-.92	.837	-.815	.802	-.762	.797	-.732	.811	-.714	.841	-.703	.885	-.697	.942	-.696
ROUND-TO-ROUND	2.005		1.093		.82		.699		.636		.598		.574		.559		.548		.539	
OCCASION-TO-OCCASION	.418	-.417	.425	-.417	.439	-.418	.46	-.419	.489	-.42	.526	-.421	.573	-.424	.629	-.427	.696	-.432	.773	-.44

7.62MM BALL M80 - SYSTEM 1

	200		400		600		800		1000		1200		1400		1600		1800		2000	
	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V
RANGE	0-.412		0-1.091		0-2.25		0-4.421		0-7.5		0-11.455		0-16.333		0-22.4		0-29.077		0-38.182	
CANT	.142-0		.329-0		.587-0		.96-0		1.493-0		2.213-0		3.093-0		4.16-0		5.413-0		6.871-0	
WIND	.408-.002		.914-.006		1.563-.021		2.412-.061		3.337-.148		4.18-.29		4.969-.493		5.73-.769		6.483-1.136		7.243-1.614	
VELOCITY	0-.041		0-.097		0-.182		0-.317		0-.492		0-.67		0-.851		0-1.043		0-1.25		0-1.48	
TEMPERATURE	0-.003		0-.018		0-.055		0-.134		0-.183		0-.143		0-.024		0-.167		0-.428		0-.759	
DENSITY	0-.01		0-.06		0-.192		0-.5		0-.949		0-1.479		0-2.12		0-2.914		0-3.909		0-5.173	
EARTH RATE	.005		.012		.02		.033		.048		.065		.084		.104		.127		.152	
SITE ANGLE	0-.001		0-.002		0-.004		0-.007		0-.01		0-.015		0-.021		0-.029		0-.037		0-.047	
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.17		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773	
SYSTEM	1.-1.236		1.274-1.421		1.855-2.419		2.718-4.539		3.743-7.623		4.797-11.60		5.908-16.52		7.126-22.64		8.484-29.40		10.02-38.61	
ROUND-TO-ROUND	.801-1.088		.712-.801		.694-.736		.688-.712		.686-.701		.683-.694		.683-.691		.682-.688		.682-.686		.681-.685	
OCCASION-TO-OCCASION	.599-.587		1.056-1.173		1.72-2.304		2.629-4.482		3.68-7.591		4.748-11.58		5.868-16.51		7.094-22.63		8.457-29.39		9.993-38.60	

7.62MM BALL M80 - SYSTEM 2

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.294	0-.779	0-1.607	0-3.158	0-5.357	0-8.182	0-11.667	0-16.	0-20.769	0-27.273
CANT	.142-0	.329-0	.587-0	.96-0	1.493-0	2.213-0	3.093-0	4.16-0	5.413-0	6.871-0
WIND	.408-.002	.914-.006	1.563-.021	2.412-.061	3.337-.148	4.18-.29	4.969-.493	5.73-.769	6.483-1.136	7.243-1.614
VELOCITY	0-.041	0-.097	0-.182	0-.317	0-.492	0-.67	0-.851	0-1.043	0-1.25	0-1.48
TEMPERATURE	0-.003	0-.018	0-.055	0-.134	0-.183	0-.143	0-.024	0-.167	0-.428	0-.759
DENSITY	0-.01	0-.06	0-.192	0-.5	0-.949	0-1.479	0-2.12	0-2.914	0-3.909	0-5.173
EARTH RATE	.005	.012	.02	.033	.048	.065	.084	.104	.127	.152
SITE ANGLE	0-.001	0-.002	0-.004	0-.007	0-.01	0-.015	0-.021	0-.029	0-.037	0-.047
RETICLE	0-.196	0-.26	0-.357	0-.526	0-.714	0-.909	0-1.111	0-1.333	0-1.538	0-1.818
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	.424-.849	.212-.424	.141-.283	.106-.212	.085-.17	.071-.141	.061-.121	.053-.106	.047-.094	.042-.085
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773
SYSTEM	1.-1.217	1.274-1.226	1.855-1.87	2.718 3.362	3.743-5.574	4.797-8.436	5.908-11.98	7.126-16.39	8.484-21.28	10.02-27.93
ROUND-TO-ROUND	.801-1.008	.712-.801	.694-.736	.688-.712	.686-.701	.683-.694	.683-.691	.682-.688	.682-.686	.681-.685
OCCASION-TO-OCCASION	.599-.547	1.056-.927	1.72-1.719	2.629-3.286	3.68-5.529	4.748-8.408	5.868-11.96	7.094-16.38	8.457-21.27	9.993-27.92

7.62MM BALL M80 - SYSTEM 3

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0	-.098	0	-.13	0	-.179	0	-.263	0	-.357	0	-.455	0	-.556	0	-.667	0	-.769	0	-.909
CANT	.142	-0	.329	-0	.587	-0	.96	-0	1.493	-0	2.213	-0	3.093	-0	4.16	-0	5.413	-0	6.871	-0
WIND	.408	-.002	.914	-.006	1.563	-.021	2.412	-.061	3.337	-.148	4.18	-.29	4.969	-.493	5.73	-.769	6.483	-1.136	7.243	-1.614
VELOCITY	0	-.041	0	-.097	0	-.182	0	-.317	0	-.492	0	-.67	0	-.851	0	-1.043	0	-1.25	0	-1.48
TEMPERATURE	0	-.003	0	-.018	0	-.055	0	-.134	0	-.183	0	-.143	0	-.024	0	-.167	0	-.428	0	-.759
DENSITY	0	-.01	0	-.06	0	-.192	0	-.5	0	-.949	0	-1.479	0	-2.12	0	-2.914	0	-3.909	0	-5.173
EARTH RATE	.005		.012		.02		.033		.048		.065		.084		.104		.127		.152	
SITE ANGLE	0	-.001	0	-.002	0	-.004	0	-.007	0	-.01	0	-.015	0	-.021	0	-.029	0	-.037	0	-.047
RETICLE	0	-.196	0	-.26	0	-.357	0	-.526	0	-.714	0	-.909	0	-1.111	0	-1.333	0	-1.538	0	-1.818
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424	-.849	.212	-.424	.141	-.283	.106	-.212	.085	-.17	.071	-.141	.061	-.121	.053	-.106	.047	-.094	.042	-.085
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773		.6773	
SYSTEM	1.	-1.185	1.274	-.956	1.855	-.974	2.718	-1.183	3.743	-1.581	4.797	-2.105	5.908	-2.768	7.126	-3.616	8.484	-4.683	10.02	-6.077
ROUND-TO-ROUND	.801	-1.088	.712	-.801	.694	-.736	.688	-.712	.686	-.701	.683	-.694	.683	-.691	.682	-.688	.682	-.686	.681	-.685
OCCASION-TO-OCCASION	.599	-.471	1.056	-.521	1.72	-.637	2.629	-.944	3.68	-1.418	4.748	-1.988	5.868	-2.681	7.094	-3.55	8.457	-4.633	9.993	-6.038

7.62MM BALL M80 - SYSTEM 4

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.098	0-.13	0-.179	0-.263	0-.357	0-.455	0-.556	0-.667	0-.769	0-.909
CANT	.014-0	.033-0	.059-0	.096-0	.149-0	.221-0	.309-0	.416-0	.541-0	.687-0
WIND	.213-.002	.478-.006	.817-.021	1.26-.061	1.743-.148	2.184-.29	2.596-.493	2.993-.769	3.387-1.136	3.784-1.614
VELOCITY	0-.008	0-.019	0-.036	0-.063	0-.098	0-.134	0-.17	0-.209	0-.25	0-.296
TEMPERATURE	0-.0005	0-.004	0-.011	0-.027	0-.037	0-.029	0-.005	0-.034	0-.086	0-.152
DENSITY	0-.002	0-.012	0-.038	0-.1	0-.19	0-.296	0-.424	0-.583	0-.782	0-1.035
EARTH RATE	.005	.012	.02	.033	.048	.065	.084	.104	.127	.152
SITE ANGLE	0-.001	0-.002	0-.004	0-.007	0-.01	0-.015	0-.021	0-.029	0-.037	0-.047
RETICLE	0	0	0	0	0	0	0	0	0	0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	.424-.849	.212-.424	.141-.283	.106-.212	.085-.17	.071-.141	.061-.121	.053-.106	.047-.094	.042-.085
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773	.6773
SYSTEM	.927-1.169	.953-.912	1.151-.866	1.498-.876	1.925-.928	2.337-1.028	2.735-1.191	3.127-1.442	3.524-1.796	3.931-2.298
ROUND-TO-ROUND	.801-1.088	.712-.801	.694-.736	.688-.712	.686-.701	.683-.694	.683-.691	.682-.688	.682-.686	.681-.685
OCCASION-TO-OCCASION	.467-.428	.634-.436	.918-.456	1.33-.511	1.799-.609	2.235-.758	2.648-.97	3.052-1.267	3.457-1.659	3.871-2.193

XM998

7.62MM SLAP - SYSTEM 1

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	.0-.19	0-.494	0-1.008	0-1.931	0-3.684	0-6.632	0-10.5	0-16.	0-22.235	0-30.
CANT	.062-0	.142-0	.249-0	.40-0	.631-0	1.004-0	1.547-0	2.267-0	3.2-0	4.364-0
WIND	.251-0	.57-.001	.979-.005	1.519-.015	2.252-.042	3.162-.109	4.065-.228	4.958-.415	5.866-.693	6.812-1.099
VELOCITY	0-.01	0-.028	0-.053	0-.092	0-.16	0-.267	0-.389	0-.525	0-.683	0-.87
TEMPERATURE	0-.003	0-.01	0-.029	0-.07	0-.158	0-.272	0-.334	0-.343	0-.304	0-.221
DENSITY	0-.005	0-.024	0-.078	0-.208	0-.515	0-1.036	0-1.702	0-2.561	0-3.703	0-5.239
EARTH RATE	.003	.007	.013	.021	.032	.048	.066	.086	.109	.136
SITE ANGLE	0-0	0-.001	0-.002	0-.003	0-.004	0-.007	0-.011	0-.016	0-.022	0-.03
RETICLE	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
REROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94	.97	.647	.485	.388	.323	.277	.243	.216	.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
SYSTEM	2.063-2.056	1.309-1.27	1.366-1.368	1.769-2.109	2.459-3.804	3.397-6.764	4.407-10.68	5.497-16.24	6.718-22.58	8.12-30.495
ROUND-TO-ROUND	2.005	1.093	.82	.699	.636	.598	.575	.559	.548	.54
OCCASION-TO-OCCASION	.489-.457	.72-.647	1.092-1.095	1.625-1.99	2.375-3.75	3.344-6.737	4.37-10.66	5.468-16.23	6.696-22.57	8.102-30.49

XM998

7.62MM SLAP - SYSTEM 2

	200 M V	400 M V	600 M V	800 M V	1000 M V	1200 M V	1400 M V	1600 M V	1800 M V	2000 M V
RANGE	0-.136	0-.353	0-.72	0-1.379	0-2.632	0-4.737	0-7.5	0-11.429	0-15.882	0-21.429
CANT	.062-0	.142-0	.249-0	.40-0	.631-0	1.004-0	1.547-0	2.267-0	3.2-0	4.364-0
WIND	.251-0	.57-.001	.979-.005	1.519-.015	2.252-.042	3.162-.109	4.065-.228	4.958-.415	5.866-.693	6.812-1.099
VELOCITY	0-.01	0-.028	0-.053	0-.092	0-.16	0-.267	0-.389	0-.525	0-.683	0-.87
TEMPERATURE	0-.003	0-.01	0-.029	0-.07	0-.16	0-.272	0-.334	0-.343	0-.304	0-.221
DENSITY	0-.005	0-.024	0-.078	0-.208	0-.515	0-1.036	0-1.702	0-2.561	0-3.703	0-5.239
EARTH RATE	.003	.007	.013	.021	.032	.048	.066	.086	.109	.136
SITE ANGLE	0-0	0-.001	0-.002	0-.003	0-.004	0-.007	0-.011	0-.016	0-.022	0-.03
RETICLE	0-.09	0-.118	0-.16	0-.23	0-.351	0-.526	0-.714	0-.952	0-1.176	0-1.429
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	1.94	.97	.647	.485	.388	.323	.277	.243	.216	.194
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
SYSTEM	2.063-2.054	1.309-1.228	1.366-1.183	1.769-1.635	2.459-2.819	3.397-4.948	4.407-7.777	5.497-11.80	6.718-16.40	8.12-22.163
ROUND-TO-ROUND	2.005	1.093	.82	.699	.636	.598	.575	.559	.548	.54
OCCASION-TO-OCCASION	.489-.447	.72-.559	1.092-.853	1.625-1.478	2.375-2.746	3.344-4.911	4.37-7.756	5.468-11.78	6.696-16.39	8.102-22.16

XM998

7.62MM SLAP - SYSTEM 3

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	.0	-.045	.0	-.059	.0	-.08	.0	-.115	.0	-.175	.0	-.263	.0	-.357	.0	-.476	.0	-.588	.0	-.714
CANT	.062	-0	.142	-0	.249	-0	.4	-0	.631	-0	1.004	-0	1.547	-0	2.267	-0	3.2	-0	4.364	-0
WIND	.251	-.0	.57	-.001	.979	-.005	1.519	-.015	2.252	-.042	3.162	-.109	4.065	-.228	4.958	-.415	5.866	-.693	6.812	-1.099
VELOCITY	0	-.01	0	-.028	0	-.053	0	-.092	0	-.16	0	-.267	0	-.389	0	-.525	0	-.683	0	-.87
TEMPERATURE	0	-.003	0	-.01	0	-.029	0	-.07	0	-.158	0	-.27 2	0	-.334	0	-.343	0	-.304	0	-.221
DENSITY	0	-.005	0	-.024	0	-.078	0	-.208	0	-.515	0	-1.036	0	-1.702	0	-2.561	0	-3.703	0	-5.239
EARTH RATE	.003		.007		.013		.021		.032		.048		.066		.086		.109		.136	
SITE ANGLE	0	-0	0	-.001	0	-.002	0	-.003	0	-.004	0	-.007	0	-.011	0	-.016	0	-.022	0	-.03
RETICLE	0	-.09	0	-.118	0	-.16	0	-.23	0	-.351	0	-.526	0	-.714	0	-.952	0	-1.176	0	-1.429
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	1.94		.97		.647		.485		.388		.323		.277		.243		.216		.194	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.5		.5		.5		.5		.5		.5		.5		.5		.5		.5	
SYSTEM	2.063	-2.05	1.309	-1.177	1.366	-.942	1.769	-.886	2.459	-1.024	3.397	-1.452	4.407	-2.087	5.497	-2.958	6.718	-4.119	8.12	-5.701
ROUND-TO-ROUND	2.005		1.093		.82		.699		.636		.598		.575		.559		.548		.54	
OCCASION-TO-OCCASION	.489	-.428	.72	-.437	1.092	-.464	1.625	-.544	2.375	-.803	3.344	-1.323	4.37	-2.006	5.468	-2.905	6.696	-4.082	8.102	-5.675

XM998

7.62MM SLAP - SYSTEM 4

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0-.045		0-.059		0-.08		0-.115		0-.175		0-.263		0-.357		0-.476		0-.588		0-.714	
CANT	.006-0		.014-0		.025-0		.04-0		.063-0		.1-0		.155-0		.227-0		.32-0		.436-0	
WIND	.131-0		.298-.001		.511-.005		.794-.015		1.177-.042		1.652-.109		2.124-.228		2.59-.415		3.065-.693		3.558-1.099	
VELOCITY	0-.002		0-.006		0-.011		0-.018		0-.032		0-.053		0-.078		0-.105		0-.137		0-.174	
TEMPERATURE	0-.001		0-.002		0-.006		0-.014		0-.032		0-.054		0-.067		0-.069		0-.061		0-.044	
DENSITY	0-.001		0-.005		0-.016		0-.042		0-.103		0-.207		0-.34		0-.512		0-.741		0-1.048	
EARTH RATE	.003		.007		.013		.021		.032		.048		.066		.086		.109		.136	
SITE ANGLE	0-0		0-.001		0-.002		0-.003		0-.004		0-.007		0-.011		0-.016		0-.022		0-.03	
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	1.94		.97		.647		.485		.388		.323		.277		.243		.216		.194	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.5		.5		.5		.5		.5		.5		.5		.5		.5		.5	
SYSTEM	2.052-2.048		1.207-1.171		1.052-.922		1.138-.823		1.402-.789		1.809-.814		2.245-.901		2.693-1.081		3.159-1.372		3.651-1.825	
ROUND-TO-ROUND	2.005		1.093		.820		.699		.636		.598		.575		.559		.548		.54	
OCCASION-TO-OCCASION	.436-.418		.512-.42		.659-.423		.897-.435		1.25-.468		1.707-.551		2.171-.694		2.634-.926		3.111-1.258		3.611-1.743	

7.62MM BALL M118 (MATCH) - SYSTEM 1

	200 M	200 V	400 M	400 V	600 M	600 V	800 M	800 V	1000 M	1000 V	1200 M	1200 V	1400 M	1400 V	1600 M	1600 V	1800 M	1800 V	2000 M	2000 V
RANGE	0-.442		0-1.12		0-2.136		0-3.818		0-6.364		0-9.333		0-13.364		0-17.684		0-22.235		0-28.	
CANT	.16-0		.356-0		.613-0		.951-0		1.404-0		2.-0		2.729-0		3.582-0		4.56-0		5.689-0	
WIND	.377-.002		.814-.007		1.332-.021		1.965-.051		2.713-.113		3.414-.214		4.053-.357		4.659-.545		5.252-.787		5.843-1.095	
VELOCITY	0-.046		0-.102		0-.182		0-.293		0-.448		0-.609		0-.768		0-.931		0-1.102		0-1.286	
TEMPERATURE	0-.003		0-.008		0-.024		0-.06		0-.106		0-.079		0-.019		0-.175		0-.384		0-.644	
DENSITY	0-.01		0-.052		0-.153		0-.362		0-.716		0-1.12		0-1.583		0-2.136		0-2.81		0-3.642	
EARTH RATE	.005		.012		.02		.031		.044		.059		.076		.093		.112		.133	
SITE ANGLE	0-.001		0-.002		0-.004		0-.007		0-.01		0-.014		0-.019		0-.025		0-.031		0-.039	
RETICLE	0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.17		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.282		.282		.282		.282		.282		.282		.282		.282		.282		.282	
SYSTEM	.777-1.084		1.044-1.305		1.557-2.226		2.244-3.887		3.098-6.444		3.991-9.437		4.913-13.50		5.899-17.85		6.975-22.46		8.172-28.30	
ROUND-TO-ROUND	.512-.897		.357-.512		.321-.404		.307-.358		.301-.334		.297-.321		.295-.313		.293-.307		.292-.303		.291-.301	
C ASION-TO-OCCASION	.584-.609		.981-1.2		1.524-2.189		2.223-3.87		3.083-6.435		3.98-9.432		4.904-13.49		5.892-17.85		6.969-22.46		8.167-28.30	

7.62MM SLAP BALL M118 (MATCH) - SYSTEM 2

	200 H	200 V	400 H	400 V	600 H	600 V	800 H	800 V	1000 H	1000 V	1200 H	1200 V	1400 H	1400 V	1600 H	1600 V	1800 H	1800 V	2000 H	2000 V
RANGE	0-.316		0-.80		0-1.525		0-2.727		0-4.545		0-6.667		0-9.545		0-12.632		0-15.882		0-20.	
CANT	.16-0		.356-0		.613-0		.951-0		1.404-0		2.-0		2.729-0		3.582-0		4.56-0		5.689-0	
WIND	.377-.002		.814-.007		1.332-.021		1.965-.051		2.713-.113		3.414-.214		4.053-.357		4.659-.545		5.252-.787		5.843-1.095	
VELOCITY	0-.046		0-.102		0-.182		0-.293		0-.448		0-.609		0-.768		0-.931		0-1.102		0-1.286	
TEMPERATURE	0-.003		0-.008		0-.024		0-.06		0-.106		0-.079		0-.019		0-.175		0-.384		0-.644	
DENSITY	0-.010		0-.052		0-.153		0-.362		0-.716		0-1.12		0-1.583		0-2.136		0-2.81		0-3.642	
EARTH RATE	.005		.012		.02		.031		.044		.059		.076		.093		.112		.133	
SITE ANGLE	0-.001		0-.002		0-.004		0-.007		0-.10		0-.014		0-.019		0-.025		0-.031		0-.039	
RETICLE	0-.211		0-.267		0-.339		0-.455		0-.606		0-.741		0-.909		0-1.053		0-1.176		0-1.333	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
ZEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.17		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.282		.282		.282		.282		.282		.282		.282		.282		.282		.282	
SYSTEM	.777-1.06		1.044-1.077		1.557-1.683		2.244-2.859		3.098-4.696		3.99-6.853		4.913-9.769		5.899-12.91		6.975-16.24		8.172-20.46	
ROUND-TO-ROUND	.512-.897		.357-.512		.321-.404		.307-.358		.301-.334		.297-.321		.295-.313		.293-.307		.292-.303		.291-.301	
OCCASION-TO-OCCASION	.584-.565		.981-.947		1.524-1.634		2.223-2.836		3.083-4.684		3.979-6.845		4.904-9.764		5.892-12.91		6.969-16.24		8.167-20.46	

7.62MM BALL M118 (MATCH) - SYSTEM 3

	200 H V	400 H V	600 H V	800 H V	1000 H V	1200 H V	1400 H V	1600 H V	1800 H V	2000 H V
RANGE	0-.105	0-.133	0-.169	0-.227	0-.303	0-.37	0-.455	0-.526	0-.588	0-.667
CANT	.16-0	.356-0	.613-0	.951-0	1.404-0	2.-0	2.729-0	3.582-0	4.56-0	5.689-0
WIND	.377-.002	.814-.007	1.332-.021	1.965-.051	2.713-.113	3.414-.214	4.053-.357	4.659-.545	5.252-.787	5.843-1.095
VELOCITY	0-.046	0-.102	0-.182	0-.293	0-.448	0-.609	0-.768	0-.931	0-1.102	0-1.286
TEMPERATURE	0-.003	0-.008	0-.024	0-.060	0-.106	0-.079	0-.019	0-.175	0-.384	0-.644
DENSITY	0-.010	0-.052	0-.153	0-.362	0-.716	0-1.120	0-1.583	0-2.136	0-2.81	0-3.642
EARTH RATE	.005	.012	.02	.031	.044	.059	.076	.093	.112	.133
SITE ANGLE	0-.001	0-.002	0-.004	0-.007	0-.010	0-.014	0-.019	0-.025	0-.031	0-.039
RETICLE	0-.211	0-.267	0-.339	0-.455	0-.606	0-.741	0-.909	0-1.053	0-1.176	0-1.333
BORESIGHT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SOLUTION	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
JUMP DISPERSION	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
ZEROING	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
AIMING	.424-.849	.212-.424	.141-.283	.106-.212	.085-.17	.071-.141	.061-.121	.053-.106	.047-.094	.042-.085
RESOLUTION	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
AMMUNITION DISPERION	.282	.282	.282	.282	.282	.282	.282	.282	.282	.282
SYSTEM	.777-1.017	1.044-.733	1.557-.733	2.244-.886	3.098-1.217	3.991-1.625	4.913-2.129	5.899-2.723	6.975-3.447	8.172-4.363
ROUND-TO-ROUND	.512-.897	.357-.512	.321-.404	.307-.358	.301-.334	.297-.321	.295-.313	.293-.307	.292-.303	.291-.301
OCCASION-TO-OCCASION	.584-.48	.981-.524	1.524-.612	2.223-.81	3.083-1.17	3.98-1.593	4.904-2.106	5.892-2.706	6.969-3.434	8.167-4.353

7.62MM BALL M118 (MATCH) - SYSTEM 4

	200		400		600		800		1000		1200		1400		1600		1800		2000	
	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V	H	V
RANGE	0-.105		0-.133		0-.169		0-.227		0-.303		0-.370		0-.455		0-.526		0-.588		0-.667	
CANT	.016-0		.036-0		.061-0		.095-0		.14-0		.2-0		.273-0		.358-0		.456-0		.569-0	
WIND	.197-.002		.425-.007		.696-.021		1.027-.051		1.417-.113		1.783-.214		2.117-.357		2.434-.545		2.743-.787		3.052-1.095	
VELOCITY	0-.009		-.02		0-.036		0-.059		0-.090		0-.122		0-.154		0-.186		0-.22		0-.257	
TEMPERATURE	0-.001		0-.002		0-.005		0-.012		0-.021		0-.016		0-.004		0-.035		0-.077		0-.129	
DENSITY	0-.002		0-.01		0-.031		0-.072		0-.143		0-.224		0-.317		0-.427		0-.562		0-.728	
EARTH RATE	.005		.012		.02		.031		.044		.059		.076		.093		.112		.133	
SITE ANGLE	0-.001		0-.002		0-.004		0-.007		0-.01		0-.014		0-.019		0-.025		0-.031		0-.039	
RETICLE	0		0		0		0		0		0		0		0		0		0	
BORESIGHT	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
SOLUTION	.1		.1		.1		.1		.1		.1		.1		.1		.1		.1	
JUMP DISPERSION	.25		.25		.25		.25		.25		.25		.25		.25		.25		.25	
XEROING	.3		.3		.3		.3		.3		.3		.3		.3		.3		.3	
AIMING	.424-.849		.212-.424		.141-.283		.106-.212		.085-.17		.071-.141		.061-.121		.053-.106		.047-.094		.042-.085	
RESOLUTION	.06		.06		.06		.06		.06		.06		.06		.06		.06		.06	
AMMUNITION DISPERION	.282		.282		.282		.282		.282		.282		.282		.282		.282		.282	
SYSTEM	.688-.994		.695-.674		.874-.606		1.155-.604		1.514-.648		1.866-.726		2.196-.855		2.514-1.034		2.829-1.271		3.148-1.594	
ROUND-TO-ROUND	.512-.897		.357-.512		.321-.404		.307-.358		.301-.334		.297-.321		.295-.313		.293-.307		.292-.303		.291-.301	
OCCASION-TO-OCCASION	.46-.429		.596-.438		.813-.452		1.113-.486		1.484-.555		1.843-.651		2.176-.796		2.497-.987		2.814-1.234		3.135-1.565	

APPENDIX C

BALLISTIC DATA FROM BRL

The following ballistic data was calculated at the Ballistics Research Laboratory in Aberdeen, MD.

.50 CALIBER M20 APIT

Range (m)	Super Elev (mil)	dR/dTh (m/mil)	t (sec)	dH Vel (m)	dH Temp (m)	dH Density (m)	dH Range Wind (m)	dD Cross Wind (m)	Vert Disp (mils)	Hor Disp (mils)
200.0	1.3	132.0	0.2	0.0006	0.0000	0.0002	0.0000	0.0134	1.00	1.50
400.0	2.9	113.0	0.5	0.0025	0.0000	0.0019	0.0004	0.0559	1.00	1.50
600.0	4.7	96.0	0.8	0.0063	0.0006	0.0077	0.0015	0.1329	1.00	1.50
800.0	6.9	80.0	1.1	0.0126	0.0021	0.0216	0.0042	0.2506	1.00	1.50
1000.0	9.6	67.0	1.5	0.0221	0.0056	0.0504	0.0100	0.4164	1.00	1.50
1200.0	12.8	55.0	2.0	0.0361	0.0122	0.1047	0.0213	0.6392	1.00	1.50
1400.0	16.7	45.0	2.5	0.0562	0.0233	0.2006	0.0423	0.9290	1.00	1.50
1600.0	21.5	37.0	3.1	0.0840	0.0371	0.3504	0.0795	1.2923	1.00	1.50
1800.0	27.4	31.0	3.7	0.1183	0.0392	0.5457	0.1385	1.7093	1.00	1.50
2000.0	34.3	27.0	4.4	0.1581	0.0220	0.7897	0.2238	2.1668	1.00	1.50

.50 CALIBER M8 API

Range	Super Elev	dR/dTh	t	dH Vel	dH Temp	dH Density	dH Range Wind	dD Cross Wind	Vert Disp	Hor Disp
(m)	(mil)	(m/mil)	(sec)	(m)	(m)	(m)	(m)	(m)	(mils)	(mils)
200.0	1.3	132.0	0.2	0.0006	0.0000	0.0002	0.0000	0.0131	1.00	1.50
400.0	2.9	113.0	0.5	0.0025	0.0002	0.0019	0.0003	0.0548	1.00	1.50
600.0	4.7	96.0	0.8	0.0063	0.0009	0.0075	0.0014	0.1302	1.00	1.50
800.0	6.9	81.0	1.1	0.0124	0.0026	0.0209	0.0039	0.2446	1.00	1.50
1000.0	9.5	68.0	1.5	0.0217	0.0062	0.0483	0.0092	0.4052	1.00	1.50
1200.0	12.6	56.0	2.0	0.0353	0.0129	0.0998	0.0196	0.6203	1.00	0.50
1400.0	16.4	46.0	2.5	0.0548	0.0249	0.1919	0.0390	0.9011	1.00	1.50
1600.0	21.1	38.0	3.0	0.0822	0.0412	0.3373	0.0737	1.2564	1.00	1.50
1800.0	16.8	32.0	3.7	0.1157	0.0446	0.5216	0.1289	1.6615	1.00	1.50
2000.0	33.4	28.0	4.3	0.1538	0.0275	0.7464	0.2080	2.1010	1.00	1.50

.50 CALIBER M33 BALL

Range (m)	Super Elev (mil)	dR/dTh (m/mil)	t (sec)	dH Vel (m)	dH Temp (m)	dH Density (m)	dH Range Wind (m)	dD Cross Wind (m)	Vert Disp (mils)	Hor Disp (mils)
200.0	1.3	133.0	0.2	0.0006	0.0000	0.0002	0.0000	0.0127	1.00	1.50
400.0	2.9	114.0	0.5	0.0025	0.0003	0.0019	0.0003	0.0535	1.00	1.50
600.0	4.7	97.0	0.8	0.0063	0.0011	0.0073	0.0013	0.1270	1.00	1.50
800.0	6.8	82.0	1.1	0.0124	0.0031	0.0203	0.0036	0.2389	1.00	1.50
1000.0	9.4	69.0	1.5	0.0218	0.0072	0.0471	0.0086	0.3963	1.00	1.50
1200.0	12.5	57.0	1.9	0.0355	0.0149	0.9076	0.0185	0.6078	1.00	1.50
1400.0	16.2	47.0	2.4	0.0552	0.0284	0.1876	0.0370	0.8842	1.00	1.50
1600.0	20.8	38.0	3.0	0.0826	0.0475	0.3321	0.0701	1.2340	1.00	1.50
1800.0	26.5	32.0	3.6	0.1173	0.0579	0.5219	0.1239	1.6411	1.00	1.50
2000.0	33.0	28.0	4.3	0.1572	0.0475	0.7750	0.2022	2.0857	1.00	1.50

.50 CALIBER SLAP XM903

Range	Super Elev	dR/dTh	t	dH Vel	dH Temp	dH Density	dH Range Wind	dD Cross Wind	Vert Disp	Hor Disp
(m)	(mil)	(m/mil)	(sec)	(m)	(m)	(m)	(m)	(m)	(mils)	(mils)
200.0	0.7	255.0	0.2	0.0002	0.0000	0.0001	0.0000	0.0049	0.50	0.50
400.0	1.5	236.0	0.4	0.0010	0.0002	0.0005	0.0000	0.0203	0.50	0.50
600.0	2.3	217.0	0.5	0.0024	0.0007	0.0018	0.0001	0.0474	0.50	0.50
800.0	3.3	198.0	0.8	0.0045	0.0019	0.0047	0.0004	0.0877	0.50	0.50
1000.0	4.3	181.0	0.1	0.0075	0.0040	0.0103	0.0009	0.1428	0.50	0.50
1200.0	5.4	164.0	1.2	0.0117	0.0075	0.0198	0.0018	0.2147	0.50	0.50
1400.0	6.6	148.0	1.5	0.0171	0.0132	0.0353	0.0032	0.3056	0.50	0.50
1600.0	8.0	133.0	1.7	0.0242	0.0217	0.0594	0.0057	0.4148	0.50	0.50
1800.0	9.5	119.0	2.1	0.0334	0.0344	0.0959	0.0095	0.5552	0.50	0.50
2000.0	11.2	105.0	2.4	0.0450	0.0526	0.1503	0.0155	0.7208	0.50	0.50

7.62mm BALL M80

Range	Super Elev	dR/dTh	t	dH Vel	dH Temp	dH Density	dH Range Wind	dD Cross Wind	Vert Disp	Hor Disp
(m)	(mil)	(m/mil)	(sec)	(m)	(m)	(m)	(m)	(m)	(mils)	(mils)
200.0	1.6	102.0	0.3	0.0008	0.0001	0.0004	0.0001	0.0239	0.68	0.68
400.0	3.7	77.0	0.6	0.0038	0.0014	0.0047	0.0007	0.1072	0.68	0.68
600.0	6.6	56.0	1.0	0.0107	0.0065	0.0226	0.0037	0.2749	0.68	0.68
800.0	10.8	38.0	1.5	0.0249	0.0211	0.0786	0.0142	0.5654	0.68	0.68
1000.0	16.8	28.0	2.2	0.0483	0.0359	0.1863	0.0433	0.9779	0.68	0.68
1200.0	24.9	22.0	2.9	0.0789	0.0337	0.3484	0.1019	1.4700	0.68	0.68
1400.0	34.8	18.0	3.7	0.1169	0.0066	0.5829	0.2023	2.0387	0.68	0.68
1600.0	46.8	15.0	4.6	0.1638	0.0526	0.9156	0.3608	2.6868	0.68	0.68
1800.0	60.9	13.0	5.6	0.2209	0.1513	1.3817	0.5991	3.4198	0.68	0.68
2000.0	77.3	11.0	6.6	0.2905	0.2979	2.0314	0.9461	4.2454	0.68	0.68

7.62mm SLAP XM948

Range (m)	Super Elev (mil)	dR/dTh (m/mil)	t (sec)	dH Vel (m)	dH Temp (m)	dH Density (m)	dH Range Wind (m)	dD Cross Wind (m)	Vert Disp (mils)	Hor Disp (mils)
200.0	0.7	221.0	0.2	0.0002	0.0000	0.0002	0.0000	0.0147	0.50	0.50
400.0	1.6	170.0	0.4	0.0011	0.0008	0.0019	0.0001	0.0668	0.50	0.50
600.0	2.8	125.0	0.6	0.0031	0.0034	0.0092	0.0008	0.1721	0.50	0.50
800.0	4.5	87.0	1.0	0.0072	0.0110	0.0327	0.0034	0.3562	0.50	0.50
1000.0	7.1	57.0	1.4	0.0157	0.0310	0.1011	0.0122	0.6601	0.50	0.50
1200.0	11.3	38.0	2.0	0.0314	0.0641	0.2442	0.0382	1.1121	0.50	0.50
1400.0	17.4	28.0	2.8	0.0534	0.0919	0.4678	0.0936	1.6678	0.50	0.50
1600.0	25.5	21.0	3.6	0.0825	0.1079	0.8047	0.1946	2.3248	0.50	0.50
1800.0	36.0	17.0	4.5	0.1207	0.1076	1.3088	0.3658	3.0946	0.50	0.50
2000.0	49.1	14.0	5.6	0.1708	0.0866	2.0574	0.6443	3.9926	0.50	0.50

7.62mm BALL M118 NATIONAL MATCH

Range	Super Elev	dR/dTh	t	dH Vel	dH Temp	dH Density	dH Range Wind	dD Cross Wind	Vert Disp	Hor Disp
(m)	(mil)	(m/mil)	(sec)	(m)	(m)	(m)	(m)	(m)	(mils)	(mils)
200.0	1.8	95.0	0.3	0.0009	0.0001	0.0004	0.0001	0.0221	0.282	0.282
400.0	4.0	75.0	0.6	0.0040	0.0006	0.0041	0.0008	0.0954	0.282	0.282
600.0	6.9	59.0	1.0	0.0107	0.0028	0.0180	0.0037	0.2343	0.282	0.282
800.0	10.7	44.0	1.5	0.0230	0.0095	0.0569	0.0120	0.4608	0.282	0.282
1000.0	15.8	33.0	2.1	0.0440	0.0208	0.1406	0.0331	0.7951	0.282	0.282
1200.0	22.5	27.0	2.7	0.0718	0.0186	0.2640	0.0754	1.2006	0.282	0.282
1400.0	30.7	22.0	3.4	0.1056	0.0052	0.4352	0.1463	1.6630	0.282	0.282
1600.0	40.3	19.0	4.2	0.1462	0.0551	0.6710	0.2554	2.1848	0.282	0.282
1800.0	51.3	17.0	5.0	0.1948	0.1358	0.9930	0.4152	2.7702	0.282	0.282
2000.0	64.0	15.0	6.0	0.2525	0.2528	1.4303	0.6418	3.4244	0.282	0.282

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