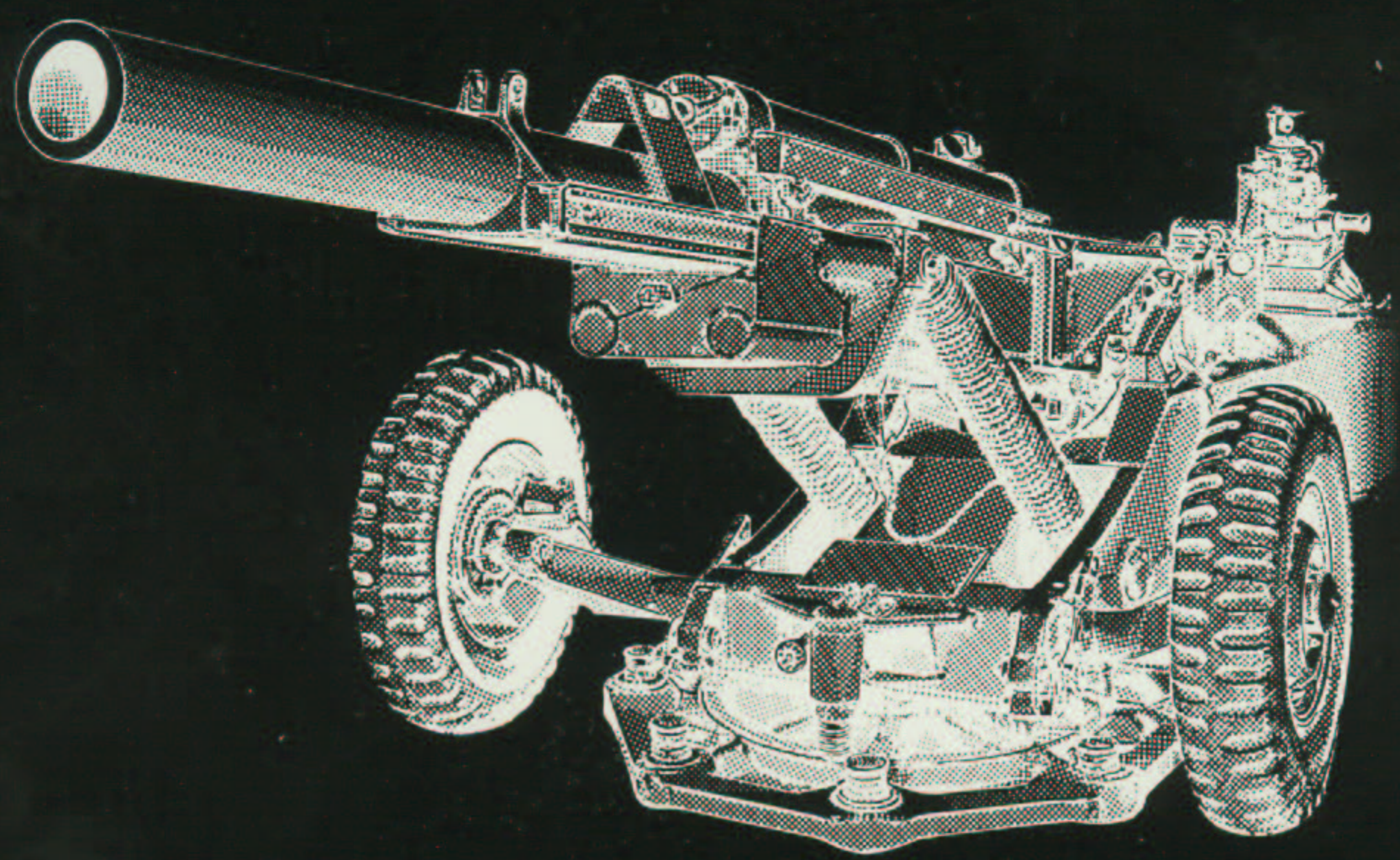




PHOENIX COMMAND™



Artillery System



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PHOENIX COMMAND™

Artillery System



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Principle Design

Barry Nakazono

Writing and Design

David McKenzie

Illustration and Graphic Design

Toni Dennis

Quotes and Layout

Irene Kinzek

Research

Robert Calvet

Nadir Elfarra

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Introduction

The **Phoenix Command Artillery System** is a part of the **Phoenix Command Combat System (PCCS)**. The components of the system are fully compatible, and many of the concepts, terms, and game mechanics used in other PCCS products appear unchanged in this one.

The **Phoenix Command Artillery System** allows PC players to add an entirely new dimension to the game. While the use of artillery lacks the immediacy of small arms combat and is an utterly impersonal means of making war, the fact remains that since the first military uses of gunpowder, artillery has been a major factor on the battlefields of the world, and its importance has never been greater than in this century.

This product includes a wide range of Indirect Fire weapons; Field Artillery, Mortars, and Rockets are presented, and the major powers from World War II to the current time are included. Chapter 1 contains the Basic Rules, and covers everything necessary for the addition of artillery to PC play. Chapter 2 has the Advanced Rules, which are used in special situations or by players who desire a higher level of realism. Weapon data is contained in Chapter 3.

Please note that either the **Phoenix Command Small Arms Combat System** or the **Phoenix Command Mechanized Combat System** is necessary for the use of this product.

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BASIC RULES

1

This Chapter contains the rules needed to add Artillery to **Phoenix Command**. Some of the terms used are defined in other products in the **Phoenix Command Combat System (PCCS)**, including the **PC Small Arms Combat System** and the **PC Mechanized Combat System**. Either one of those two products is necessary to use the **PC Artillery System**, although this product contains a great deal of general and technical information regarding the use of artillery, and may be of interest to students of the military.

1.1

For centuries, the use of Artillery in war saw few changes. It was mostly a matter of brass cannon of varying sizes hurling heavy iron balls across battlefields and at fortresses, causing damage by sheer momentum. Occasional experiments with explosive shells were conducted, but irregularities in the powder and fuzes of the time prevented these projects from attaining wide use.

In the 19th Century, however, the Industrial Revolution made radical changes in the technologies available to the military, and by the beginning of the 20th Century those changes had been assimilated. Artillery pieces were manufactured with much greater precision and with a far higher level of mechanical sophistication, which gave them greater accuracy and reliability, as well as improved rates of fire. At the same time the transition from solid shot to explosive shells was made, and the range and destructive abilities of artillery were also greatly improved.

For the last fifty years, this has been the artillery piece of the modern battlefield; an efficient machine capable of firing hundreds of devastating high explosive rounds every hour, accurate enough to place the rounds within a few dozen yards of targets several miles away, and linked to other weapons and to observers in the field by sophisticated communications equipment. The Artillery is the least glamorous of the combat arms, and it is not usually mentioned in recruiting drives and ad campaigns. This does not change the fact that it has been a vital presence in every major ground action of this century, and is the single most important force for destroying enemy positions, inflicting casualties, and winning battles. In the words of Josef Stalin, "Artillery is the God of War."

THE USE OF ARTILLERY IN THE 20TH CENTURY

1.2

The scale used for Artillery is the same as the normal PCCS scale of 2 yards per hex, one-half second per Impulse, and 2 seconds per Phase. The **Phoenix Command Mechanized Combat System** uses a scale of 20 yards per hex and 8 seconds per Turn; guidelines for converting the information in this product to the Mechanized scale are contained in the Mechanized System.

SCALE

FIRE MISSIONS

"First, let's separate the cases into those who have insurance, and those who don't."

Dr. Oscar Schneiderbunk

"I'll distract him with idle conversation. You blow him up."

Lindsey

The majority of support fire that infantry units can count on is in the form of **Fire Missions** by indirect fire weapons. In modern warfare, these Fire Missions play the key role in both offense and defense, and are generally performed by Field Artillery, Rockets, and Mortars.

The mechanics of calling in a Fire Mission vary primarily in who has control of the artillery. The further up the chain of command the field commander has to go, the slower the process will generally be. Guidelines for the amount of time it takes for a Fire Mission to be called in are in Section 1.5. In most cases, a Fire Mission will begin with a Forward Observer.

The **Forward Observer (FO)** is a specially trained soldier who is responsible for directing artillery fire. As the name indicates, he is generally in the field with advanced forces and communicating with an artillery base that might be many miles away. To call in accurate fire from miles away, the FO must obviously make a number of calculations, most with the aid of maps, but some using his vision alone. The accuracy of these calculations plays the most important role in determining whether the artillery fire will be valuable, useless, or even dangerous to the FO and the other friendly troops in the field. At the same time, the FO decides on the number and types of rounds to be fired.

The FO's information goes into the chain of command, and passes through various levels depending on the type of support required. For example, if the FO is requesting support from a Battery attached at Division level, he will have to receive approval from all levels of command up to Division. This can be a slow procedure, naturally, and for important missions it is not uncommon for the FO to have prior approval, and a more direct link with the artillery that will be called in. This is especially true when a unit is part of a scheduled assault, or when it is known that they are soon going to be under direct attack.

Once the Fire Mission has been approved, the artillery crew begins the calculations that are necessary to make sure that the shells will fall in the appropriate location. Weather conditions are often a major factor in these calculations, so meteorological information must be provided. At the same time, orders go out clearing friendly aircraft from the area, to eliminate the risk of an accidental hit. Only after all of these preparations have been made will the Fire Mission commence.

The Mission itself begins with one or more shots fired by a single artillery piece, in order to make sure that the FO's directions and the Battery's calculations are correct. Once the FO is satisfied with where the shells are landing, the full Fire Mission begins. Whether it consists of just a few rounds or of a sustained bombardment of hundreds of rounds, it is certain that the targets of the Fire Mission will immediately wish they were somewhere else.

Guidelines for Fire Missions are given in Section 1.8.

Notes on World War II

The rules which follow have been written with the Vietnam conflict in mind, and with standard US operating procedures as the basis. Less sophisticated military forces, especially the combatants in World War II, use their artillery in less controlled ways. Where the US practice in Vietnam was to provide artillery support for even the smallest units in the field, militaries without complex communications and command control structures are forced to use their artillery less subtly.

This was not too severe a restriction during World War II, where the vast majority of activity was by large, well-organized units moving through comparatively open terrain. The artillery was generally deployed in support of coordinated offensives and defenses, rather than the scattered patrols of modern warfare. In that role, the communications and other resources used were quite sufficient. The frantic, desperate encounters of Vietnam, dominated by small unit actions, infiltration, and difficult terrain with limited visibility, were many years away.

PLOTTING FIRE MISSIONS

As mentioned above, the Fire Mission is the standard way in which Artillery is used to support troops in the field. The number of artillery pieces involved in a given Fire Mission varies widely, from a single weapon or a battery of several pieces, to large, multiple battery Fire Missions of devastating power. The number of rounds fired per weapon is also highly variable, and depends entirely on the situation. For game purposes, there are up to three stages to a Fire Mission; Ranging, Adjustment, and Fire for Effect.

The first step for an FO is to call in a single **Ranging** shot, using coordinates which have been developed entirely by the FO's use of maps and his estimation of distances. The FO will watch carefully to see where the Ranging shot lands, and then call for an **Adjustment** shot if necessary. The Adjustment shot will include the FO's best estimate of how to correct for whatever error was involved in the Ranging shot. The FO will continue to call in Adjustment shots until he is happy with where one lands; at that point, he will issue the Fire for Effect command, and the full Fire Mission will begin. For game purposes, the place where the FO wants the shells to land is called the **Target Hex**, the location that the shells are plotted for is called the **Plotted Hex**, and the place where a shell actually hits, after accounting for the Shell Accuracy, weather, and any other factors, is called the **Impact Hex**.

If the Ranging shot is on (or acceptably near) the Target Hex, the FO will obviously skip the Adjustment shots and proceed directly to Fire for Effect; likewise, if a Battery has previously Ranged in on an area, it is possible to omit even the Ranging shot and go directly to the Fire for Effect portion of the Mission. This tactic has the advantage of hitting the enemy with a concentrated artillery attack without warning, and maximizes both the casualties and the morale effect.

Being a Forward Observer is a Skill, just like Gun Combat and any number of other abilities, as discussed in other Role-Playing Systems from **Leading Edge Games**. As with all Skills, a soldier's **Forward Observer Skill Level** can range from 0 to 20. Forward Observer Skill affects two major issues; how accurate the Fire Mission is, and how long it takes the FO to plot the fire. The following table lists the effects of a soldier's Forward Observer Skill Level on his Position Error (PE) and Plot Time.

"Don't put off until tomorrow what you can demolish today."

Corley Norris

FORWARD OBSERVER POSITION ERROR TABLE			
Forward Observer Skill Level	Calculated Target Position Error	Spotted Target Position Error	Plot Time (Actions)
0	900	80	900
1	600	50	600
2	400	35	400
3	300	25	300
4	240	20	240
5	200	17	200
6	190	16	190
7	180	15	180
8	170	14	170

For each level above 8th, just subtract 10 more hexes from the Calculated Target PE, subtract 1 hex from the Spotted Target PE, and subtract 10 more Actions from the Plot Time.

The **Position Error (PE)** is the maximum error made by the FO; that is, the PE gives the maximum distance between the Target Hex (where he wants the Fire Mission to land) and the Plotted Hex (the actual coordinates he has given to the Artillery crew.)

The **Calculated Target PE** is used if the Forward Observer is using map coordinates to determine where the Fire Mission will land. It generally applies only to the Ranging shot; thereafter, the FO will tend to have visual information about the actual landing locations of any shells fired.

The **Spotted Target PE** applies in many different situations. It is used if the FO is actually with the weapons and is calling in fire on visible targets. Additionally, if the artillery has previously fired a Ranging shot at a site within the FO's view, he can use the site as a reference and may therefore use the Spotted Target PE. It also applies to Adjustment shots, as long as the FO can see where the shells land. To qualify for this column, the FO must observe the impact of the shell. This takes 10 AC after the shell detonates. Note that the FO must be watching when the shell lands, or must be listening carefully for the report.

There are some adjustments to the PE values given in the table. If the FO is calling in fire on a Calculated Target without maps, the PE value is tripled. For fire at Spotted Targets, the PE is doubled if the FO has indirect visual information about where the shell landed (if all the FO can see is the smoke or dust created by the detonation), and quadrupled if the FO must use sound alone to determine where the round landed. This is why White Phosphorus rounds are frequently used for Ranging shots in jungles and similar terrain, as they at least provide the FO with a large smoke cloud.

The **Plot Time** is the number of Actions used by the FO when plotting a Fire Mission. This includes making the necessary estimations, performing the calculations, and calling in the Fire Mission. When the FO is Adjusting Fire, the corrections to the Target Location take 1/10 the Plot Time.

"He sent his sympathies... postage due."

O. Man

1.5

FIRE MISSION TIME

Once the FO has called in the Mission, there is a noticeable delay before the shells actually begin to arrive. The reasons for the delay are touched on above; to confirm that the Fire Mission has authorization, to perform the necessary calculations, to clear friendly aircraft from the area, and so forth. Finally, the actual Time of Flight of the shells adds another delay of perhaps 20 seconds or more. For simplicity, all of these factors are included in the Fire Mission Time.

To find the **Fire Mission Time**, the FO rolls a number from 0 to 9 and adds 4 to it. (For those using the Crew Quality rule of Section 2.1, add the Crew Skill Level of the best unit supplying fire to the 0 to 9 roll). This total, called the **Fire Mission Speed**, is entered into the following table, and cross-indexed with the Fire Mission Type, to determine the number of Phases it will be before the first Shell arrives.

FIRE MISSION TIME TABLE					
Fire Mission Speed	Fire Supplied By		Fire Mission Speed	Fire Supplied By	
	Artillery Fire Base	Company Level Fire Support		Artillery Fire Base	Company Level Fire Support
1	650	200	11	190	64
2	560	170	12	170	60
3	480	150	13	160	58
4	420	130	14	150	56
5	380	120	15	140	54
6	340	110	16	130	52
7	300	100	17	120	50
8	260	90	18	110	48
9	230	80	19	100	44
10	210	70	20+	90	40

The values in the table assume that the Fire Mission is being called in by a qualified person in the field who has no formal relationship with the Fire Base from which the Mission is being requested. Such a person has no direct influence or authority at the Fire Base, and therefore there are additional layers of red tape to deal with. For FO's with greater influence, one of the following modifiers may be applied to the Fire Mission Speed, as appropriate.

If the Fire Mission is being called in by an FO who is assigned to the Fire Base and who has been attached to the field unit, the Fire Mission Speed is modified by +3.

If the Fire Mission is being called in by an FO in an aircraft, there is a modifier of +5.

If the Fire Mission is being called in to a Battery or Fire Base which has been specifically assigned to the support of the FO on a particular Mission, the weapons are on Standby and there is a modifier of +7 to the Fire Mission Speed.

Example:

Derek is a Forward Observer on a long range patrol. When the patrol spots an enemy encampment, Derek Plots a Fire Mission and calls it in to his Fire Base. To determine his Fire Mission Speed, he rolls a 0 to 9 number and gets an 8. This is added to the Battery's Crew Skill Level of 4, for a total of 12. In addition, the Fire Base is the unit to which he is attached, and another 3 is added to the Fire Mission Speed, for a final total of 15. Consulting the table, the Ranging Shot for the Fire Mission will arrive in 140 Phases (280 seconds, or a little over 4 1/2 minutes.)

Once a Fire Mission is in progress, it is obviously much easier to call in corrections for **Adjustment Fire** or to begin the **Fire for Effect** portion of the Mission. To reflect this, the number of Phases it takes for Adjustment Fire and Fire for Effect shells is equal to 40 minus the Battery's Crew Skill Level, or 36 Phases for those not using that rule.

When the Fire for Effect order is given, the first several rounds will be fired at the rate shown in the **Weapon Data Tables** for Short Term Rate of Fire, or for Burst Rate of Fire, if the weapon is capable of firing Bursts. The exact number of rounds fired by each weapon at the Short Term Rate of Fire is equal to the Crew Skill Level divided by two and rounded up; for Burst fire, it is the number of rounds in the weapon's clip or rapid-loading mechanism, as defined in the weapon description. If no value is given there, then the number is again equal to the Crew Skill Level divided by two, and rounded up. Again, for those not using the Crew Skill rule, assume a Crew Skill of 4.

"I knew that someday, somehow, we'd both die. I just figured you'd be first."

Gerfel, his last words.
Wrong, as usual.

1.6

ACCURACY

Each weapon has three Accuracy values, which are used under different conditions and which are contained in the **Weapon Data Tables**. They are **Ranging Accuracy**, **Adjustment Accuracy**, and **Shell Accuracy**, and each is described below. In all cases, the Accuracy is given in terms of the **Scatter Radius (SR)**, which is the maximum number of hexes away from the Plotted Target the shell will actually land.

Ranging Accuracy: This is used for the initial shot in a Fire Mission, the Ranging shot. Once the FO has marked the location of this round, he will call in corrections and the battery will fire a second round.

Adjustment Accuracy: This is used for all Adjustment shots in a Fire Mission. With each shot, the weapon is hopefully closing in on the Target Location; this clearly depends heavily on the skill of the FO.

Shell Accuracy: Once the FO accepts the Ranging and/or Adjustment shots, he will have the weapon or Battery Fire for Effect. The Shell Accuracy is used for all further rounds in the Fire Mission.

Shell Placement

Whenever a shell is fired, these guidelines determine exactly where it lands. The rules given here cover the basic issues; for those desiring more detail, the **Advanced Accuracy** rules are in Section 2.3.

There are two factors to where a shell lands; how far from the Plotted Target it is, and in what direction. These are referred to as the **Scatter Distance** and the **Scatter Angle**, respectively. The hex in which a shell lands is called the Impact Hex.

To determine the **Scatter Distance (SD)**, choose the greater of the FO's Position Error and the Accuracy; this distance is called the **Maximum Scatter**. Then enter the following table with a 00-99 number to find the Scatter Value, and multiply the Scatter Value by the Maximum Scatter to arrive at the Scatter Distance.

"Well, you missed the enemy, but that tree will never be the same."

Derek

SCATTER VALUE					
Roll	Scatter Value	Roll	Scatter Value	Roll	Scatter Value
00 - 01	.01	29 - 37	.20	79 - 86	.60
02 - 03	.02	38 - 46	.25	87 - 91	.70
04 - 09	.05	47 - 54	.30	92 - 94	.80
10 - 19	.10	55 - 67	.40	95 - 97	.90
20 - 28	.15	68 - 78	.50	98 - 99	1.00

For example, Chuck is an inexperienced FO calling in his first Fire Mission. He is 3rd Level in Forward Observation, and the Ranging Accuracy of the Battery is 37. Since Chuck's Position Error is 300, which is larger than the RA, the Maximum Scatter is 300. The GM rolls a 10, for a Scatter Value of .10. He multiplies the Maximum Scatter of 300 by .10, and the Scatter Distance is 30.

Scatter Angle

The Scatter Angle can be determined in one of two ways as shown on the following table.

"We have found after extensive research that living human cannonballs are only marginally effective, and can only be used once."

King's Men Scientific Manual

SCATTER ANGLE		
Percentile Roll	12-sided die Roll	Scatter Angle
00 - 07	1	0°
08 - 16	2	30°
17 - 24	3	60°
25 - 32	4	90°
33 - 41	5	120°
42 - 49	6	150°
50 - 57	7	180°
58 - 66	8	210°
67 - 74	9	240°
75 - 82	10	270°
83 - 91	11	300°
92 - 99	12	330°

The column labeled Percentile Roll is used in the normal way; roll a 00-99 number, and read across to the Scatter Angle column.

The 12-Sided Die Roll column is actually slightly more accurate, for those who have 12-sided dice. (They can be found in hobby stores, if desired.) For those who do not have a 12-sided die but desire the accuracy of that column, two six-sided dice can be used instead. The dice must be visibly different, whether they are of different sizes or colors. Simply choose one of the two dice as the "Determiner" and roll them both; if the Determiner is a 1, 2, or 3, enter the table with the value on the other die (1 through 6). If the Determiner is a 4, 5, or 6, however, add 6 to the value of the second die and enter the table with that value (7 through 12).

Note that on a hex grid, the 0, 60, 120, 180, 240, and 300 degree Scatter Angles are straight through the various hexsides of the target hex, and the Scatter Distance should be counted normally. The other Scatter Angles (30, 90, and so forth) go through the point

where two hexsides meet. If the Scatter Distance is an even number, that is not a problem; the shell will land cleanly in a normal hex. If the SD is an odd number, however, it will be placed on a hexside. The referee should roll randomly to determine which of the two possible hexes will be hit.

Battery Fire

A Battery is made up of two or more artillery pieces; in modern practice, batteries generally consist of 6 pieces, but larger and smaller batteries are not uncommon.

When an entire Battery is used for a Fire Mission, a single piece will fire the Ranging and Adjustment shots. Only when the Battery receives the word to Fire for Effect will the rest of the Battery open up. When determining where the Battery's shells fall, roll the Scatter Angle and Scatter Distance separately for each round, using the method described above.

1.7

When a Shell detonates, the following steps are followed to determine the effects it has on surrounding personnel.

The **Shell Type** is the first issue. Since the numbers and types of shells are defined by the FO when he calls in the Mission, the players should simply refer to the appropriate Burst Data Table, using the Shell Index for the weapon that is firing. On the **Burst Data Table**, the player selects the **Burst Condition**, depending on whether the shell is an Airburst or not, and the type of ground in which the detonation is taking place.

At the top of each Burst Condition is the **Shrapnel Table** for the shell itself, and directly below that are the lines which give the Shrapnel Hit Chances and the Base Concussion for the blast. **Base Concussion** is applied normally to all nearby personnel. There are two types of Shrapnel Hit Chances; **Base Shrapnel Hit Chance (BSHC)** and **Base Shrapnel Hit Chance - Critical Range (BSCC)**. The BSHC is used for all personnel outside the Critical Range, as listed in the right hand column, while the BSCC is used for troops who are at that distance or less.

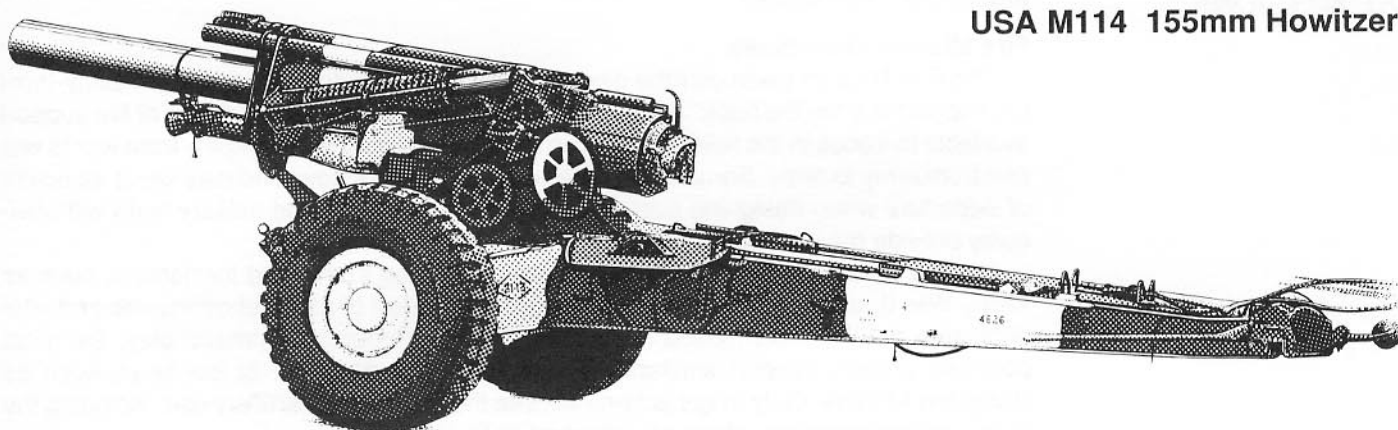
The **Critical Range** represents the area close to the detonation where personnel are subjected to the full shrapnel produced by the round, along with any rock fragments being thrown out by the detonation. The size of this area varies, depending on how deep in the ground the shell penetrates before detonating. The deeper it penetrates, the steeper the angle at which the shrapnel is thrown, and the smaller the area that is endangered. The BSHC represents only the shrapnel which is produced by the part of the shell which is above ground; this shrapnel is not restricted in its path, and endangers people at any range.

SHELL DETONATION

"Using living humans for terminal guidance has been completely ineffective on all spin-stabilized rounds."

King's Men Scientific Manual

USA M114 155mm Howitzer.



"I don't think any of us will ever forget Louie. Ever since the explosion, there's a little piece of him on all of us."

Trebor Nawoc

Players should choose the appropriate Shrapnel Hit Chance for each of the personnel in the area. Note that the Critical Range varies, depending on the Stance of the target. People who are standing up are within the Critical Range at far greater ranges than those who are prone, which is part of the reason that soldiers throw themselves on the ground during artillery barrages. Once the appropriate Shrapnel Hit Chance line has been selected, the normal rules are followed to determine the effects. The Hit Chance and Target Size rules (Section 3.7 in 3rd Edition Phoenix Command) should be used when finding the actual BSHC or BSCC.

If a piece of Shrapnel does hit someone, the Shrapnel Table for that Shell and Burst Condition should be consulted. Just roll a 0 to 9 number, and enter the appropriate line to determine what the damage is. This table represents the different sizes of shrapnel which can be produced by a particular Burst; the higher the number rolled, the larger the piece of shrapnel which has hit the character.

In many cases there is another table beneath the Shrapnel Hit Chance and Concussion section. This is the **Fragments Table**, which represents any rock or wood fragments which are being thrown out by the burst. The BSCC for these Fragments is given at the bottom of the table, and is applied normally. If a hit is scored, a 0 to 9 number is rolled as above to determine what type of Fragment hits. The number of points of Impact Damage (ID) caused by the Fragment is entered in the **Impact Damage Table** below, to determine the number of PD applied to the character. Where these values are present for Ground Bursts, they should always be used. For Airbursts, the Fragments are only created if the explosion takes place in a wooded or jungle hex.

BLUNT IMPACT DAMAGE TABLE												
		Impact Damage										
	Rigid Armor	11	22	24	31	40	44	53	62	73	84	99
	Flex Armor	4	7	8	11	15	17	20	24	28	32	39
	No Armor	1	2	3	4	5	6	7	8	10	12	14
00-05	Head	1	2	4	34	2H	4H	7H	1K	2K	4K	6K
06-48	Body	1	2	3	6	11	18	27	37	61	1H	2H
49-99	Limb	1	1	2	4	8	15	19	23	43	72	1H

1.8

GUIDELINES FOR FIRE MISSIONS

A general guide to Fire Missions follows, as well as a detailed example of the complete process of a Fire Mission.

Fire Mission Guidelines

The Fire Mission given on the next page is a good example of typical Company-level fire support in a "by the book" action. In the real world, the amount and type of fire support available to troops in the field depends on the situation, and varies widely from war to war and from army to army. Some basic notes on fire support follow, and may serve as points of departure when designing scenarios. Historical accounts and military texts will obviously provide the best guidelines for the use of artillery.

In wars where large, organized units are committed in massed formations, such as World War II, artillery fire is concentrated in the support of planned offensives and vital defensive actions. This means that in man-to-man Phoenix Command play, the most common artillery support available will be light units attached at low level, such as Company Mortars. Only major actions will see the full range of artillery use, including the larger-caliber weapons which are attached at Division level.

In conflicts where the action is dispersed, and where units rarely assemble into formations larger than the Squad or the Platoon, the use of artillery is very different and is subject to wider variation. In Vietnam, for example, a Squad of US troops in distress could very well expect the support of a full Battery of 105mm Howitzers, an undreamed of concept in earlier conflicts. For NVA and Viet Cong operating in the South, however, who had significantly less artillery available, a Squad in the field was quite isolated and could expect no support at all. On the other hand, during major NVA offensives such as Tet, they fielded the full range of artillery and operated in a manner very similar to a traditional military.

In general, the player or referee who designs a scenario should do the obvious things; scale the use of artillery to the size of the units involved, refer to historical sources for specific guidelines, and be sure to use the weapons that will make the game the most interesting for everyone.

Company Fire Support

A Company is on maneuvers, sweeping through a large area. It has a Battery of 60mm Mortars attached for immediate fire support. The Mortars are man-carried, and are being moved along a ridge from which they command a view of the Company's activities below.

Without warning a fire fight erupts in the valley below, with enemy fire coming from a tree line. The Mortar teams immediately deploy their weapons, and in a little over a minute (Deploy Time for a US M-19 60mm Mortar is 36 Phases, or 72 seconds) they are ready to fire. An FO travelling with the Mortar teams has used this time to begin plotting his fire. He is a 6th Skill Level FO, so his Plot Time is 190 Actions. At 4 Actions per Phase, it will take him 48 Phases to complete his calculations.

Therefore, 48 Phases after the start of fighting, the Mortar crews are set up and have a plotted target. They are Crew Skill Level 5, and an 8 is rolled, so the Fire Mission Speed is $8 + 5$ (Crew Skill Level) $+ 7$ (Battery on Standby) $= 20$. This means the Fire Mission Time is 40 Phases, using the column for Company Level Fire Support, and the Ranging shot lands on Phase 88 of the fire fight.

The weapon has a Ranging Accuracy of 32 hexes and a 6th Level FO with a Spotted Target has a Position Error of 16 hexes. The Maximum Scatter is the larger of the two, 32 hexes, and a roll of 36 on the Scatter Table gives a Scatter Value of .20. The Ranging shot falls $.20 \times 32 = 6$ hexes from the Target Hex. This is within the general area of the enemy, so the FO immediately calls for a Fire for Effect with each Mortar firing 3 rounds. The first of these lands 40 (base Fire Mission Speed for Adjustment / Fire for Effect) $- 5$ (Crew Skill Level) $= 35$ Phases later. Each subsequent round from each Mortar lands one Phase later, using the Burst Rate of Fire. The first set of rounds of the Fire for Effect portion of the Mission would land on Phase $88 + 35 = 123$, and the next rounds would land on Phases 124 and 125. It has taken a little over 4 minutes for a Battery of 60mm Mortars to deliver effective fire support to the Company. Further fire by the Battery would obviously depend on the situation, but if the enemy does not withdraw, they are clearly going to be subjected to a rain of increasingly well-directed Mortar fire.

"With all the wood I've taken out of you, I'll be able to build a new rec room."

Dr. Ezra Millstone

"Of course, since you've donated most of the material, you can visit anytime."

Dr. Ezra Millstone

"Of course, that hinges on the assumption that you pull through."

Dr. Ezra Millstone

2

ADVANCED RULES

This Chapter contains all the rules for unusual circumstances, and expansions on the level of detail found in the Basic Rules. Players may pick and choose from among the Sections below as they wish, but should be sure to agree which rules are being used before play begins.

2.1

CREW QUALITY

While the quality of a given gun will not change from situation to situation, there can be a wide range of quality in the crew for the gun. The modifiers shown below should be applied by the referee as is appropriate, based on the level of skill possessed by the artillery crews involved.

BATTERY CREW QUALITY MODIFIERS			
Crew	Skill Level	Combat Actions	Scatter Radius Modifier
Militia	1st	3 AC	x2.0
Green	2nd	4 AC	x1.5
Line	4th	4 AC	x1.0
Crack	5th	5 AC	x0.8
Elite	6th	6 AC	x0.6
Expert	8th	8 AC	x0.5

2.2

MAXIMUM SCATTER MODIFIERS

The normal Maximum Scatter numbers represent the efforts of a crew working under fairly normal conditions. The following modifiers to the Maximum Scatter should be applied when suitable.

Light Wind	+30 hexes
Moderate Wind	+60 hexes
Heavy Wind	+200 hexes

The numbers given apply to all weapons which are not being supplied with sophisticated and reliable meteorological data, such as is available to modern militaries. If good meteorological data is available, then no modifier is applied unless the weather is irregular.

In irregular weather, meaning gusting winds and changing conditions, units with good weather data suffer the penalties listed above, while units without good data suffer double the normal penalties.

The Basic Rules for Shot Accuracy present a fairly simple way of determining where a shell falls. For greater accuracy, the following method may be used. Instead of using either the greater of the FO's Position Error or the weapon's Accuracy, the referee will use both.

First the Position Error should be determined. This is calculated in the normal way, including rolling for the Scatter Value and the Scatter Angle, and the referee marks the **Plotted Hex** for where the Shell was actually targeted. Next, the Accuracy is found, again including the Scatter Value and Angle, and it should be placed on the map relative to the Plotted Hex, not the original Target Hex. In this way the two errors add together.

This makes it much more difficult for the FO to correct any mistake he has made, since the exact amount of his error is masked by the Artillery's error. The range of the error can also be far greater, of course.

Example:

Returning to the example in Section 1.6, the FO (Chuck) had a Position Error of 300 and the Battery had a Ranging Accuracy of 37. The roll for Chuck's PE is a 68, for a Scatter Value of .50, or 150 hexes away from the Target Hex. A 1 is rolled on the 1 to 12 roll for Scatter Angle, and the referee notes the hex that is 150 hexes from the Target Hex and at 0° as the Plotted Hex. The referee now rolls for the weapon's Accuracy and gets an 87, so the SV is .70 and the Scatter Distance is $.70 \times 37 = 26$ hexes. Another 1 is rolled for the SA, so the Impact Hex ends up at 0° and 176 hexes from the Target Hex.

Not knowing how much of the error is his and how much the weapon's, Chuck decides to try to bring the Plotted Hex in by 176 hexes, which is 26 hexes at 180° from the Target Hex. His PE this time is 25 hexes; the referee rolls a 08, for a SV of .05 and a SD of $.05 \times 25 = 1$ hex. The roll for the SA is a 3, so the current Plotted Hex is 1 hex up at 60° from where Chuck had planned. From there, the weapon's Adjustment Fire Accuracy is 29 and the roll for SV is a 96, for a .90. The SD is $.90 \times 29 = 26$ hexes, and the SA roll is again 1, or 0°. This puts the Impact Hex for this round just 1 hex away from the Target Hex, and an elated Chuck calls for the Fire for Effect.

When the rounds come in, however, they will be centered on the current Plotted Hex, which is 25 hexes away from the Target Hex. This is obviously an extreme example of what can go wrong for an FO, but demonstrates the special problems involved in calling in an accurate artillery barrage.

For the true aficionado, it is quite possible to use a protractor to determine the Scatter Angle; just generate a number from 1 to 360, and have the shell fall at that Angle. This method will have little appeal to anyone who is not a mathematician or an engineer, however, and with good cause. If the game includes players who spend time dissecting the possible Scatter Distances in such a way as to undermine the normal method, however, it may be advisable to use this system.

As a final note, it is obviously important to minimize the information which goes to the players. They should certainly not see any of the die rolls involved, and if possible the referee might wish to only supply them with vague information about their weapon's Accuracy and the values on the Scatter table.

Battery Fire

The basic Battery Fire rules use the Plotted Location for all the guns which fire. In reality, this is called **Converging Fire**, and is not the standard way that Batteries fire. Instead, batteries usually use **Parallel Fire**, in which the shells fall in a pattern which roughly approximates the layout of the guns in the Battery. The following rules should be used to represent this.

The central gun of the battery will be used for the Ranging and Adjustment shots, and

"One more word out of you and you'll be our next adjustment shot."

Field Marshall Paul Maul

the others will fire only when the Fire for Effect command is given. The easiest layout of the other guns in the Battery is in a line based on the central gun. This is not ideal, because of its vulnerability to air attack and the inability of the guns to fire to the flank, but can be adopted out of simplicity and for ease of coordination. A more common formation is a five-pointed star, with a sixth weapon at the center; again, the central weapon is used for Ranging. The exact formation used should be determined by the player or referee according to the situation or in line with historical practice. The spacing between the weapons will also vary depending on the Battery and the situation, but for a typical battery of 105mm guns, the preferred distance is 100 yards, or 50 hexes, between weapons. In US Fire Bases in Vietnam, a spacing of 40 yards was more common, to reduce the Fire Base perimeter.

When determining the Impact Hex, the distance of the gun firing the shell from the #1 gun is included in the calculation. For example, if the #2 gun in a Battery is 20 hexes left of the #1 gun, the Plotted Hex for shells fired from this gun will be the same distance and direction from the #1 gun's Plotted Hex, and the Scatter Value and Scatter Angle should be determined from that point.

Note that the FO's Position Error will be the same for the entire Battery; only the Accuracy will vary per gun.

2.4

DIRECT FIRE WITH ARTILLERY

Although Artillery is designed to be used at long ranges, there are times when it must be used for short range and self-defense purposes. While this is substantially the same as direct fire with normal weapons, there are special problems involved in Traversing the gun and Depressing its barrel. Artillery also has a few special tricks which it can use to defend itself. Two of the most powerful are below; Flechette Rounds and Timed Airbursts.

When using Direct Fire with any Artillery piece except a Mortar, all the normal rules of PCCS are used in determining the Odds of Hitting, including Range, Visibility, Movement, Target Size, and so forth. (Unless specified in the weapon's description in the Weapon Data Tables, Mortars cannot use Direct Fire.) Unlike normal weapons, however, artillery pieces cannot simply be pointed at the target and fired.

First, the target must be within the **Traverse** of the weapon. The Traverse is given in the **Weapon Data Tables**, and is the number of degrees that the weapon's barrel can be tracked across without Repositioning the entire weapon. Half of this Traverse distance will generally be to each side of the current orientation of the weapon. If the target is within the Traverse angle, then the weapon may be aimed. If not, the weapon must be Repositioned. The number of Phases this takes is listed in the Weapon Data Tables as the **Reposition Time**. Once the weapon has been Repositioned in the correct orientation, Aim Time can begin.

Direct Fire Scatter

If an Artillery piece uses Direct Fire against a target and misses, the location of the shell's impact must still be found. Each weapon has consequently been given a **Direct Fire Error Value (DFE)** at each Range. The number of hexes between the target hex and the actual detonation hex is found using the following formula.

$$\text{Scatter Distance} = \text{DFE} \times \text{Difference in EAL}$$

The **Difference in EAL** in the above equation is the difference between the EAL needed to hit, and the EAL for which the number actually rolled would have been a hit. Because the trajectory of the shell is so flat, a round which misses is likely to miss by quite a great distance.

For example, an artillery crew is firing a French 155mm TR at a jeep 300 hexes away. They have an EAL of 14, and therefore need a 27 to hit. They roll an 81, however, so they miss badly. Checking the Odds of Hitting Table, the referee sees that with a roll of 81, they

"Well, I realize it must be uncomfortable, but think how much worse it would be if the round had detonated."

Dr. Buen-scheuk

would have needed an EAL of 23 to get a hit; therefore, the Difference in EAL is 9. The DFE for a 155mm TR is 27 at that Range, so the Scatter Distance is equal to $27 \times 9 = 243$ hexes.

Once the Scatter Distance has been determined, the referee should roll a ten-sided die; on a roll of 0 through 2, the shot is short, and on a roll of 3 through 9 the shot is long. The referee should place the shell directly on the line of fire, at a distance from the Target Hex equal to the Scatter Distance. Note that it is not possible for a shell to Scatter short by more than 1/4 the Range.

Timed Airbursts

Another very effective use of Direct Fire is with normal High Explosive shells modified by special fuzes. These fuzes are timed to go off at a specific range from the weapon, which is fired with its barrel roughly level. The fuze detonates the shell as an Airburst at the specified Range.

For accuracy, use a Target Size of 10 and a Range of 40 Hexes. If the Shell scores a hit, then it is on the proper line and will detonate within 10 hexes of the desired Range. Just roll a 0 to 9 die to find the number of hexes, and another one to determine if it is long or short of the Range. (0 through 4 is short; 5 through 9 is long.)

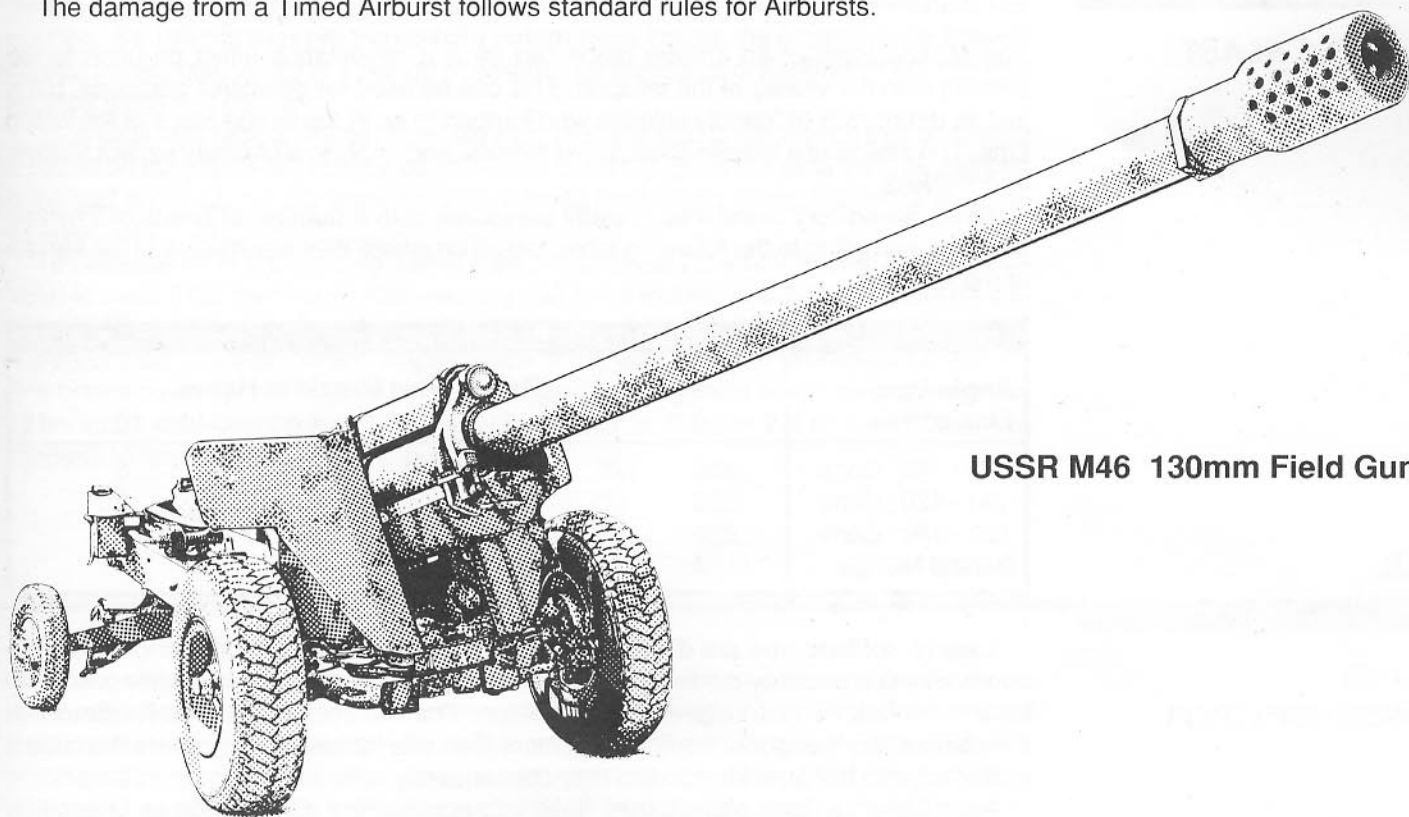
If the round misses, however, the shot will detonate to the left or right of the target. Use the normal PCCS Grenade Shot Scatter rules to determine the number of hexes by which it misses; on a 0 to 9 roll of 4 or less, it detonates this distance to the left of the desired hex, and on a 5 or more it is to the right. The 0 to 9 hex Range error described above is also applied.

To set the Range on the fuze, it must be prepared before loading. This takes 14 Actions. The shell can then be loaded and fired using the normal rules. For targets which are closing rapidly, the fuze should be set for a closer Range than the enemy has reached, and then loaded into the weapon. At that point, the crew simply holds fire until the enemy is at the appropriate Range, at which time they are able to fire the weapon without delay and with a great deal of certainty as to its effect.

The damage from a Timed Airburst follows standard rules for Airbursts.

"There's a surprise out there with your name on it. Your name is Claymore, isn't it?"

Sgt. Ingram



USSR M46 130mm Field Gun

"Of course I'm having a good time. I'm winning."

Gil the Treacherous

Flechette Rounds

Also called the Beehive Round, the Flechette Round essentially transforms a 105mm Howitzer into a giant shotgun. The Flechette Round has a timed fuze and contains thousands of fin-stabilized darts. It is fired using normal Direct Fire rules at an attacking enemy, and like the Timed Airburst above, it must be pre-set for a particular Range.

The following table gives the Penetration (PEN), Damage Class (DC), Base Pellet Hit Chance (BPHC), and Pattern Radius (PR) for the Flechette Round.

FLECHETTE ROUND DATA TABLE										
	Direct Line Range from Burst in Hexes									
	1	2	3	4	6	8	10	12	15	20
PEN	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
DC	2	2	2	2	2	2	2	2	2	2
BPHC	*5	*1	51	28	12	06	04	02	01	00
PR	.3	.5	.8	1	2	2	3	3	4	5

The normal PC Shotgun rules are used to determine Odds of Hitting and Damage, with the following exceptions. To determine the Odds of Hitting, use a Target Size of 10 and the standard Direct Fire Odds of Hitting rules, assuming the Target is at 40 hexes. If the shot hits, the Range at which the round detonates is determined as given under Timed Airbursts above. All targets within the Pattern Radius are subject to being hit. If the shot misses, use the Shot Scatter rules for Timed Airbursts. When determining what area is covered by the Pattern, simply base the Pattern Radius in the hex where the shell detonates, and direct it in a straight line away from the weapon.

2.5

MUZZLE BLAST

The Muzzle Blast of an artillery piece can have a devastating effect on unprotected personnel in the vicinity of the weapon. This can be used for defensive purposes, but is just as dangerous to friendly soldiers who happen to be in the wrong place at the wrong time. The effects of a Muzzle Blast are as follows, and apply to all Artillery except Mortars and Rockets.

When an artillery piece fires, nearby personnel take a number of points of Physical Damage according to the following table, based on where they are relative to the Muzzle of the weapon.

MUZZLE BLAST TABLE								
Angle from Line of Fire	Range from Muzzle in Hexes							
	0	1	2	3	4	5	10	15
0 - 60° Cone	450	120	40	20	10	8	3	1
60 - 120° Cone	330	90	30	15	8	6	2	
120 - 180° Cone	220	65	20	11	6	4	1	
Behind Muzzle	4							

Clearly, soldiers who are directly in front of the Muzzle are in more danger from the shock waves created by the firing of the piece than are those to the side, while personnel behind the Muzzle take relatively little damage. The GM should note that for almost all suitable artillery weapons, the Muzzle is more than one hex away from where the crew is stationed, due to barrel length, and they consequently take no damage.

For greater realism, players may take into account the different forces created by weapons of various calibers. The numbers given above apply to 105mm to 122mm caliber weapons. For 76mm to 90mm weapons, multiply the PD caused by the Muzzle Blast by

.5. For 130mm to 155mm weapons, multiply it by 3.0, and for 180mm to 203mm weapons, multiply it by 5.0.

2.6

STRUCTURES

This Section provides guidelines for the effects of Artillery on Buildings and Structures. These rules are used if a shell strikes a building or lands nearby. All Structures have a **Breach Value** and a **Collapse Value**, as given in the following table, and these Values are used to determine the exact effects of damage from a shell.

STRUCTURE BREACH AND COLLAPSE TABLE		
Structure	Breach Value	Collapse Value
Thatch	300	150
Wood Frame	500	300
Mud Hut	800	350
Brick House	800	500
Brick Factory	1600	1000
Steel Frame High Rise	1300	2000
Concrete Commercial	5000	3000

"Multiple gunshot wounds. Numerous shell fragments. A deep bayonet wound. Let's call it Natural Causes."

Dr. Oscar Schneiderbunk

When a shell hits a wall, the size of the Breach it makes is determined by comparing the Base Concussion of the shell for a Burst on Rock at the Range from the wall, with the Breach Value of the wall. The referee should find the greatest Range at which the BC is greater than the Breach Value; all hexes of the wall within this distance are destroyed. If the BC at Range 0 is less than the Breach Value, then the wall is not breached. For example, if a 105mm shell hits the wall of a Wood Frame house, the Breach will be 2 hexes across; the BC falls to 173 at a Range of 2 hexes, so the radius of the Breach is 1 hex and the total width is 2 hexes.

If the shell falls near a wall but does not hit it, then the size of the breach that is created is based on the shell's BC compared to 2 times the wall's Breach Value. Find all portions of the wall for which the BC is greater than 2 times the Breach Value; this entire area will be breached.

To Collapse an entire building, rather than simply breaking a hole in one, the Collapse Value is used. Find the nearest load-bearing wall in the vicinity, and go to the point on that wall which is furthest from the place of the detonation. If the Base Concussion at that point is greater than or equal to the Collapse Value of the wall, then the entire wall Collapses. This brings down the roof and all internal non-load bearing walls which are not protected by an intact load-bearing wall. Players should refer to Section 2.8 to determine what happens to any inhabitants of the building.

2.7

FIELD FORTIFICATIONS

The most elementary defense against enemy attack in modern warfare is the Foxhole. When a Foxhole is expanded it becomes a Field Trench or a Slit Trench, but the concept remains the same; it is a hole to hide in. The protection offered by a Foxhole is obviously important against almost all attacks, but is perhaps most important against the incredible violence of an artillery attack. For the purposes of the following rules, a Field Trench is assumed to be about 4 feet wide and 7 feet deep, while Slit Trenches and Foxholes are 2 1/2 feet wide and 4 feet deep.

For obvious reasons, the effect of a Field Fortification is different against Ground Burst and Air Burst shells, each of which are discussed below. Additionally, the modifiers for Field Fortifications only apply to persons who are concealed within them; the only benefit received from standing in a Field Fortification with your head exposed is the Partial Cover Blast Modifier from PCCS, which is .5.

Ground Burst

When a shell Ground Bursts near soldiers in a Foxhole, the shrapnel and the concussion generally pass harmlessly over their heads. The Blast Modifier for the shell's Base Concussion is .01; the referee should multiply the shell's BC by .01 when determining the damage done to nearby troops.

The best chance that a Ground Burst explosion has of injuring personnel in Foxholes is of Collapsing the walls of their shelter. The Range at which a shell will Collapse a Foxhole or Trench is based on its **Collapse Radius** value; this is an indicator of how much of the Concussion will be forced through the earth. It is found in the right column of the Shell Burst Data Table.

For example, if a US 105mm shell lands in the middle of a Trench network in the Sand, all Trenches within 4 hexes of the Impact Hex would immediately Collapse. Section 2.8 gives the effects of a Collapsing Fortification on the troops inside.

If a shell Ground Bursts in a hex with a Foxhole or Trench, the following guidelines should be used. The referee rolls a 00 to 99 number; on a roll of 00 to 14, the shell is actually in Contact with one of the inhabitants of the Fortification, if there are any. If there is more than one person in the Fortification, roll randomly to determine which is hit. On a roll of 15 to 54, the shell simply detonates within the Fortification. The Blast Modifier is X3, and all personnel are subject to the full Shrapnel Hit Chances without protection. On a roll of 55 to 99, the shell detonates in the hex outside the Fortification, and the normal Fortification rules apply.

Air Burst

A shell which Air Bursts above a Foxhole is far more effective than a Ground Burst, since much of the Concussion and Shrapnel is directed down into the Foxhole. The following table shows the effects of an Air Burst on Field Trenches and on Slit Trenches and Foxholes.

FIELD FORTIFICATION BLAST MODIFIERS		
Range	Field Trench Blast Modifier	Slit Trench or Foxhole Blast Modifier
0	3.0*	3.0*
1	3.0*	2.3*
2	2.3*	.8
3	.7	.4
4	.5	.3
5	.4	.2
6 - 7	.3	.2
8 - 13	.2	.1
14 - 25	.1	.1
26 - 60	.05	.05
61+	.01	.01

Just enter the table with the Range from the Impact Hex to the Fortification, and find the Blast Modifier under the appropriate Fortification type. For the asterisked entries, there is no protection from Shrapnel; in all other cases, the personnel in the Fortifications are immune to Shrapnel.

Note that the table above already includes the normal PCCS modifiers for being behind solid cover and in a trench. These should not be applied a second time.

"You have so many wood fragments in you, that I'm not going to remove them. I'll just sand you down."

Dr. Ezra Millstone

"In fact, you don't even need surgery. You need to be varnished."

Dr. Ezra Millstone

Bunkers

Bunkers are far more durable than Trenches and Foxholes, naturally, and provide the soldiers inside them with a greater degree of protection. Bunkers are immune to the effects of Airbursts, and the special rules above for direct hits with Ground Burst shells are also ignored. In addition, the Collapse Radius is modified as follows.

The normal Collapse Radius is used for standard Foxholes and the like, with little or no reinforcement. For Bunkers, the amount of reinforcement is represented by the **Bunker Value (BV)**. For heavy field fortifications made by hand, the BV would be 1 or 2; for normal Fire Base bunkers, the BV would be 3 to 5; and heavy bunkers designed to withstand sustained shelling would have BV's of 9 or more.

To determine the effects of a burst on a Bunker, take the shell's Collapse Radius and subtract the distance to the Bunker from it. This is the **Collapse Potential (CP)**. If the CP is less than 1/2 of the BV, then the Bunker is undamaged. If the CP is less than the BV, but greater than or equal to 1/2 the BV, then the Bunker survives the impact, but has its BV reduced by 1. If the CP is greater than or equal to the BV, then the Bunker collapses.

Example:

A shell with a Collapse Radius of 4 lands 3 hexes from a Bunker with a BV of 4. The CP is 4 (Collapse Radius) - 3 (range to Bunker) = 1. This is less than 1/2 of the BV, so the Bunker takes no damage. A short time later, another shell lands 2 hexes from the Bunker. The CP is 4 - 2 = 2. This is 1/2 of the BV, so the Bunker is damaged, and its BV is lowered to 3. Another shell lands just 1 hex from the Bunker. Here the CP is 4 - 1 = 3. This is equal to the current BV, so the Bunker collapses. Note that if the BV had not been lowered from 4 to 3 by the second shell, then the third shell would not have collapsed the Bunker.

If a Foxhole, Trench, Bunker, or Building Collapses, the troops inside may be in greater danger from their own defenses than they were from the artillery shell. Each person in a Collapsed Bunker or Building must make two **Success Rolls**; one to avoid taking damage in the Collapse, and another to avoid being trapped in the wreckage. Those in Foxholes and Trenches are immune to damage, but must roll to avoid being trapped. Each time, the character rolls 3 six-sided dice, as described in **2nd Edition Advanced Phoenix Command**, adds them together, and compares the total to the Success Roll.

To avoid damage, the Success Roll is equal to 6 minus the Collapse Potential (CP), defined in the preceding section, minus the Bunker Value, and plus the character's Combat Skill Level. If the character rolls less than or equal to the Success Roll, he is safe. If the roll is higher than the Success Roll, then a 00 to 99 number is rolled and the following table is consulted to find the damage that has been taken.

COLLAPSED BUNKER DAMAGE TABLE	
Roll	PD Taken
00 - 06	(1 - 10)
07 - 19	(1 - 10) x 10
20 - 79	(1 - 10) x 100
80 - 89	(1 - 10) x 1,000
90 - 99	(1 - 10) x 10,000

To avoid being trapped, the Success Roll is equal to 10 minus the Collapse Potential (CP) plus the character's Combat Skill Level. The character compares the die roll to this number; if it is less than or equal to the Success Roll, he has Succeeded; if it is greater, he has Failed. The character then rolls a second time, and if the result (Success or Failure) is the same as the first, he rolls a third time. He then checks his results against the following table to determine the situation of the character.

"Look on the bright side. Dying is the next best thing to living."

Sgt. Strict

2.8

EFFECTS OF COLLAPSED FORTIFICATIONS

"Why recover the bodies? Someone's just going to have to bury them again anyway."

Gil the Treacherous

COLLAPSED FIELD FORTIFICATION ASPHYXIATION TABLE

Roll Results	Asphyxiation Modifier	Actions to Free Lungs	Actions to Escape
Failed 3 Times in a Row	1	600	1200
Failed 2 Times in a Row	.5	300	900
Failed 1 Time Only	.25	100*	700*
Succeeded 1 Time Only	-	-	600*
Succeeded 2 Times in a Row	-	-	200*
Succeeded 3 Times in a Row	-	-	10*

"Why recover the body? I cleaned him out in the poker game last night."

Gil the Treacherous

The **Asphyxiation Modifier** is applied to the elapsed time when determining damage taken from Asphyxiation, which is naturally one of the first side effects of burying someone under several feet of earth, sandbags, and timber. For those using the rules in Section 4.3 of the **Special Weapons Weapon Data Supplement**, the character is assumed to be in a Strangle Hold for purposes of taking Shock Points and Physical Damage. The Asphyxiation Modifier above should be applied to the Asphyxiation Time; for example, if the character Failed only 1 roll and has been buried for 40 Phases, the effective Asphyxiation Time would be equal to 40 divided by 4, or 10 Phases. For those who do not have those rules, assume that a character is Incapacitated after 30 Phases for those who have Failed 3 Times, 60 Phases for those who Failed twice, and 120 Phases for those who Failed only once.

The other two columns indicate the amount of time it will take to dig a character out of a Collapsed Fortification. This is the total number of Actions necessary, and the troops doing the digging are assumed to be exposed and In The Open for purposes of incoming fire. The asterisks in these entries indicate that the trapped character can use his own Actions to free himself. For entries without asterisks, the character is pinned and cannot use any Actions.

Note that once a Bunker Collapses, it is treated as an open trench for all further fire.

2.9

TREES AND JUNGLE

When Artillery is fired into wooded areas, the density of the cover can reduce the effects of the rounds and the trees can even set them off prematurely, resulting in an Air Burst. The effects for Direct Fire and Indirect Fire are different, and use the following rules.

Note that these rules apply only to shells with normal **Point Detonating Quick Fuzes**, which comprise the majority of Artillery shells. Shells with Delay or Armor Piercing Fuzes are not subject to premature detonation, and will detonate normally. **Delay Fuze** data is given for two shells in the **Burst Data Tables**; the US 81mm Mortar and 105mm rounds, both of which were commonly fired with Delay Fuzes in Vietnam. **Armor Piercing** rounds, listed as **APC** in the **Direct Fire Data Tables**, have a small explosive charge that is roughly equivalent to a grenade, and have therefore been left out of the Burst Data Tables. In the rare event that the explosive charge of an APC round is considered important, the explosion can be modelled by using the effects of a Belgian NR446 Blast Grenade from PCCS.

Indirect Fire

Shells which use Quick Fuzes are likely to detonate prematurely when falling into Wooded or Jungle areas. The chances and effects of a **Premature Detonation** are given in the following table, based on the density of the area. Any Premature Detonation is treated as an Air Burst.

"Don't look at me. He wasn't squished like a bug the last time I saw him."

Axly

INDIRECT FIRE PREMATURE DETONATION		
Terrain Type	Blast Modifier	% Chance of Premature Detonation
Woods - Light	1	04
Medium	1	08
Heavy	.9	20
Jungle	.9	08
Triple Canopy	.7	29

The referee should roll a 00 to 99 number for any Quick Fuze shell which falls into any area which matches one of the above descriptions; if the number rolled is less than or equal to the number on the table, the shell has a Premature Detonation and is treated as an Airburst. The Blast Modifier shown shown on the table is applied to the shell's Base Concussion.

Note that shells which detonate prematurely do not have any chance of penetrating targets in the hex.

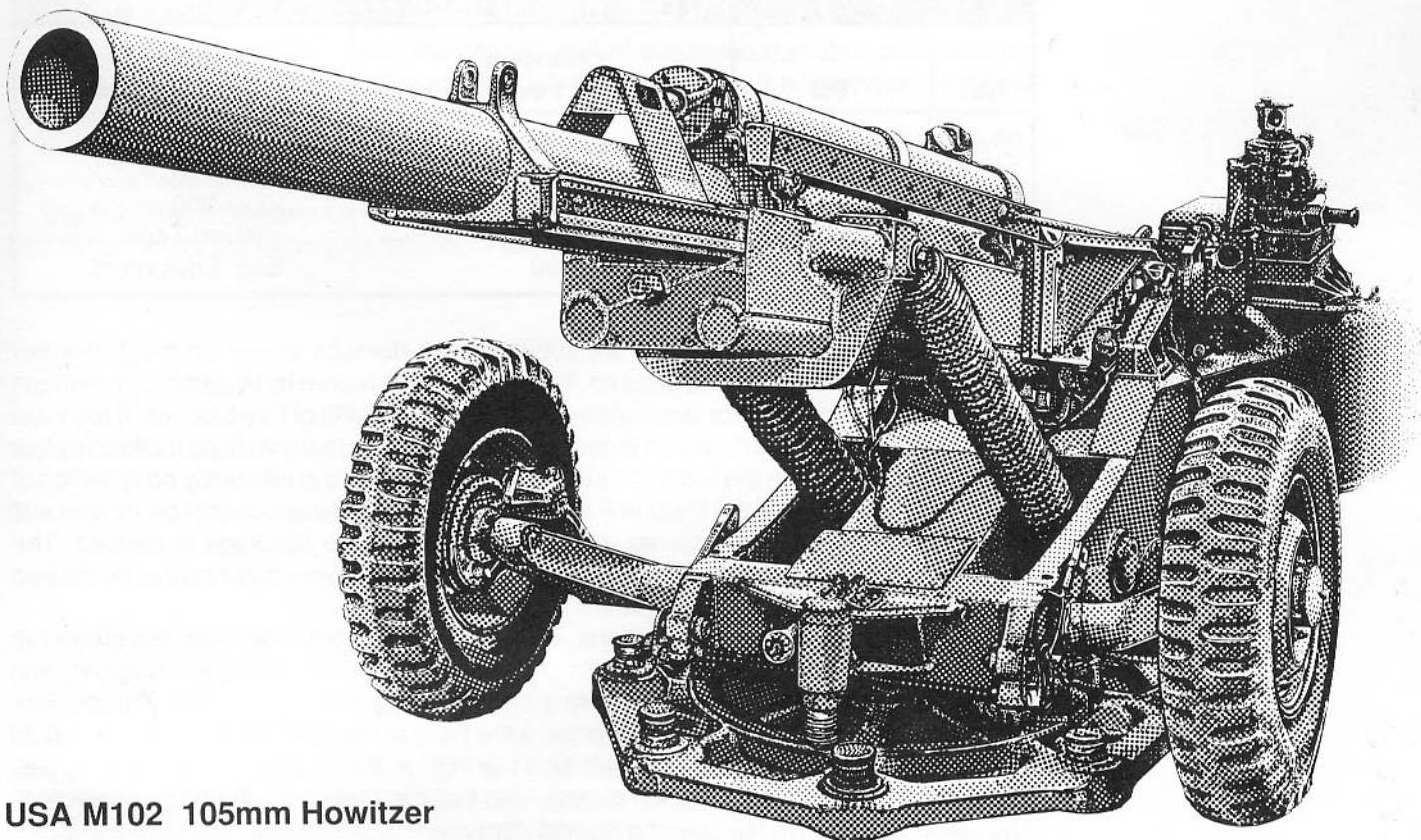
Direct Fire

When Artillery Direct Fire goes into wooded areas, there is a chance that the shell will make a solid contact with a tree trunk or limb and will detonate. If this happens, the shell is considered to be an Airburst, and normal Airburst rules are used to determine the effects of the blast.

To determine the maximum distance a shell penetrates into a wooded area before detonation, roll a 00 to 99 number and enter the table on the following page, using the line for the appropriate terrain type.

"Sorry, Captain, but it sure didn't look like a friendly aircraft from here."

Schnurda



USA M102 105mm Howitzer

DIRECT FIRE PREMATURE DETONATION

Terrain Type	Direct Fire Penetration - Number of Hexes									
	1	3	5	10	20	40	60	80	100	140
Woods - Light	97	93	90	82	67	45	31	21	14	06
Medium	95	88	82	67	45	21	09	04	01	00
Heavy	90	74	61	37	14	01	-	-	-	-
Brush - Light	99	97	96	92	86	74	65	56	49	36
Medium	97	94	90	82	68	47	32	22	15	07
Heavy	96	90	85	73	53	29	15	08	04	01
Jungle	93	84	75	55	31	10	02	00	-	-
Triple Canopy	86	70	55	31	09	00	-	-	-	-

On the appropriate line, find the column which has the largest number that is less than or equal to the number rolled. This is the maximum number of wooded hexes that the shell will penetrate before detonating. If the Impact Hex is within that number of hexes, then fire is executed normally. If the Impact Hex is deeper inside the woods than the given number of hexes, the shell will detonate as an Airburst when it reaches the number of hexes indicated.

When a round suffers Premature Detonation, there is a chance that branches and other large debris from the tree which has been hit will endanger nearby troops. Multiply the Shell's Collapse Radius in Earth by 10%; this is the chance that the debris has damaged or blocked the view of nearby personnel. Roll a 00 to 99 number for each person and each piece of equipment in the hex with the detonation, or in an adjacent hex. Each time the number is less than or equal to 10% times the Collapse Radius, the following table should be consulted.

"Fine, shoot off my other leg. See if I care."

Ridan

FALLING TREE DAMAGE TABLE

Roll	PD	Chance a 60° Field of Fire is Blocked	Actions to Clear a 60° Field of Fire
00 - 30	0	20	20
31 - 60	0	60	100
61 - 80	(1 - 10)	70	200
81 - 93	(1 - 10) x 100	80	*Need Tools
94 - 99	(1 - 10) x 1,000	90	*Eng. Equipment

Personnel who are in the open are subject to the damage shown on the Table, but cannot have their Fields of Fire blocked. Those who are in roofed fortifications are immune to Physical Damage, but are susceptible to having their Fields of Fire blocked. If the Field of Fire is blocked, the third column is used to determine how many Actions it takes to clear the branches and open the Field of Fire. For equipment there is obviously no question of Physical Damage, but if the Field of Fire is blocked, then vehicles cannot be moved and weapons such as artillery pieces cannot be fired until the blockage is cleared. The asterisks in the third column indicate that the blockage is so severe that it cannot be cleared without tools or engineering equipment.

Troops who are in open fortifications, such as Trenches and Foxholes, are subject to having their Fields of Fire blocked in the same way as those in roofed fortifications, and are also in limited physical danger from a branch falling directly into their Trench. Roll normally on the Falling Branch Table to see if the Field of Fire is Blocked. If damage could be taken on that roll; that is, if the roll is an 81 or higher, then there is a 10% chance that the branch has entered the Trench cleanly, and that the Trench is offering no protection. Any soldiers in the Trench take the normal damage.

RIFLE GRENADES

The Direct Fire use of **Rifle Grenades** is discussed in Section 2.1 of the **Phoenix Command Special Weapons Weapon Data Supplement**, and full information about how Rifle Grenades work is presented there. Rules for using Rifle Grenades as Indirect Fire weapons are as follows.

Rifle Grenades use the same Indirect Fire rules as Artillery for Shell Placement. Unlike Artillery, however, a Rifle Grenade does not have a carriage, so the second and all additional shots are little more accurate than the first, and the shooter's experience with this unusual function is vital. Consequently, Indirect Fire of a Rifle Grenade is a Skill, like Gun Combat. To determine a soldier's Accuracy, use the following **Rifle Grenade Accuracy Table**.

RIFLE GRENADE SHELL ACCURACY TABLE			
Rifle Grenade Indirect Fire Skill Level	Shell Accuracy	Rifle Grenade Indirect Fire Skill Level	Shell Accuracy
0	84	5	18
1	42	6	16
2	33	7	14
3	24	8	12
4	21	9+	9

"Don't make me blow you up."

Kyle the Walking Claymore

This Accuracy should be used in the normal way when determining the initial Shell Placement Hex. For the second and all subsequent shots, however, the shot should be run with 1 added to the Rifle Grenade Indirect Fire Skill Level of the shooter. For example, if a shooter is 0th Level Rifle Grenade Indirect Fire, the first shot to a given location would be with an Accuracy of 84 hexes; the second and all subsequent shots would have an Accuracy of 42 hexes. This modifier applies only if the target hex is unchanged, and if the shooter does not move.

Note that most soldiers have little experience with firing Rifle Grenades, and consequently will have an Rifle Grenade Indirect Fire Skill Level of 0.

The **Maximum Range** of a Rifle Grenade for Indirect Fire is 4 times the normal Direct Fire range, while the **Minimum Indirect Fire Range** is equal to the Direct Fire Range.

3

WEAPON DATA

This Chapter contains the Weapon Data for a wide range of Artillery pieces from World War II through the present. Some of the values are also used in PCCS, while others are unique to the Artillery System.

The tables are in four Sections: Weapon Data, Direct Fire Performance, Burst Performance, and Incendiary Data. Each is discussed below.

3.1

WEAPON DATA

The **Weapon Data Table** shows the basic Physical, Direct Fire, and Indirect Fire characteristics of each of the weapons. Both the Artillery and Mortar Data Tables have the same terms, which are defined below.

Length

For most artillery pieces, this is the overall length in feet of the weapon when it is prepared for movement. For mortars, this is the overall length in inches.

Weight

The weapon's weight in pounds, when it is ready for transportation. This does not include ammunition.

Rate of Fire (ROF)

The number of rounds which can be fired from the weapon each minute, or the number of Phases it takes to reload and fire a round. There are three different Rate of Fire values listed for various weapons; Burst ROF, Short Term ROF, and Sustained ROF.

The **Burst ROF** is for modern weapons with automatic loading devices, and generally applies to three rounds fired in rapid succession. Except for Clip-fed weapons, it is not possible to use the Burst ROF with more than three rounds, as the rounds must be prepared and carefully placed for Burst use. For weapons which use a Clip of ammunition, the entire contents of the Clip may be fired using the Burst ROF before reloading.

Short Term ROF is the ROF which the Crew can maintain for a period of a few minutes. The rounds must be prepared in advance and be placed properly in the gun pit.

Sustained ROF is the ROF which the Crew can maintain for longer periods.

Shell Weight

The weight in pounds of the projectile.

Crew

The number of people normally attending the weapon.

Elevation

The angles to which the weapon's barrel can be elevated, with 0 degrees being horizontal. Negative values indicate the maximum depression of the weapon's barrel, or how low it can point.

"Yes, I was aiming at him, but I've never hit anything with a rocket launcher before, so I didn't think it mattered."

Axly

Traverse

This is the angle over which the weapon's barrel can be moved without having to Reposition the gun.

Deploy Time

The time, in Phases, needed to deploy and set up a gun as part of a battery, including leveling, placing azimuth stakes, and establishing the fire control devices such as radios, computers, and so forth.

If the weapon is to be set up for Direct Fire only, use 1/2 this time.

**"All's Well That
Aims Well."**

Neemis Enterprises
Quality Assurance Slogan

USA M29A1 81mm Mortar



**"Hand me my Melon
Baller. This man is
full of Shrapnel."**

Dr. Oscar Schneiderbunk

Reposition Time

This is the number of Phases needed to get the gun set up for rotation in its gun pit. Generally, a special device called a Firing Jack is used to lift the weapon and allow it to be pivoted to a new angle. Once the weapon has been rotated, it must be dropped off the Firing Jack and prepared for fire, which includes setting the weapon's tail to handle the recoil, adjusting the levelling, and so forth.

Range

The Minimum and Maximum ranges at which the weapon can be fired, in hexes.

Ranging Accuracy

This is the base Scatter Radius in hexes for the first shot in a Fire Mission, based on the inaccuracies of the weapon, fire control, and other effects.

Adjusted Fire Accuracy

The Scatter Radius in hexes for all Adjustment shots in a Fire Mission, when corrections are called for by the Forward Observer.

Shell Accuracy

The Scatter Radius in hexes for shells fired during the Fire for Effect portion of a Fire Mission.

Shell Index

This gives the shells which may be fired by the weapon. The numbers listed here are the **Shell Numbers** from the **Burst Data Tables**; for example, 1 refers to the 76mm HE artillery shell produced by the USSR. Mortar shells have their own Burst Data Tables.

The **Smoke** entries indicate the Smk and Dur values for White Phosphorus rounds fired by the weapon. These values are fully explained in **Advanced Phoenix Command** and in the **Special Weapons Weapon Data Supplement**.

3.2

DIRECT FIRE PERFORMANCE

The data for shells fired in the Direct Fire mode is found on this half of the Artillery Data Table. The values are generally those used in PCCS, and are defined below.

Aim Time Modifiers

The weapon's Aim Time Modifiers for Direct Fire accuracy. These are used in the same manner as the Aim Time Mods in PCCS. The Minimum Aim Time here is 4 Actions, and Aim Time does not begin until the weapon has been positioned for fire.

Shell Type

Located at the left of the Direct Fire Data Tables, the Shell Type is an indicator of the type of round being fired. **HE** stands for High Explosive, **HEAT** is High Explosive Anti-Tank, and **APC** is Armor Piercing Capped. APC rounds have a small explosive charge that is roughly equivalent to a grenade, and have therefore been left out of the Burst Data Tables. In the rare event that the explosive charge of an APC round is considered important, the explosion can be modelled by using the effects of a Belgian NR446 Blast Grenade from PCCS.

Penetration (PEN)

This is the maximum armor which the shell can penetrate. Although much of the round has not penetrated the armor at the time of detonation in this case, the explosive effects are generally sufficient to disable the target. This value is used extensively in the **Mechanized Combat System**.

Full Penetration (PENF)

This is the amount of armor which the shell can completely penetrate. This means that on detonation, the entire shell is through the armor. This is used in the **Mechanized Combat System**.

Angle of Incidence (AOI)

This is the angle at which the projectile strikes its target, and is used in the **Mechanized Combat System**.

Non-Penetrating Impact Damage (NID)

This is the Impact Damage delivered to a target if the round fails to penetrate the target's armor, and is used in the **Mechanized Combat System**. For powerful modern rounds, this is often enough to disable a vehicle even without penetration.

Direct Fire Error (DFE)

This measures the shot scatter when the weapon is used in the Direct Fire mode.

Ballistic Accuracy (BA)

This is a measure of the weapon's accuracy potential. The larger the BA, the greater the potential. This value is used in the **Advanced Phoenix Command** supplement and in the **Mechanized Combat System**.

Time of Flight (TOF)

The projectile's time of flight in tenths of seconds. This is also used in the **Advanced Phoenix Command** supplement and in the **Mechanized Combat System**.

3.3

The shell burst and shrapnel data are contained in this table, and are defined below.

SHELL BURST DATA

Shell Number

At the upper left corner of each page is the Shell Number, which is used with the Shell Index to determine which Shells can be fired by various weapons.

Shell Description

Adjacent to each Shell Number is the Shell Description, which lists the caliber, type, and nationality of the round, as well as any other pertinent information.

Burst Condition

Each table is divided into five sections; either Airburst, or Ground Burst on Earth, in Rock, in Sand or Ice, and in a Flooded Rice Paddy or other shallow water. This is done because, unlike a grenade burst, artillery and mortar shells often penetrate the earth before detonating, and this can result in large amounts of thrown debris being added to the shrapnel. To accurately model this, each shell's Burst Data is shown for detonation in various conditions.

Shrapnel

The top portion of each Burst Condition is given over to the Shrapnel effects of the round. If a Shrapnel hit is indicated, then a 0 to 9 number is rolled and this portion of the table is consulted. The roll determines how large a piece of Shrapnel has hit the target; on a 0 to 6, the top lines are used, on a 7 or 8 the middle lines apply, and on a 9 the bottom lines are used. Find the PEN and DC for the Shrapnel at the appropriate Range. Damage done by a piece of Shrapnel is handled exactly as normal small arms fire. The Shrapnel sizes model the fact that most artillery shells are not fitted with a Fragmentation Sleeve like that on a grenade, which would result in uniform pieces of Shrapnel. Without the Sleeve, the artillery shell breaks into an irregular number of fragments, which range in size from metal dust to large chunks weighing many ounces.

Base Shrapnel Hit Chance (BSHC)

This is the chance that a piece of Shrapnel has hit each target beyond Critical Range, and is used in the same way as the BSHC in PCCS.

Base Shrapnel Hit Chance, Critical Range (BSCC)

Exactly as the BSHC, except that it applies to targets within Critical Range.

**"If all of your friends
threw themselves on
grenades, would you
do it too?"**

Sgt. Servo

"Of course they're loyal to me. I have the best troops money can buy."

Corley Norris

Base Concussion (BC)

The Base Concussion generated by the explosion of the round, at various ranges. This is used in the same way as the BC in PCCS.

Fragments

In some cases, the bottom portion of each section is given over to the necessary data for Fragments of wood or rock generated by the burst. Airbursts can generate wood fragments when they detonate in wooded or jungle hexes; Ground Bursts generate rock fragments when they detonate in Earth or Rock. A 0 to 9 number is rolled, as above, to determine the type of fragment generated. The **Impact Damage (ID)** done by this Fragment is given for each Range, along with the BSCC. Note that these Fragments are only dangerous within the **Critical Range**.

Penetration Data

In the top block of the right column is the Penetration Data of the Shell, in the event that it scores a direct hit on an armored target. The PEN and PENF numbers are used in exactly the same way as those given in the **Direct Fire Tables**.

Also included in this block is the Base Concussion (BC) of the round in direct contact with a target.

Critical Range Data

These are the Critical Ranges for targets in various stances, and determine whether the BSHC or the BSCC is used to find the chance of Shrapnel hitting a target.

Collapse Radius

This is the radius within which all Trenches and Walls will collapse, and is also used in conjunction with the Bunker Value to find if a Bunker collapses. It is noticeably higher in areas with soft ground, such as rice paddies, reflecting the weaker nature of fortifications built out of weak materials. If a solid, well-constructed fortification is constructed in an area surrounded by soft ground, the lower Collapse Radius of the two values is used.

3.4

INCENDIARY DATA

"I Didn't Get Through, But I Died Way Cool."

Ridan
His Epitaph

The necessary data for Incendiary and White Phosphorus shells is contained in this table. This data is used in conjunction with the Incendiary rules of Section 1.1 in the **Phoenix Command Special Weapons WDS**. The terms are defined below.

Base White Phosphorus Hit Chance (BWPHC)

This is the base chance of hitting a target with a White Phosphorus Fragment. This Hit Chance is similar to the Base Shrapnel Hit Chance.

Physical Damage for Body and Limbs (PD Body, PD Limbs)

The damage caused by a WP Fragment.

Physical Damage Surface Burns at Target Size 0, 4, and 7 (PDs TS 0, 4, 7)

The Physical Damage caused by the small particles of WP which saturate the burst area.

ARTILLERY SUMMARY TABLE

FORWARD OBSERVER POSITION ERROR TABLE

Forward Observer Skill Level	Calculated Target Position Error	Spotted Target Position Error	Plot Time (Actions)
0	900	80	900
1	600	50	600
2	400	35	400
3	300	25	300
4	240	20	240
5	200	17	200
6	190	16	190
7	180	15	180
8	170	14	170

**"Oops!
Adjustment Fire,
1000 Meters Left...
No, no,
the other Left!"**

Axly
Forward Observer for a Day

FIRE MISSION TIME TABLE

Fire Mission Speed	Fire Supplied By		Fire Mission Speed	Fire Supplied By	
	Artillery Fire Base	Company Level Fire Support		Artillery Fire Base	Company Level Fire Support
1	650	200	11	190	64
2	560	170	12	170	60
3	480	150	13	160	58
4	420	130	14	150	56
5	380	120	15	140	54
6	340	110	16	130	52
7	300	100	17	120	50
8	260	90	18	110	48
9	230	80	19	100	44
10	210	70	20+	90	40

SCATTER ANGLE

Percentile Die Roll	Scatter Angle
00 - 07	0°
08 - 16	30°
17 - 24	60°
25 - 32	90°
33 - 41	120°
42 - 49	150°
50 - 57	180°
58 - 66	210°
67 - 74	240°
75 - 82	270°
83 - 91	300°
92 - 99	330°

SCATTER VALUE

Roll	Scatter Value	Roll	Scatter Value	Roll	Scatter Value
00 - 01	.01	29 - 37	.20	79 - 86	.60
02 - 03	.02	38 - 46	.25	87 - 91	.70
04 - 09	.05	47 - 54	.30	92 - 94	.80
10 - 19	.10	55 - 67	.40	95 - 97	.90
20 - 28	.15	68 - 78	.50	98 - 99	1.00

12 - Sided Die Roll	Scatter Angle
---------------------	---------------

1	0°
2	30°
3	60°
4	90°
5	120°
6	150°
7	180°
8	210°
9	240°
10	270°
11	300°
12	330°

BLUNT IMPACT DAMAGE TABLE

		Impact Damage											
Rigid Armor		11	22	24	31	40	44	53	62	73	84	99	
Flex Armor		4	7	8	11	15	17	20	24	28	32	39	
No Armor		1	2	3	4	5	6	7	8	10	12	14	
00-05	Head	1	2	4	34	2H	4H	7H	1K	2K	4K	6K	
06-48	Body	1	2	3	6	11	18	27	37	61	1H	2H	
49-99	Limb	1	1	2	4	8	15	19	23	43	72	1H	

MORTAR DATA TABLE

Mortar	Physical Data	Gun Handling	Indirect Fire	Shell Index
Type V Commando 60mm France This is a light Brandt mortar which can be fired by one man. It has no bipod and is little more than a tube with an elevation sight. The range is dialed into the sight and the tube elevated until a bubble is levelled in the sight. Azimuth is controlled by lining up a mark on the lip of the tube.	Length 26.8 Weight 17.0 Burst ROF 2p Short Term ROF 3p Sustained ROF 10p Shell Weight 3.2	Elevation - Traverse - Deploy Time 4p Reposition Time 2p Crew 1 Target Size 0	Range Maximum 570 Minimum 55 Accuracy Treat this mortar as a rifle grenade launcher for accuracy.	HE 1 WP 1 Smoke Smk 3 Dur 3
MO-60-63 Brandt 60mm France This light conventional mortar was developed in the 1960's and is still in production. It is in service with the French Army and is also widely exported. Data is for use with US 60mm bombs.	Length 28.5 Weight 32.6 Burst ROF 1p Short Term ROF 2p Sustained ROF 4p Shell Weight 3.2	Elevation 40 - 60° Traverse 17° Deploy Time 35p Reposition Time 6p Crew 3 Target Size 0	Range Maximum 1120 Minimum 55 Accuracy Ranging Fire 42 Adjustment Fire 37 Shell Accuracy 33	HE 1 WP 1 Smoke Smk 3 Dur 3
81mm Long Range 81mm France The Long Range mortar was designed to match the range of the vehicular mortar cannon and approach the range of the 120mm mortar. It is of conventional design and can be broken down into three loads.	Length 66.9 Weight 190 Burst ROF 1p Short Term ROF 3p Sustained ROF 6p Shell Weight 9.4	Elevation 30 - 85° Traverse 29° Deploy Time 45p Reposition Time 12p Crew 3 Target Size 5	Range Maximum 3170 Minimum 90 Accuracy Ranging Fire 135 Adjustment Fire 115 Shell Accuracy 100	HE 2 3 WP 2 Smoke Smk 5 Dur 3
MO-120-60 Brandt 120mm France A simple, reliable, smooth bore mortar of conventional design, it has been designed for mobility and speed. It can be brought into action and operated by as few as three men. Normally the baseplate is set by firing a "bedding in" round at an elevation of 60° or greater.	Length 64.2 Weight 207 Burst ROF - Short Term ROF 2p Sustained ROF 4p Shell Weight 28.7	Elevation 40 - 85° Traverse 10° Deploy Time 45p Reposition Time 12p Crew 3 Target Size 7	Range Maximum 3610 Minimum 330 Accuracy Ranging Fire 150 Adjustment Fire 115 Shell Accuracy 100	HE 7 WP 4 Smoke Smk 10 Dur 4
SGr-34 80mm Germany The Schwerer Granatenwerfer 34 was the standard heavy infantry mortar of the German Army in the Second World War. Burst data is similar to the Soviet 82mm mortar.	Length 45.0 Weight 137 Burst ROF 1p Short Term ROF 2p Sustained ROF 6p Shell Weight 7.7	Elevation 45 - 85° Traverse 6° Deploy Time 40p Reposition Time 12p Crew 3 Target Size 5	Range Maximum 1300 Minimum 35 Accuracy Ranging Fire 47 Adjustment Fire 44 Shell Accuracy 43	HE 4 WP 2 Smoke Smk 5 Dur 3
M-37 82mm USSR This mortar is nearly identical to the M-36, which was the first Soviet 82mm mortar. The design of the M-37 has become a standard; it served throughout the Second World War and is still in service. Ammunition for these mortars has not changed since their introduction in 1936.	Length 48.0 Weight 123 Burst ROF 1p Short Term ROF 2p Sustained ROF 8p Shell Weight 7.1	Elevation 45 - 85° Traverse 6° Deploy Time 45p Reposition Time 12p Crew 3 Target Size 4	Range Maximum 1640 Minimum 55 Accuracy Ranging Fire 54 Adjustment Fire 51 Shell Accuracy 48	HE 4 WP 2 Smoke Smk 5 Dur 3
Vasilyek 2B9 82mm USSR The Vasilyek is an 82mm automatic mortar which has a two wheeled carriage similar to the 76mm Mountain Gun. It fires four round clips at rates as high as 2 rounds per second, and can be direct fired. Towed versions are issued 6 per motorized rifle battalion. Weight and length data are estimates.	Length 132 Weight 1500 Capacity 4 Reload Time 1p Rate of Fire 4rnd / p Shell Weight 7.1	Elevation 0 - 80° Traverse 10° Deploy Time 50p Reposition Time 20p Crew 3 Target Size 8	Range Maximum 2730 Accuracy Ranging Fire 122 Adjustment Fire 107 Shell Accuracy 96	HE 4 WP 2 Smoke Smk 5 Dur 3
M-38 107mm USSR The M-38 was produced for mountain divisions and for animal transport, and is a reduced version of the 120mm mortar. This weapon was used in the Second World War and the current version, the M-107, is of similar design. Ammunition has not changed since its introduction.	Length 65.7 Weight 750 Burst ROF 2p Short Term ROF 4p Sustained ROF 10p Shell Weight 20.1	Elevation 45 - 80° Traverse 3° Deploy Time 60p Reposition Time 16p Crew 6 Target Size 6	Range Maximum 2820 Minimum 270 Accuracy Ranging Fire 100 Adjustment Fire 90 Shell Accuracy 85	HE 5 WP 3 Smoke Smk 10 Dur 4

MORTAR DATA TABLE

Mortar			Physical Data		Gun Handling		Indirect Fire		Shell Index	
M-43	120mm	USSR	Length	73.0	Elevation	45 - 80°	Range		HE	7
<p>The M-43 is almost identical to the M-38 which was used throughout the Second World War. These mortars are no longer in production but are still in service, six being attached to each motorized rifle division. During World War II, the 120mm mortar was usually found in divisional artillery.</p>			Weight	1100	Traverse	8°	Maximum	3120		
			Burst ROF	2p	Deploy Time	70p	Minimum	250	WP	4
			Short Term ROF	3p	Reposition Time	20p	Accuracy			
			Sustained ROF	10p	Crew	6	Ranging Fire	103	Smoke	
			Shell Weight	35.3	Target Size	7	Adjustment Fire	94	Smk	10
							Shell Accuracy	87	Dur	4
M-160	160mm	USSR	Length	179	Elevation	50 - 80°	Range		HE	8
<p>The Soviet Army introduced the 160mm mortar in 1943 and continues to use them in divisional mortar units of mountain divisions. The M-160 is the current version and is nearly identical to the M-43 used in World War II. It is a breech loading mortar whose barrel pivots about a trunnion on the mounting base.</p>			Weight	3240	Traverse	24°	Maximum	4400		
			Burst ROF	10p	Deploy Time	120p	Minimum	410	WP	-
			Short Term ROF	15p	Reposition Time	50p	Accuracy			
			Sustained ROF	30p	Crew	7	Ranging Fire	136	Smoke	
			Shell Weight	88.2	Target Size	13	Adjustment Fire	128	Smk	-
							Shell Accuracy	123	Dur	-
M-240	240mm	USSR	Length	210	Elevation	45 - 65°	Range		HE	9
<p>The M-240 heavy mortar was deployed in the mid-1950's in heavy artillery brigades. It is used for demolition of buildings and fortifications and is especially useful in towns and urban areas where its high angle of fire can hit where conventional artillery cannot. The weapon is breech loaded.</p>			Weight	9200	Traverse	18°	Maximum	5300		
			Burst ROF	15p	Deploy Time	750p	Minimum	440	WP	-
			Short Term ROF	30p	Reposition Time	600p	Accuracy			
			Sustained ROF	60p	Crew	9	Ranging Fire	164	Smoke	
			Shell Weight	286.6	Target Size	15	Adjustment Fire	154	Smk	-
							Shell Accuracy	148	Dur	-
L16ML	81mm	UK	Length	50.4	Elevation	45 - 80°	Range		HE	2
<p>This 81mm mortar has been designed for use primarily from fixed positions, but it can be broken down into three manloads or transported by light vehicles, such as jeeps. Like all 81mm mortars, it is a little heavy for field infantry, but it is an accurate and reliable weapon for support of a fire base or Fighting Vehicle.</p>			Weight	80.9	Traverse	11°	Maximum	3090		3
			Burst ROF	1p	Deploy Time	41p	Minimum	100	WP	2
			Short Term ROF	2p	Reposition Time	11p	Accuracy			
			Sustained ROF	6p	Crew	3	Ranging Fire	108	Smoke	
			Shell Weight	9.9	Target Size	4	Adjustment Fire	90	Smk	5
							Shell Accuracy	77	Dur	3
M-19	60mm	USA	Length	32.2	Elevation	40 - 85°	Range		HE	1
<p>The M-19 is of standard design and is similar to the M1 and M2 mortars used in World War II. It is a light weight company mortar that can be handled by field infantry. It was used throughout the Vietnam conflict and has only recently been placed in reserve. The M19 is being replaced by the new M224.</p>			Weight	46.4	Traverse	14°	Maximum	990		
			Burst ROF	1p	Deploy Time	36p	Minimum	25	WP	1
			Short Term ROF	2p	Reposition Time	10p	Accuracy			
			Sustained ROF	4p	Crew	2	Ranging Fire	32	Smoke	
			Shell Weight	3.2	Target Size	2	Adjustment Fire	29	Smk	3
							Shell Accuracy	27	Dur	3
M29A1	81mm	USA	Length	51.0	Elevation	45 - 84°	Range		HE	2
<p>The M29A1 is a conventional mortar almost identical to the M1 81mm mortar used in World War II. The 81mm was a common fire base support weapon and was used throughout the Vietnam conflict. Today there are plans for replacing it with a modern design, but it is still in production and is found throughout the world.</p>			Weight	96.8	Traverse	11°	Maximum	2180		3
			Burst ROF	1p	Deploy Time	43p	Minimum	25	WP	2
			Short Term ROF	2p	Reposition Time	11p	Accuracy			
			Sustained ROF	6p	Crew	3	Ranging Fire	65	Smoke	
			Shell Weight	9.4	Target Size	5	Adjustment Fire	59	Smk	5
							Shell Accuracy	55	Dur	3
M30	107mm	USA	Length	60	Elevation	40 - 65°	Range		HE	6
<p>The M30 107mm mortar fires a spin stabilized round. It has a rifled barrel and is drop fired. It can be disassembled and carried in five manloads, but is primarily vehicle mounted or found in fixed fire bases. It is the largest mortar in the US inventory and has excellent accuracy due to its spin stabilization.</p>			Weight	672	Traverse	14°	Maximum	3090		
			Burst ROF	2p	Deploy Time	80p	Minimum	500	WP	3
			Short Term ROF	3p	Reposition Time	30p	Accuracy			
			Sustained ROF	10p	Crew	5	Ranging Fire	50	Smoke	
			Shell Weight	27.0	Target Size	6	Adjustment Fire	42	Smk	10
							Shell Accuracy	40	Dur	4
RPU-14	140mm Multiple Rocket	USSR	Length	159	Elevation	0 - 48°	Range		HE	10
<p>The RPU-14 140mm multiple rocket launcher is a towed 16 round rocket launcher designed for Soviet airborne divisions. There are 18 in the artillery regiment of each Airborne Assault Division, and the rockets are spin stabilized. There is also a single round 140mm launcher available for use by guerrilla or special forces.</p>			Weight	4045	Traverse	30°	Maximum	5360		
			Capacity	16	Deploy Time	50p	Minimum	220	WP	-
			Reload Time	100p	Reposition Time	30p	Accuracy			
			Rate of Fire	4rnd/p	Crew	5	Ranging Fire	133	Smoke	
			Shell Weight	87.3	Target Size	14	Adjustment Fire	108	Smk	-
							Shell Accuracy	100	Dur	-

ARTILLERY DATA TABLE

Artillery	Physical Data		Gun Handling		Indirect Fire		Shell Index		
Type 54 - 1 122mm Howitzer China The Type 54 - 1 is virtually identical to the Soviet M30 Howitzer of the same caliber. It uses a variable propellant charge system, fires from its road wheels, and is of standard split trail design.	Towed Length	19.4	Elevation	+60.5 / -3°	Range		HE	6	
	Weight	5511	Traverse	49°	Maximum	6450	AP	-	
	Crew	8	Deploy Time	45p	Accuracy	Ranging Fire	45	WP	6
	Gunshield PF	30	Reposition Time	50p		Adjustment Fire	35		
	Burst ROF	-	Target Size		Shell Accuracy	27	Smoke	Smk	12
	Short Term ROF	5p	Front	14	Dur	4			
	Sustained ROF	15p	Front fire over	10					
	Shell Weight	48.0	Side	14					
			Side fire over	12					
Type 59 - 1 130mm Field Gun China This field gun is similar to the Soviet M46. The Type 59 - 1 is a new model 130mm gun which combines designs from the prior Type 59 and Type 60 122mm gun. It is in service in China, North Korea, Vietnam, Africa, and the Middle East.	Towed Length	35.4	Elevation	+45 / -2.5°	Range		HE	8	
	Weight	13890	Traverse	58°	Maximum	15030	AP	-	
	Crew	8	Deploy Time	51p	Accuracy	Ranging Fire	94	WP	7
	Gunshield PF	30	Reposition Time	65p		Adjustment Fire	72		
	Burst ROF	-	Target Size		Shell Accuracy	56	Smoke	Smk	13
	Short Term ROF	4p	Front	13	Dur	4			
	Sustained ROF	15p	Front fire over	9					
	Shell Weight	71.5	Side	16					
			Side fire over	14					
Type 66 152mm Gun-Howitzer China The Type 66 is a Chinese version of the Soviet D20. The designs are almost identical and it is normally towed by a 6x6 truck. The Type 66 fires from its road wheels and is in service in China, North Korea, Vietnam, and Africa.	Towed Length	28.5	Elevation	+45 / -5°	Range		HE	9	
	Weight	12610	Traverse	58°	Maximum	9420	AP	-	
	Crew	10	Deploy Time	50p	Accuracy	Ranging Fire	69	WP	8
	Gunshield PF	30	Reposition Time	62p		Adjustment Fire	52		
	Burst ROF	-	Target Size		Shell Accuracy	40	Smoke	Smk	15
	Short Term ROF	4p	Front	16	Dur	5			
	Sustained ROF	15p	Front fire over	12					
	Shell Weight	96.0	Side	16					
			Side fire over	13					
Model 50 155mm Howitzer France The Model 50 was developed in France following the Second World War and was widely used by the Israeli, Swedish, and other armies. Currently it is being replaced in France by the new 155mm TR. In Israel it has been largely replaced by self propelled artillery, but a number of weapons are still in service. Many of these weapons were also captured by the Israeli Army after the invasion of Lebanon in 1982.	Towed Length	25.6	Elevation	+69 / -4°	Range		HE	12	
	Weight	19840	Traverse	80°	Maximum	9840	AP	-	
	Crew	11	Deploy Time	68p	Accuracy	Ranging Fire	81	WP	8
	Gunshield PF	-	Reposition Time	60p		Adjustment Fire	62		
	Burst ROF	-	Target Size		Shell Accuracy	49	Smoke	Smk	15
	Short Term ROF	7p	Front	13	Dur	5			
	Sustained ROF	15p	Front fire over	7					
	Shell Weight	94.8	Side	16					
			Side fire over	14					
155mm TR 155mm Towed Gun France The TR is replacing the Model 50 and has been designed for use by French Motorized Infantry Divisions. The gun has an Auxilliary Power Unit (APU) which provides hydraulic power for repositioning and laying of the gun as well as reloading. The APU provides drive to the road wheels, and the gun can move under its own power at speeds of 8 km/hr. The hydraulic shell ramming system allows rates of fire as high as three rounds in 18 seconds.	Towed Length	28.7	Elevation	+66 / -7°	Range		HE	12	
	Weight	23480	Traverse	65°	Maximum	13120	AP	-	
	Crew	8	Deploy Time	60p	Accuracy	Ranging Fire	66	WP	8
	Gunshield PF	-	Reposition Time	38p		Adjustment Fire	51		
	Burst ROF	3rnd in 9p	Target Size		Shell Accuracy	39	Smoke	Smk	15
	Short Term ROF	5p	Front	16	Dur	5			
	Sustained ROF	15p	Front fire over	7					
	Shell Weight	96.4	Side	16					
			Side fire over	14					
leFH18 105mm Howitzer Germany The 105mm leFH18 was the standard divisional field howitzer of the German Army in the Second World War. It was a light, maneuverable gun of split trail design. Introduced in 1935, it served throughout the war.	Towed Length	17.0	Elevation	+40 / -2°	Range		HE	3	
	Weight	4380	Traverse	56°	Maximum	5840	AP	-	
	Crew	8	Deploy Time	44p	Accuracy	Ranging Fire	34	WP	5
	Gunshield PF	30	Reposition Time	38p		Adjustment Fire	27		
	Burst ROF	-	Target Size		Shell Accuracy	21	Smoke	Smk	10
	Short Term ROF	4p	Front	14	Dur	4			
	Sustained ROF	10p	Front fire over	12					
	Shell Weight	32.6	Side	14					
			Side fire over	12					

DIRECT FIRE DATA

Aim Time		Direct Fire Data																		
AC	Mod	Target Range in 2 yard hexes																		
		40	100	150	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
4	-14	HE	PEN	163	159	156	153	147	141	136	131	126	121	116	112	103	96	89	82	76
6	-7		PENF	97	95	93	91	87	83	80	77	73	70	67	65	59	54	50	46	42
8	-4																			
10	-1																			
12	1																			
16	4																			
20	6		AOI															1	1	1
			NID	66	65	63	62	60	58	55	53	51	49	48	46	42	39	36	34	31
			DFE	116	45	30	22	14	10	8	6	5	5	4	3	3	2	2	1	1
			BA	31	24	21	18	15	12	10	8	6	5	4	3	1	-1	-3	-4	-5
			TOF	1	4	5	7	11	15	19	23	27	31	35	39	48	57	66	76	86
4	-21	HE	PEN	710	700	691	683	667	651	635	620	605	591	577	563	536	511	487	464	442
6	-12		PENF	443	437	431	426	416	406	396	386	377	368	359	350	333	317	302	288	274
8	-9																			
10	-6																			
12	-4																			
16	0																			
20	3		AOI																	
24	6		NID	322	318	315	311	304	298	291	285	279	273	267	261	250	239	228	219	209
28	9		DFE	380	150	99	74	48	36	28	23	19	17	14	13	10	8	7	6	5
32	10		BA	31	24	21	19	16	14	12	10	9	8	7	6	4	3	1	0	-1
			TOF	1	2	3	4	6	8	10	12	14	17	19	21	25	30	35	39	44
4	-20	HE	PEN	363	357	352	347	337	327	318	309	300	292	284	276	260	246	232	220	207
6	-12		PENF	223	219	216	212	206	200	194	188	183	178	172	167	158	148	140	132	124
8	-8																			
10	-5																			
12	-3																			
16	1																			
20	4		AOI																	
24	7		NID	236	232	229	226	220	214	208	203	197	192	187	182	172	163	155	147	139
28	9		DFE	188	74	49	36	24	17	14	11	9	8	7	6	5	4	3	3	2
32	10		BA	31	24	21	19	15	13	11	9	8	6	5	4	2	1	-1	-2	-3
			TOF	1	3	4	6	9	12	14	18	21	24	27	30	37	43	50	57	64
4	-23	HE	PEN	344	338	333	328	318	308	299	290	282	273	265	257	242	228	215	203	191
6	-15		PENF	210	206	203	199	193	187	181	176	170	165	160	155	145	137	128	120	113
8	-12																			
10	-10																			
12	-8																			
16	-4																			
20	-1		AOI																	
24	2		NID	229	225	222	218	212	206	201	195	190	184	179	174	164	155	147	139	131
28	4		DFE	185	73	48	36	23	17	13	11	9	8	7	6	5	4	3	3	2
32	6		BA	32	25	22	20	16	13	11	9	8	7	5	4	2	0	-1	-3	-4
36	8		TOF	1	3	4	6	9	12	15	18	21	24	27	30	37	44	51	58	65
4	-10	HE	PEN	404	397	392	386	375	364	354	344	334	324	315	306	289	273	258	244	230
6	-3		PENF	248	243	240	236	229	222	216	209	203	197	191	186	175	165	155	146	137
8	0																			
10	2																			
12	4																			
16	7																			
20	10		AOI																	
			NID	267	263	259	256	249	242	236	229	223	217	211	206	195	185	175	166	157
			DFE	215	85	56	41	27	20	16	13	11	9	8	7	6	5	4	3	3
			BA	35	28	24	22	19	16	14	12	11	9	8	7	5	3	1	0	-1
			TOF	1	3	4	5	8	11	14	16	19	22	25	28	34	40	47	53	60
4	-13	HE	PEN	119	116	113	110	106	101	97	92	89	85	81	78	71	65	60	55	51
6	-5		PENF	70	68	66	65	62	59	56	53	51	48	46	44	40	36	33	30	27
8	-2																			
10	1																			
12	3																			
16	6																			
20	8		AOI														1	1	1	1
			NID	35	34	34	33	31	30	29	28	26	25	24	23	21	20	18	16	15
			DFE	96	38	25	18	12	8	7	5	4	4	3	3	2	2	1	1	1
			BA	31	24	21	18	15	12	10	8	7	5	4	3	1	-1	-3	-4	-5
			TOF	2	4	6	8	12	16	21	25	30	34	39	44	53	64	74	85	96

ARTILLERY DATA TABLE

Artillery			Physical Data		Gun Handling		Indirect Fire		Shell Index	
GP M1966	76mm Mountain Gun	USSR	Towed Length	15.7	Elevation	+65 / -5°	Range		HE	1
			Weight	1720	Traverse	50°	Maximum	6010	AP	-
			Crew	7	Deploy Time	40p	Accuracy		WP	-
			Gunshield PF	30	Reposition Time	40p	Ranging Fire	41	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	32	Smk	-
			Short Term ROF	2p	Front	12	Shell Accuracy	25	Dur	-
			Sustained ROF	15p	Front fire over	10				
			Shell Weight	13.7	Side	10				
					Side fire over	7				
<p>The 76mm Mountain Gun GP is similar to the M56 Italian pack howitzer and has been used by Soviet forces in Afghanistan. It has a split trail and two piece gun shield.</p>										
M1931/37	122mm Corps Gun	USSR	Towed Length	25.8	Elevation	+65 / -2°	Range		HE	6
			Weight	17750	Traverse	58°	Maximum	11370	AP	-
			Crew	8	Deploy Time	60p	Accuracy		WP	6
			Gunshield PF	30	Reposition Time	68p	Ranging Fire	81	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	63	Smk	12
			Short Term ROF	5p	Front	16	Shell Accuracy	48	Dur	4
			Sustained ROF	15p	Front fire over	13				
			Shell Weight	48.0	Side	16				
					Side fire over	13				
<p>The M1931/37 was developed shortly before the Second World War. It was based upon the M1931 gun and shares the same carriage as the M1937 152mm gun. The M1931/37 served throughout the Second World War but has been replaced by the M-46 and D-74 in the Soviet Army and the Warsaw Pact.</p>										
D-30	122mm Howitzer	USSR	Towed Length	17.7	Elevation	+70 / -7°	Range		HE	6
			Weight	7080	Traverse	360°	Maximum	6420	AP	7
			Crew	7	Deploy Time	80p	Accuracy		WP	6
			Gunshield PF	30	Reposition Time	-	Ranging Fire	73	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	56	Smk	12
			Short Term ROF	4p	Front	13	Shell Accuracy	43	Dur	4
			Sustained ROF	15p	Front fire over	9				
			Shell Weight	48.0	Side	13				
					Side fire over	11				
<p>The D-30 replaced the M-30 in the early 1960's and has a full 360° firing traverse. The weapon has three trails which support the gun once it has been raised up on the firing jack. The D-30 is still in production and has been widely exported throughout the Warsaw Pact, Africa, and the Middle East. It has a highly effective fin stabilized HEAT round.</p>										
D-74	122mm Field Gun	USSR	Towed Length	32.4	Elevation	+45 / -5°	Range		HE	6
			Weight	12235	Traverse	58°	Maximum	13120	AP	-
			Crew	10	Deploy Time	65p	Accuracy		WP	6
			Gunshield PF	30	Reposition Time	52p	Ranging Fire	81	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	63	Smk	12
			Short Term ROF	4p	Front	15	Shell Accuracy	48	Dur	4
			Sustained ROF	15p	Front fire over	10				
			Shell Weight	47.8	Side	14				
					Side fire over	13				
<p>The D-74 was introduced in 1955 and was to replace the M1931/37 122mm Corps Gun. At the same time, the M-46 130mm Field Gun was also developed. Although the M-46 was chosen over the D-74, a number of D-74's were produced and exported. The weapon is in service in China, Cuba, North Korea, Africa, and Vietnam.</p>										
M-46	130mm Field Gun	USSR	Towed Length	38.5	Elevation	+45 / -2.5°	Range		HE	8
			Weight	18630	Traverse	50°	Maximum	14840	AP	-
			Crew	9	Deploy Time	62p	Accuracy		WP	7
			Gunshield PF	30	Reposition Time	68p	Ranging Fire	98	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	76	Smk	13
			Short Term ROF	5p	Front	15	Shell Accuracy	58	Dur	4
			Sustained ROF	15p	Front fire over	10				
			Shell Weight	73.6	Side	15				
					Side fire over	14				
<p>The M-46 was developed in the mid-1950's and has replaced the M1931/37 Corps Gun. It is ballistically identical to the Soviet Naval gun of the same caliber. The M-46 has been widely exported and was used extensively by the North Vietnamese Army. It is still in service throughout Africa and the Warsaw Pact.</p>										
M1937	152mm Gun-Howitzer	USSR	Towed Length	23.6	Elevation	+65 / -2°	Range		HE	9
			Weight	17800	Traverse	58°	Maximum	9440	AP	-
			Crew	9	Deploy Time	65p	Accuracy		WP	8
			Gunshield PF	30	Reposition Time	60p	Ranging Fire	68	Smoke	-
			Burst ROF	-	Target Size		Adjustment Fire	53	Smk	15
			Short Term ROF	8p	Front	16	Shell Accuracy	41	Dur	5
			Sustained ROF	15p	Front fire over	13				
			Shell Weight	95.9	Side	15				
					Side fire over	12				
<p>The M1937 was developed just before the Second World War as a replacement for the M1910/34. It was used extensively in the Second World War but is no longer in service in the Soviet Army. It is still found in reserve units within the Warsaw Pact and is in use in Africa and Southeast Asia.</p>										

DIRECT FIRE DATA

Aim Time	AC	Mod	Direct Fire Data																			
					Target Range in 2 yard hexes																	
					40	100	150	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	
4 6 8 10 12 16	-9 -1	HE	PEN	132	128	124	121	115	109	104	99	94	89	85	80	73	66	60	54	49		
			PENF	80	77	75	73	69	66	62	59	56	53	50	47	42	38	34	31	27		
	2 4 6 8	HEAT	PEN		458	517	567	617	721	825	931	927	842	772	714	665	588	530	485	450	422	
				AOI								1	1	1	1	1	2	3	3	4	5	
				NID	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	0	0
				DFE	36	14	9	6	4	3	2	1	1	1	1	1	1	1	1	1	1	1
				BA	30	21	17	14	9	6	3	1	-1	-3	-4	-6	-8	-10	-12	-13	-14	-14
				TOF	3	6	10	13	21	28	36	44	53	62	71	81	101	123	145	168	193	193
4 6 8 10 12 16 20 24 28 32 36	-22 -15	HE	PEN	438	430	423	417	405	393	381	370	359	348	338	328	309	291	274	258	243		
			PENF	271	266	262	258	250	243	235	228	221	214	208	202	190	178	168	158	148		
	-12 -9 -7 -4 -1 1	APC	PENF		17H	17H	17H	16H	16H	15H	15H	14H	14H	14H	13H	13H	12H	11H	11H	996	937	
				AOI																		
				NID	173	170	168	166	161	157	153	148	144	140	137	133	126	119	112	106	101	
				DFE	281	111	73	54	35	26	20	16	14	12	10	9	7	6	5	4	4	
				BA	31	24	21	19	16	13	11	10	8	7	6	5	3	1	0	-1	-3	
				TOF	1	2	3	5	7	9	12	14	17	19	22	25	30	35	41	47	53	
4 6 8 10 12 16 20 24	-16 -8	HE	PEN	286	280	275	270	260	251	242	234	225	217	210	202	188	175	163	152	142		
			PENF	175	171	168	165	159	153	147	142	136	131	127	122	113	105	97	90	84		
	-4 -2 0 4 7 8	HEAT	PEN		44H	46H	48H	50H	54H	58H	62H	62H	58H	55H	52H	49H	44H	40H	37H	34H	32H	
				AOI																		
				NID	126	124	122	120	116	112	108	105	102	98	95	92	86	81	75	71	66	
				DFE	240	94	62	46	30	22	17	14	11	10	8	7	6	5	4	3	3	
				BA	32	25	22	19	15	13	10	9	7	5	4	3	1	-1	-3	-4	-5	
				TOF	1	2	4	5	8	10	13	16	18	21	24	27	33	39	45	52	58	
4 6 8 10 12 16 20 24 28	-20 -12	HE	PEN	582	573	565	558	543	529	515	502	489	476	463	451	428	406	385	365	347		
			PENF	363	357	352	347	338	329	320	312	303	295	288	280	265	251	238	225	214		
	-9 -6 -4 0 3 6 8	APC	PENF		21H	20H	20H	20H	19H	19H	18H	18H	17H	17H	16H	16H	15H	14H	13H	12H	12H	
				AOI																		
				NID	208	205	202	199	194	189	184	179	175	170	165	161	153	145	137	130	124	
				DFE	343	136	89	66	43	32	25	20	17	15	13	11	9	7	6	5	4	
				BA	32	25	22	20	17	14	12	11	9	8	7	6	4	2	1	-1	-2	
				TOF	1	2	3	4	6	9	11	13	15	18	20	22	27	32	37	42	47	
4 6 8 10 12 16 20 24 28 32 36	-22 -14	HE	PEN	903	891	881	871	851	832	813	794	776	758	741	724	692	661	631	603	576		
			PENF	565	557	551	544	532	520	508	496	485	473	462	452	431	412	393	375	358		
	-11 -8 -6 -2 1 4 6 8 10	APC	PENF		27H	27H	27H	26H	26H	25H	25H	24H	24H	23H	22H	22H	21H	20H	19H	18H	17H	
				AOI																		
				NID	404	399	395	391	383	375	367	360	352	345	338	331	317	304	292	280	269	
				DFE	484	192	127	94	62	46	36	29	25	21	19	16	13	11	9	8	7	
				BA	31	24	21	19	16	14	12	10	9	8	7	6	4	3	1	0	-1	
				TOF	1	2	3	4	5	7	9	11	13	15	16	18	26	26	30	35	39	
4 6 8 10 12 16 20 24 28 32 36	-22 -15	HE	PEN	363	357	352	347	337	327	318	309	300	292	283	275	260	246	232	219	207		
			PENF	222	219	215	212	206	200	194	188	183	177	172	167	157	148	140	131	124		
	-12 -9 -7 -4 -1 1 3 5 6	APC	PENF		12H	12H	11H	11H	11H	11H	10H	10H	983	956	930	905	856	810	767	725	686	
				AOI																		
				NID	231	227	224	222	216	211	206	201	196	191	186	182	173	164	156	149	142	
				DFE	158	62	41	31	20	15	11	9	8	7	6	5	4	3	3	2	2	
				BA	31	24	21	19	16	13	11	10	8	7	6	5	3	2	0	-1	-2	
				TOF	1	3	5	6	9	13	16	19	22	26	29	33	40	47	54	62	69	

ARTILLERY DATA TABLE

Artillery			Physical Data		Gun Handling		Indirect Fire		Shell Index		
M1943 D-1	152mm Howitzer	USSR	Towed Length	24.8	Elevation	+63.5 / -3°	Range		HE	9	
			Weight	8020	Traverse	35°	Maximum	6780			
<p>The D-1 was introduced in 1943 as a replacement for the M1938 152mm Howitzer. It fires the same ammunition but is much lighter, and eighteen D-1's were issued to each motorized rifle division in the Soviet Army. The D-1 has been largely replaced by self propelled howitzers in the USSR, but it is still found in service throughout Africa, China, and Southeast Asia.</p>			Crew	7	Deploy Time	47p	Accuracy		AP	11	
			Gunshield PF	30	Reposition Time	55p		Ranging Fire	47		
			Burst ROF	-	Target Size		Adjustment Fire	36	WP	8	
			Short Term ROF	8p	Front	15	Shell Accuracy	28			Smoke
			Sustained ROF	20p	Front fire over	10					Smk
			Shell Weight	95.9	Side	15			Dur	5	
					Side fire over	12					
D-20	152mm Gun-Howitzer	USSR	Towed Length	28.5	Elevation	+63 / -5°	Range		HE	9	
			Weight	18670	Traverse	58°	Maximum	9520			
<p>The D-20 replaced the ML-20 in the mid-1950's. It has been widely exported and is found in three batteries of six per artillery regiment in motorized rifle divisions. Like the D-1, the D-20 is being replaced by self propelled howitzers in the Soviet Army, but many units still rely on the towed model.</p>			Crew	10	Deploy Time	65p	Accuracy		AP	11	
			Gunshield PF	30	Reposition Time	50p		Ranging Fire	67		
			Burst ROF	-	Target Size		Adjustment Fire	52	WP	8	
			Short Term ROF	5p	Front	16	Shell Accuracy	40			Smoke
			Sustained ROF	15p	Front fire over	12					Smk
			Shell Weight	95.9	Side	15			Dur	5	
					Side fire over	14					
2A36	152mm Gun	USSR	Towed Length	42.4	Elevation	+57 / -2.5°	Range		HE	9	
			Weight	21600	Traverse	50°	Maximum	14760		10	
<p>The 2A36 was introduced in the mid-1970's and began to enter operational service in the early 1980's. It is replacing the 130mm M-46 in category 1 independent artillery brigades and artillery divisions. A new set of 152mm ammunition has been developed for this weapon which provides improved range and lethality.</p>			Crew	8	Deploy Time	70p	Accuracy		AP	-	
			Gunshield PF	30	Reposition Time	60p		Ranging Fire	97		
			Burst ROF	-	Target Size		Adjustment Fire	75	WP	8	
			Short Term ROF	5p	Front	16	Shell Accuracy	57			Smoke
			Sustained ROF	15p	Front fire over	13					Smk
			Shell Weight	95.9	Side	16			Dur	5	
					Side fire over	14					
S-23	180mm Gun	USSR	Towed Length	34.4	Elevation	+50 / -2°	Range		HE	14	
			Weight	47290	Traverse	44°	Maximum	16620			
<p>The S-23 was developed from a naval gun in the 1950's. For many years it was mistakenly identified in the West as the 203mm gun-howitzer M1955, until some were captured in the Middle East by the Israelis. In the Soviet army, there are 12 S-23's in the heavy artillery brigade of an artillery division.</p>			Crew	16	Deploy Time	80p	Accuracy		AP	-	
			Gunshield PF	-	Reposition Time	80p		Ranging Fire	92		
			Burst ROF	-	Target Size		Adjustment Fire	71	WP	9	
			Short Term ROF	30p	Front	16	Shell Accuracy	54			Smoke
			Sustained ROF	60p	Front fire over	7					Smk
			Shell Weight	185.4	Side	17			Dur	5	
					Side fire over	14					
L118	105mm Light Gun	UK	Towed Length	16.0	Elevation	+70 / -5.5°	Range		HE	3	
			Weight	4100	Traverse	11°	Maximum	9400		4	
<p>In the mid-1970's, the British Army replaced their M56 Melara Italian Pack Howitzers with the L118. The L118 has also been chosen by the US Army as its new light howitzer and is called the M119. The US version fires standard US 105mm M1 ammunition. In the British Army, each Light Gun Regiment has three batteries of eight guns.</p>			Crew	8	Deploy Time	65p	Accuracy		AP	5	
			Gunshield PF	-	Reposition Time	32p		Ranging Fire	38		
			Burst ROF	-	Target Size		Adjustment Fire	29	WP	5	
			Short Term ROF	4p	Front	13	Shell Accuracy	22			Smoke
			Sustained ROF	10p	Front fire over	7					Smk
			Shell Weight	32.8	Side	14			Dur	4	
					Side fire over	12					
25 Pounder Field Gun		UK	Towed Length	26.0	Elevation	+40 / -5°	Range		HE	2	
			Weight	3970	Traverse	8°	Maximum	6700			
<p>The 25 Pounder Field Gun was developed late in the 1930's and served throughout the Second World War. It has been widely exported and is still in service in many parts of Africa and Asia. The 25 Pound Field Gun and US 105mm and 155mm guns were the primary artillery pieces used by British forces during the Second World War.</p>			Crew	6	Deploy Time	60p	Accuracy		AP	-	
			Gunshield PF	30	Reposition Time	25p		Ranging Fire	25		
			Burst ROF	-	Target Size		Adjustment Fire	20	WP	5	
			Short Term ROF	6p	Front	14	Shell Accuracy	15			Smoke
			Sustained ROF	10p	Front fire over	12					Smk
			Shell Weight	25.0	Side	14			Dur	4	
					Side fire over	12					

DIRECT FIRE DATA

Aim Time		Direct Fire Data																			
AC	Mod	Target Range in 2 yard hexes																			
		40	100	150	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000			
4	-17	HE	PEN	206	202	198	195	188	182	176	170	165	159	154	149	139	131	122	115	107	
6	-8		PENF	123	120	118	116	112	108	104	100	97	93	90	87	81	75	70	65	60	
8	-4																				
10	-1	HEAT	PEN	29H	30H	31H	31H	32H	34H	35H	35H	34H	33H	32H	31H	29H	28H	26H	25H	24H	
12	1																				
16	5																				
20	8		AOI																	1	1
			NID	149	146	144	142	138	133	130	126	122	118	115	112	105	99	93	88	83	
			DFE	113	45	29	22	14	10	8	7	5	5	4	3	3	2	2	2	1	
			BA	31	24	21	18	15	12	10	8	7	5	4	3	1	-1	-2	-4	-5	
			TOF	1	4	5	7	11	15	19	23	27	31	35	39	48	56	65	74	84	
4	-20	HE	PEN	363	357	352	347	337	327	318	309	300	292	284	276	260	246	232	219	207	
6	-12		PENF	223	219	215	212	206	200	194	188	183	177	172	167	157	148	140	132	124	
8	-8																				
10	-5	HEAT	PEN	30H	31H	31H	32H	33H	34H	35H	34H	32H	31H	30H	29H	28H	26H	25H	23H	22H	
12	-3																				
16	1																				
20	4		AOI																		
24	7		NID	201	197	195	192	187	182	177	172	167	162	158	154	145	137	130	123	116	
28	9		DFE	158	62	41	30	20	15	11	9	8	7	6	5	4	3	3	2	2	
32	10		BA	32	25	22	20	16	14	12	10	8	7	6	5	3	1	0	-2	-3	
			TOF	1	3	5	6	9	13	16	19	22	26	29	33	40	47	55	62	70	
4	-24	HE	PEN	608	599	591	583	568	554	539	526	512	499	486	474	450	427	406	385	366	
6	-16		PENF	376	370	365	360	351	341	332	324	315	307	299	291	276	261	248	235	223	
8	-13																				
12	-8																				
16	-4																				
20	-1																				
24	1		AOI																		
28	4		NID	377	372	367	363	354	346	338	330	322	314	307	300	286	272	259	247	236	
32	6		DFE	317	125	83	61	40	30	23	19	16	14	12	10	8	7	6	5	4	
36	8		BA	32	25	22	20	17	14	13	11	9	8	7	6	4	3	1	0	-1	
44	10		TOF	1	2	3	4	7	9	11	13	16	18	21	23	28	33	38	43	49	
4	-30	HE	PEN	772	763	756	749	734	720	706	692	679	666	653	640	616	592	569	548	527	
8	-22		PENF	479	473	469	464	455	446	437	428	420	412	403	395	380	365	351	337	324	
12	-19																				
16	-16																				
20	-14																				
28	-10																				
36	-7		AOI																		
44	-4		NID	729	721	715	709	696	683	671	659	648	636	625	613	592	571	551	531	512	
60	0		DFE	274	109	72	54	35	26	20	17	14	12	11	10	8	6	5	5	4	
68	2		BA	32	26	23	20	17	15	13	11	10	9	8	7	5	4	2	1	0	
76	4		TOF	1	2	3	5	7	9	12	14	17	19	22	24	29	35	40	45	51	
4	-12	HE	PEN	134	131	128	125	120	115	110	105	101	96	92	89	81	75	69	64	59	
6	-3		PENF	80	78	76	74	71	67	64	61	59	56	53	51	46	42	38	35	32	
8	0																				
10	3	HEAT	PEN	542	580	611	643	707	772	837	834	778	729	686	648	584	533	491	457	428	
12	5																				
16	9																				
20	10		AOI												1	1	1	1	1	2	
			NID	17	17	16	16	15	14	13	12	11	11	10	9	8	7	6	5	5	
			DFE	69	27	17	13	8	6	4	3	3	2	2	2	1	1	1	1	1	
			BA	31	23	19	16	11	8	5	3	1	-1	-2	-4	-6	-8	-10	-12	-13	
			TOF	2	5	7	9	14	20	25	30	36	42	48	54	67	80	94	108	123	
4	-12	HE	PEN	144	141	138	135	130	125	120	116	111	107	103	99	91	84	78	72	67	
6	-4		PENF	87	85	83	81	78	75	72	69	66	63	60	58	53	49	45	41	38	
8	-1																				
10	2	APC	PENF	498	483	472	461	439	418	398	379	361	344	328	312	284	257	234	212	192	
12	4																				
16	7																				
20	8		AOI																	1	
			NID	32	31	30	30	28	27	26	25	24	23	22	21	19	18	16	15	14	
			DFE	162	63	41	31	20	14	11	9	7	6	5	5	4	3	2	2	2	
			BA	32	25	22	19	16	13	11	9	8	6	5	4	2	0	-1	-3	-4	
			TOF	1	3	5	6	9	13	16	19	23	26	30	34	41	49	57	66	74	

ARTILLERY DATA TABLE

Artillery			Physical Data		Gun Handling		Indirect Fire		Shell Index	
M102	105mm Howitzer	USA	Towed Length Weight	17.0 3300	Elevation Traverse	+75 / -5° 10°	Range Maximum	6290	HE	3 4
<p>The M102 was produced in the mid-1960's and is the standard howitzer of Airborne and Air Mobile Divisions. The weapon was used extensively in Vietnam and is being replaced by the M119 (see L118 above). There are three batteries of eight guns in each battalion. The M102 is similar to the M101 but is much lighter and fires from a circular baseplate which allows rapid 360° rotation.</p>			Crew	8	Deploy Time	80p	Accuracy Ranging Fire 37 Adjustment Fire 29 Shell Accuracy 22	AP	5	
			Gunshield PF	-	Reposition Time	22p		Target Size Front 12 Front fire over 7 Side 13 Side fire over 12	WP	5
			Burst ROF	-	Short Term ROF	3p			Smoke Smk 10 Dur 4	
			Sustained ROF	10p	Shell Weight	32.8				
M101	105mm Howitzer	USA	Towed Length Weight	19.6 4475	Elevation Traverse	+66 / -5° 46°	Range Maximum	6160	HE	3 4
<p>The M101 Howitzer was developed prior to the Second World War and was the standard gun of the US Army. Over 10,000 were produced and many saw action in Vietnam. Today, the M101 has largely been replaced by the M102, but a large number are still in inventory. During the Second World War, the M101 was also widely used by British and French forces.</p>			Crew	8	Deploy Time	54p	Accuracy Ranging Fire 35 Adjustment Fire 27 Shell Accuracy 21	AP	5	
			Gunshield PF	-	Reposition Time	38p		Target Size Front 12 Front fire over 7 Side 13 Side fire over 12	WP	5
			Burst ROF	-	Short Term ROF	3p			Smoke Smk 10 Dur 4	
			Sustained ROF	10p	Shell Weight	32.8				
M114	155mm Howitzer	USA	Towed Length Weight	24.0 12790	Elevation Traverse	+63 / -2° 49°	Range Maximum	7980	HE	12
<p>The M114 was developed shortly after the Second World War. It has been widely exported and is essentially identical to the M1 155mm Howitzer used by French, British, and US forces in the Second World War. The M114 is being replaced by the M198 in the US Army, but will likely remain in service for a number of years.</p>			Crew	11	Deploy Time	65p	Accuracy Ranging Fire 58 Adjustment Fire 45 Shell Accuracy 34	AP	-	
			Gunshield PF	-	Reposition Time	50p		Target Size Front 14 Front fire over 7 Side 15 Side fire over 10	WP	8
			Burst ROF	-	Short Term ROF	15p			Smoke Smk 15 Dur 5	
			Sustained ROF	20p	Shell Weight	94.6				
M198	155mm Howitzer	USA	Towed Length Weight	40.5 15790	Elevation Traverse	+72 / -5° 45°	Range Maximum	9890	HE	12 13
<p>The M198 was developed to replace the M114 and production began in the late 1970's. By 1988 approximately 1800 had been produced and delivered to the US Army and Marine Corps. The M198 is found in batteries of eight guns, and there are three batteries per gun battalion.</p>			Crew	11	Deploy Time	68p	Accuracy Ranging Fire 85 Adjustment Fire 65 Shell Accuracy 50	AP	-	
			Gunshield PF	-	Reposition Time	55p		Target Size Front 14 Front fire over 7 Side 15 Side fire over 13	WP	8
			Burst ROF	-	Short Term ROF	15p			Smoke Smk 15 Dur 5	
			Sustained ROF	20p	Shell Weight	94.6				
M115	8 Inch Howitzer	USA	Towed Length Weight	36.0 32000	Elevation Traverse	+65 / -2° 60°	Range Maximum	9180	HE	15
<p>Development of the 8 inch howitzer began in the 1920's, and shortly before the Second World War the weapon was standardized as the M1 8 inch Howitzer. After the war it was redesignated the M115 Heavy Towed Howitzer.</p>			Crew	14	Deploy Time	90p	Accuracy Ranging Fire 66 Adjustment Fire 51 Shell Accuracy 39	AP	-	
			Gunshield PF	-	Reposition Time	75p		Target Size Front 15 Front fire over 8 Side 18 Side fire over 14	WP	10
			Burst ROF	-	Short Term ROF	30p			Smoke Smk 20 Dur 5	
			Sustained ROF	60p	Shell Weight	204.0				
16 inch Naval Gun		USA	Towed Length Weight	- -	Elevation Traverse	- -	Range Maximum	20000	HE	16
<p>The 16 inch gun was the largest naval gun of the US Navy in World War II, and there were 9 of them on each Iowa class Battleship. Four Iowa class Battleships were recommissioned after World War II and saw action in the Middle East. Present plans call for them to be taken out of service.</p>			Crew	-	Deploy Time	-	Accuracy Ranging Fire 86 Adjustment Fire 68 Shell Accuracy 53	AP	-	
			Gunshield PF	-	Reposition Time	-		Target Size Front - Front fire over - Side - Side fire over -	WP	-
			Burst ROF	-	Short Term ROF	60p			Smoke Smk - Dur -	
			Sustained ROF	90p	Shell Weight	2100				

DIRECT FIRE DATA

Aim Time		Direct Fire Data																			
AC	Mod	Target Range in 2 yard hexes																			
		40	100	150	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000			
4	-11	HE	PEN	131	128	125	122	117	112	107	103	98	94	90	87	79	73	67	62	57	
6	-2		PENF	78	76	74	72	69	66	63	60	57	54	52	50	45	41	37	34	31	
8	1																				
10	4	HEAT	PEN	545	582	614	645	709	773	837	834	779	730	687	650	586	536	494	460	431	
12	6																				
16	10		AOI												1	1	1	1	1	2	
			NID	17	16	16	15	14	13	12	12	11	10	10	9	8	7	6	5	5	
			DFE	67	26	17	12	8	6	4	3	3	2	2	2	1	1	1	1	0	
			BA	31	23	19	16	11	8	5	3	1	-1	-3	-4	-6	-8	-10	-12	-13	
			TOF	2	5	7	10	15	20	25	31	37	43	49	55	68	81	96	110	126	
4	-13	HE	PEN	120	117	115	112	107	103	98	94	90	86	83	79	73	67	61	56	52	
6	-4		PENF	71	69	67	66	63	60	57	54	52	49	47	45	41	37	34	31	28	
8	-1																				
10	2	HEAT	PEN	566	602	633	665	727	790	853	821	768	722	681	645	585	536	496	462	434	
12	4																				
16	8		AOI												1	1	1	1	1	2	
20	10		NID	15	15	14	14	13	12	11	11	10	9	9	8	7	6	5	5	4	
			DFE	61	24	15	11	7	5	4	3	2	2	2	1	1	1	1	1	0	
			BA	31	23	19	16	11	8	5	3	1	-1	-3	-4	-6	-8	-10	-12	-13	
			TOF	2	5	8	10	15	21	27	32	38	45	51	58	71	86	101	116	132	
4	-20	HE	PEN	261	256	252	248	241	233	226	219	212	205	199	193	181	170	160	150	141	
6	-12		PENF	157	154	152	149	144	140	135	130	126	122	118	114	107	100	93	87	82	
8	-8																				
10	-5																				
12	-3																				
16	1																				
20	4		AOI																	1	
24	7		NID	176	173	171	168	163	158	154	149	145	140	136	132	124	117	110	104	98	
28	9		DFE	139	55	36	27	17	13	10	8	7	6	5	4	3	3	2	2	2	
32	10		BA	32	25	22	19	16	13	11	9	8	6	5	4	2	0	-1	-3	-4	
			TOF	1	3	5	7	10	13	17	20	24	28	31	35	43	51	59	67	76	
4	-22	HE	PEN	379	372	367	361	351	340	330	321	311	302	293	285	268	253	268	225	212	
6	-14		PENF	232	229	224	221	214	207	201	195	189	183	178	172	162	152	159	135	126	
8	-10																				
10	-7																				
12	-5																				
16	-1																				
20	2		AOI																		
24	5		NID	250	246	242	239	233	226	220	214	208	202	197	191	181	171	162	153	145	
28	7		DFE	205	81	53	40	26	19	15	12	10	9	7	6	5	4	4	3	3	
32	9		BA	33	26	23	20	17	14	12	10	8	7	6	5	3	1	-1	-2	-3	
36	10		TOF	1	3	4	5	8	11	14	17	20	23	26	29	35	41	48	55	62	
4	-26	HE	PEN	395	389	384	379	370	361	352	343	335	326	318	311	296	281	268	255	243	
8	-16		PENF	240	236	233	230	224	218	212	207	201	196	191	186	177	168	159	151	143	
12	-12																				
16	-9																				
20	-6																				
24	-4																				
28	-2		AOI																		
32	0		NID	478	471	466	460	450	439	429	419	409	400	390	381	364	347	331	316	301	
36	2		DFE	151	60	39	29	19	14	11	9	8	7	6	5	4	3	3	2	2	
44	5		BA	33	26	23	20	17	14	12	10	9	7	6	5	3	1	0	-2	-3	
52	8		TOF	1	3	5	6	10	13	16	19	23	26	30	33	40	48	55	63	70	
4	-22	HE	PEN	28H	28H	27H	27H	27H	27H	27H	27H	26H	26H	26H	26H	25H	25H	25H	24H	24H	23H
6	-10		PENF	17H	17H	17H	17H	17H	17H	17H	17H	16H	16H	16H	16H	16H	15H	15H	15H	15H	15H
8	-6																				
10	-2																				
12	1																				
16	7																				
20	11		AOI																		
24	15		NID	155H	154H	154H	153H	152H	151H	150H	148H	147H	146H	145H	144H	142H	139H	137H	135H	133H	
28	18		DFE	321	128	85	64	42	31	25	21	18	15	13	12	10	8	7	6	6	
32	20		BA	29	23	20	18	15	13	11	10	8	7	6	5	4	3	2	1	0	
			TOF	1	2	3	4	6	9	11	13	15	17	20	22	26	31	36	40	45	

MORTAR BURST DATA TABLE

2	81mm HE USA	Burst Data														Penetration and Critical Range				
		0	1	2	3	4	5	6	8	10	12	15	20	30	40					
Airburst	0-6	PEN	3.6	3.5	3.4	3.2	3.0	2.8	2.6	2.2	1.8	1.5	1.2	.7				PEN	11	
		DC	2	2	2	2	1	1	1	1	1	1	1	1				PENF	3.1	
	7-8	PEN	7.8	7.7	7.5	7.3	7.0	6.7	5.8	5.8	5.2	4.7	4.0	3.0	1.7	1.0		BC Contact	97K	
		DC	4	4	4	4	3	3	3	3	3	3	2	2	1	1				
	9	PEN	11	11	11	11	10	9.8	8.7	8.7	8.0	7.4	6.5	5.2	3.4	2.2				
		DC	6	5	5	5	5	5	5	5	5	4	4	4	3	2	2			
		BSHC	24	22	18	13	10	7	5	3	2	1	1	-2	-5	-7				
		BC	54	51	42	33	26	20	16	11	8	6	4	3	1	1				
	0-1	ID	5	5	4	4	3	3	3	2	1	1								
	2-7	ID	7	7	7	6	6	5	5	4	3	2	1							
	8-9	ID	10	10	10	9	8	8	7	6	4	3	2	1						
		BSCC	1	1	1	1	-2	-3	-4	-5	-7	-8	-9	-11						
Burst on Earth	0-6	PEN	4.6	4.4	4.0	3.7	3.4	3.1	2.8	2.3	1.9	1.6	1.2	.8				Standing	3	
		DC	2	2	2	2	2	2	1	1	1	1	1	1						Kneel/Fire Over
	7-8	PEN	9.1	8.9	8.4	7.9	7.5	7.1	6.7	6.0	5.4	4.8	4.1	3.1	1.8	1.0		Hands & Knees	1	
		DC	4	4	4	4	4	3	3	3	3	3	2	2	1	1				Crawl
	9	PEN	13	12	12	11	11	10	9.8	9.0	8.2	7.5	6.6	5.3	3.4	2.2		Prone	1	
		DC	6	6	6	6	5	5	5	5	4	4	4	3	2	2				
		BSHC	*6	*1	36	16	9	5	4	2	1	1	-2	-4	-7	-9		Collapse Radius	0	
		BSCC	*10	*2	60	27	15	9	6	3	2	1	1	-2	-5	-7				
		BC	3K	530	95	43	25	17	13	8	5	4	3	2	1	1				
	0-1	ID	6	6	6	5	5	5	4	4	3	3	2	2						
	2-7	ID	12	12	11	11	10	10	9	8	8	7	6	4						
	8-9	ID	22	21	20	20	19	18	17	16	14	13	12	9						
BSCC		5	1	-4	-7	-9	-11	-12	-14	-16	-17	-19	-21							
Burst on Rock	0-6	PEN	4.6	4.4	4.0	3.7	3.4	3.1	2.8	2.3	1.9	1.6	1.2	.8				Standing	4	
		DC	2	2	2	2	2	2	1	1	1	1	1	1						Kneel/Fire Over
	7-8	PEN	9.1	8.9	8.4	7.9	7.5	7.1	6.7	6.0	5.4	4.8	4.1	3.1	1.8	1.0		Hands & Knees	1	
		DC	4	4	4	4	4	3	3	3	3	3	2	2	1	1				Crawl
	9	PEN	13	12	12	11	11	10	9.8	9.0	8.2	7.5	6.6	5.3	3.4	2.2		Prone	1	
		DC	6	6	6	6	5	5	5	5	4	4	4	3	2	2				
		BSHC	*9	*2	54	24	13	8	6	3	2	1	0	-3	-6	-8		Collapse Radius	-	
		BSCC	*10	*2	62	27	15	9	6	3	2	1	1	-2	-5	-7				
		BC	3K	539	130	57	34	24	17	11	7	6	4	2	1	1				
	0-1	ID	2	2	2	2	2	1	1	1	1	1								
	2-7	ID	4	4	3	3	3	3	2	2	2	1	1	1						
	8-9	ID	6	6	5	5	5	4	4	4	3	3	2	1						
BSCC		9	2	-2	-5	-7	-9	-10	-12	-14	-15	-17	-19							
Burst on Sand or Ice	0-6	PEN	4.3	4.1	3.7	3.4	3.1	2.8	2.6	2.1	1.8	1.5	1.1	.7				Standing	6	
		DC	2	2	2	2	2	1	1	1	1	1	1	1						Kneel/Fire Over
	7-8	PEN	5.3	5.2	4.9	4.6	4.3	4.0	3.8	3.3	2.9	2.6	2.1	1.6	.8			Hands & Knees	2	
		DC	3	3	3	3	2	2	2	2	2	2	1	1	1					Crawl
	9	PEN	5.7	5.5	5.2	5.0	4.7	4.5	4.3	3.8	3.4	3.1	2.6	2.0	1.2	.7		Prone	1	
		DC	3	3	3	3	3	3	3	3	2	2	2	2	1	1				
		BSHC	*3	78	19	8	4	3	2	1	-1	-3	-4	-6	-9	-11		Collapse Radius	2	
		BSCC	*10	*3	64	28	16	10	7	4	2	1	1	-2	-5	-7				
		BC	3K	545	134	65	27	18	13	8	5	4	3	2	1	1				
	0-1	ID	2	2	2	2	2	1	1	1	1	1								
	2-7	ID	4	4	3	3	3	3	2	2	2	1	1	1						
	8-9	ID	6	6	5	5	5	4	4	4	3	3	2	1						
BSCC	9	2	-2	-5	-7	-9	-10	-12	-14	-15	-17	-19								
Burst in a Flooded Rice Paddy	0-6	PEN	2.7	2.6	2.3	2.1	1.9	1.7	1.5	1.2	1.0	.8	.6					Standing	5	
		DC	1	1	1	1	1	1	1	1	1	1	1	1						Kneel/Fire Over
	7-8	PEN	3.7	3.6	3.3	3.1	2.9	2.7	2.5	2.2	1.9	1.7	1.4	1.0	.5			Hands & Knees	2	
		DC	2	2	2	2	2	2	2	1	1	1	1	1						Crawl
	9	PEN	4.1	4.0	3.8	3.6	3.4	3.2	3.0	2.7	2.4	2.1	1.8	1.4	.8	.4		Prone	1	
		DC	3	3	2	2	2	2	2	2	2	2	1	1	1	1				
		BSHC	*2	51	12	5	3	2	1	-1	-3	-4	-6	-8	-11	-13		Collapse Radius	2	
		BSCC	*10	*3	64	28	16	10	7	4	2	1	1	-2	-5	-7				
		BC	3K	546	134	65	24	15	11	6	4	3	2	1	1					
	0-1	ID	2	2	2	2	2	1	1	1	1	1								
	2-7	ID	4	4	3	3	3	3	2	2	2	1	1	1						
	8-9	ID	6	6	5	5	5	4	4	4	3	3	2	1						
BSCC	9	2	-2	-5	-7	-9	-10	-12	-14	-15	-17	-19								

MORTAR BURST DATA TABLE

3	81mm HE USA delay fuse		Burst Data														Penetration and Critical Range							
			Range from Burst in 2 yard hexes																					
			0	1	2	3	4	5	6	8	10	12	15	20	30	40								
Airburst	0-6	PEN	3.6	3.5	3.4	3.2	3.0	2.8	2.6	2.2	1.8	1.5	1.2	.7			PEN	11						
		DC	2	2	2	2	1	1	1	1	1	1	1	1					PENF	3.1				
	7-8	PEN	7.8	7.7	7.5	7.3	7.0	6.7	6.4	5.8	5.2	4.7	4.0	3.0	1.7	1.0					BC Contact	97K		
		DC	4	4	4	4	3	3	3	3	3	2	2	1	1									
	9	PEN	11	11	11	11	10	9.8	9.5	8.7	8.0	7.4	6.5	5.2	3.4	2.2							BC Contact	97K
		DC	6	5	5	5	5	5	5	5	4	4	4	3	2	2								
		BSHC	24	22	18	13	10	7	5	3	2	1	1	-2	-5	-7	BC Contact	97K						
		BC	54	51	42	33	26	20	16	11	8	6	3	3	1	1								
	0-1	ID	5	5	4	4	3	3	3	2	1	1							BC Contact	97K				
	2-7	ID	7	7	7	6	6	5	5	4	3	2	1											
	8-9	ID	10	10	10	9	8	8	7	6	4	3	2	1										
		BSCC	1	1	1	1	-2	-3	-4	-5	-7	-8	-9	-11										
Burst on Earth	0-6	PEN	.9	.8	.7	.6	.5										Standing	4						
		DC	1	1	1	1	1														Kneel/Fire Over	3		
	7-8	PEN	1.4	1.3	1.2	1.1	1.0												Hands & Knees	2				
		DC	1	1	1	1	1																	
	9	PEN	1.6	1.6	1.5	1.4	1.3																Crawl	1
		DC	1	1	1	1	1																	
		BSHC															Prone	1						
		BSCC	1	1	1	1	0																	
		BC	3K	546	131	27	14	9	6	3	2	2	1	1										
	0-1	ID	2	1	1	1	1	1	1	1									Collapse Radius	1				
	2-7	ID	4	3	3	3	3	3	2	2	2	1	1	1										
	8-9	ID	7	7	6	6	6	5	5	4	4	3	3	2	1									
	BSCC	76	19	4	2	1	-1	-3	-5	-6	-8	-9	-11	-14										
Burst on Rock	0-6	PEN	4.6	4.4	4.0	3.7	3.4	3.1	2.8	2.3	1.9	1.6	1.2	.8			Standing	4						
		DC	2	2	2	2	2	2	1	1	1	1	1	1							Kneel/Fire Over	2		
	7-8	PEN	9.1	8.9	8.4	7.9	7.5	7.1	6.7	6.0	5.4	4.8	4.1	3.1	1.8	1.0			Hands & Knees	1				
		DC	4	4	4	4	4	3	3	3	3	3	2	2	1	1								
	9	PEN	13	12	12	11	11	10	9.8	9.0	8.2	7.5	6.6	5.3	3.4	2.2							Crawl	1
		DC	6	6	6	6	5	5	5	5	4	4	4	3	2	2								
		BSHC	*9	*2	54	24	13	8	6	3	2	1	0	-3	-6	-8	Prone	1						
		BSCC	*10	*2	62	27	15	9	6	3	2	1	1	-2	-5	-7								
		BC	3K	539	130	57	34	24	17	11	7	6	4	2	1	1								
	0-1	ID	2	2	2	2	2	1	1	1	1	1							Collapse Radius	-				
	2-7	ID	4	4	3	3	3	3	2	2	2	1	1	1										
	8-9	ID	6	6	5	5	5	4	4	4	3	3	2	1										
	BSCC	9	2	-2	-5	-7	-9	-10	-12	-14	-15	-17	-19											
Burst on Sand or Ice	0-6	PEN															Standing	2						
		DC																			Kneel/Fire Over	2		
	7-8	PEN																	Hands & Knees	1				
		DC																						
	9	PEN																					Crawl	1
		DC																						
	BSHC															Prone	1							
	BSCC	9	2																					
	BC	4K	546	41	12	6	3	2	1	1	1													
Burst in a Flooded Rice Paddy	0-6	PEN																	Standing	2				
		DC																			Kneel/Fire Over	1		
	7-8	PEN																					Hands & Knees	1
		DC																						
	9	PEN															Crawl	1						
		DC																						
	BSHC															Prone			1					
	BSCC	9	2																					
	BC	4K	491	22	6	3	2	1	1															

MORTAR BURST DATA TABLE

4	82mm HE USSR	Burst Data														Penetration and Critical Range			
		Range from Burst in 2 yard hexes																	
			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0 - 6	PEN	4.1	4.1	4.0	3.8	3.6	3.3	3.1	2.7	2.3	2.0	1.6	1.1				PEN 7.5 PENF 1.7	
		DC	2	2	2	2	2	2	2	2	1	1	1	1					
	7 - 8	PEN	8.3	8.3	8.1	7.9	7.6	7.3	7.0	6.4	5.9	5.4	4.7	3.7	2.3	1.4		BC Contact 40K	
		DC	4	4	4	4	4	4	4	4	3	3	3	2	2	1			
	9	PEN	7.4	7.4	7.3	7.1	6.9	6.6	6.4	5.9	5.5	5.1	4.5	3.6	2.4	1.6			
		DC	4	4	4	4	4	4	4	4	4	3	3	3	2	1			
		BSHC	16	15	12	9	6	5	3	2	1	1	-1	-3	-6	-8			
		BC	36	34	29	23	18	14	11	8	6	4	3	2	1	1			
	0 - 1	ID	5	5	4	4	4	3	3	2	1	1							
	2 - 7	ID	7	7	7	6	6	5	5	4	3	2	1						
	8 - 9	ID	10	10	10	9	8	8	7	6	4	4	2	1					
		BSCC	1	1	1	0	-2	-3	-4	-5	-7	-8	-9	-11					
	Burst on Earth	0 - 6	PEN	5.2	5.0	4.6	4.2	3.9	3.6	3.4	2.9	2.4	2.1	1.7	1.1				Standing 2 Kneel/Fire Over 1 Hands & Knees 1 Crawl 1 Prone 0
			DC	2	2	2	2	2	2	2	2	1	1	1	1				
7 - 8		PEN	8.4	8.2	7.8	7.4	7.1	6.7	6.4	5.8	5.2	4.8	4.1	3.2	1.9	1.2		Collapse Radius -	
		DC	4	4	4	4	4	4	4	3	3	3	3	2	1	1			
9		PEN	7.6	7.4	7.1	6.8	6.5	6.2	6.0	5.5	5.0	4.6	4.0	3.3	2.1	1.4			
		DC	5	4	4	4	4	4	4	4	3	3	3	2	2	1			
		BSHC	*3	87	21	9	5	3	2	1	0	-2	-4	-6	-9	-11			
		BSCC	*6	*1	35	15	8	5	3	2	1	0	-2	-4	-7	-9			
		BC	2K	296	54	25	15	10	8	5	3	2	2	1	1				
0 - 1		ID	17	16	15	15	14	13	13	11	10								
2 - 7		ID	29	29	27	26	25	24	23	21	20								
8 - 9		ID	47	46	45	43	42	40	39	36	33								
		BSCC	1	-4	-9	-12	-14	-15	-17	-19	-20								
Burst on Rock		0 - 6	PEN	5.2	5.0	4.6	4.2	3.9	3.6	3.4	2.9	2.4	2.1	1.7	1.1				Standing 4 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1
	DC		2	2	2	2	2	2	2	2	1	1	1	1					
	7 - 8	PEN	9.6	9.3	8.9	8.5	8.1	7.7	7.3	6.6	6.0	5.5	4.7	3.7	2.3	1.4		Collapse Radius -	
		DC	5	5	5	4	4	4	4	4	3	3	3	2	2	1			
	9	PEN	8.4	8.2	7.9	7.5	7.2	6.9	6.6	6.1	5.6	5.2	4.5	3.7	2.4	1.6			
		DC	5	5	5	4	4	4	4	4	4	3	3	3	2	1			
		BSHC	*6	*1	36	16	9	5	4	2	1	1	-2	-4	-7	-9			
		BSCC	*6	*2	39	17	9	6	4	2	1	1	-2	-4	-7	-9			
		BC	2K	323	86	39	24	16	12	7	5	4	3	2	1	1			
	0 - 1	ID	2	2	1	1	1	1	1	1									
	2 - 7	ID	3	3	3	2	2	2	2	1	1	1	1						
	8 - 9	ID	5	4	4	4	4	3	3	3	2	2	1						
		BSCC	4	1	-5	-8	-10	-12	-13	-15	-17	-18	-20						
	Burst on Sand or Ice	0 - 6	PEN	2.9	2.8	2.6	2.3	2.1	2.0	1.8	1.5	1.3	1.0	.8					Standing 4 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1
DC			2	2	1	1	1	1	1	1	1	1	1	1					
7 - 8		PEN	3.4	3.3	3.1	3.0	2.8	2.6	2.5	2.2	1.9	1.7	1.4	1.1	.6			Collapse Radius 0	
		DC	2	2	2	2	2	2	2	2	1	1	1	1	1				
9		PEN	3.6	3.5	3.3	3.1	3.0	2.8	2.7	2.4	2.2	2.0	1.7	1.3	.8	.5			
		DC	3	3	3	2	2	2	2	2	2	2	1	1	1	1			
		BSHC	*1	36	9	4	2	1	1	-3	-4	-5	-7	-9	-12	-14			
		BSCC	*6	*2	39	17	9	6	4	2	1	1	-2	-4	-7	-9			
		BC	2K	324	86	24	13	9	6	4	3	2	1	1					
Burst in a Flooded Rice Paddy		0 - 6	PEN	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.0	.8	.7						Standing 4 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1
			DC	1	1	1	1	1	1	1	1	1	1	1	1				
		7 - 8	PEN	2.6	2.5	2.3	2.2	2.1	1.9	1.8	1.6	1.4	1.2	1.0	.7				Collapse Radius 0
			DC	2	2	2	2	2	1	1	1	1	1	1	1				
		9	PEN	2.8	2.7	2.6	2.4	2.3	2.2	2.1	1.8	1.7	1.5	1.3	1.0	.6			
	DC		2	2	2	2	2	2	2	2	1	1	1	1	1				
		BSHC	60	15	3	1	0	-2	-4	-6	-7	-9	-10	-12	-15				
		BSCC	*6	*2	38	17	9	6	4	2	1	1	-2	-4	-7				
		BC	2K	322	85	18	10	6	4	3	2	1	1	1					

MORTAR BURST DATA TABLE

5	107mm HE USSR	Burst Data															Penetration and Critical Range	
		0	1	2	Range from Burst in 2 yard hexes											3		
Airburst	0-6	PEN	11	11	11	11	10	10	9.7	9.0	8.3	7.6	6.7	5.4	3.5	2.3	PEN	15
		DC	6	6	6	5	5	5	5	5	4	4	4	3	2	2		
	7-8	PEN	11	11	11	11	11	10	10	9.5	9.0	8.4	7.7	6.6	4.8	3.6	BC Contact	102K
		DC	7	7	7	6	6	6	6	6	6	6	6	5	4	3		
	9	PEN	9.9	9.9	9.8	9.6	9.4	9.2	9.0	8.6	8.2	7.7	7.2	6.3	4.8	3.6		
		DC	7	7	7	7	7	7	7	7	6	6	6	6	5	4		
		BSHC	5	4	3	2	2	1	1	-1	-3	-4	-5	-7	-10	-12		
		BC	55	52	43	34	27	21	17	11	8	6	5	3	2	1		
		0-1	ID	5	5	4	4	3	3	3	2	1	1					
		2-7	ID	7	7	7	6	6	5	5	4	3	2	1				
		8-9	ID	10	10	10	9	8	8	7	6	4	3	2	1			
			BSCC	2	2	1	1	0	-2	-2	-4	-6	-7	-8	-10			
Burst on Earth	0-6	PEN	13	13	12	12	11	11	10	9.3	8.5	7.8	6.8	5.5	3.6	2.3	Standing	2
		DC	6	6	6	6	6	5	5	5	4	4	4	3	2	2		
	7-8	PEN	11	11	11	10	9.9	9.6	9.3	8.7	8.1	7.6	6.9	5.9	4.3	3.1	Hands & Knees	1
		DC	7	6	6	6	6	6	6	6	6	6	5	5	4	3		
	9	PEN	9.9	9.7	9.5	9.2	9.0	8.7	8.5	8.0	7.6	7.2	6.6	5.7	4.3	3.3	Prone	0
		DC	7	7	7	7	7	7	6	6	6	6	6	5	4	4		
		BSHC	*1	28	7	3	1	1	-1	-3	-5	-6	-8	-10	-13	-15	Collapse Radius	0
		BSCC	*2	46	11	5	2	1	1	-2	-3	-5	-6	-8	-11	-13		
		BC	3K	513	85	38	23	15	11	7	5	4	2	2	1			
		0-1	ID	24	24	23	22	21	20	19	17	16	15	13				
		2-7	ID	42	41	40	38	37	36	34	32	29	27	24				
		8-9	ID	67	66	64	62	60	58	56	53	49	46	42				
	BSCC		4	1	-5	-8	-10	-11	-13	-15	-16	-18	-19					
Burst on Rock	0-6	PEN	13	13	12	12	11	11	10	9.3	8.5	7.8	6.8	5.5	3.6	2.3	Standing	3
		DC	6	6	6	6	6	5	5	5	4	4	4	3	2	2		
	7-8	PEN	12	12	12	11	11	11	10	9.7	9.1	8.6	7.8	6.7	4.9	3.6	Hands & Knees	1
		DC	7	7	7	7	7	6	6	6	6	6	6	5	4	3		
	9	PEN	11	11	10	10	9.8	9.5	9.2	8.8	8.3	7.8	7.2	6.3	4.8	3.6	Prone	0
		DC	7	7	7	7	7	7	7	7	6	6	6	6	5	4		
		BSHC	*2	44	11	4	2	1	1	-2	-3	-5	-6	-8	-11	-13	Collapse Radius	-
		BSCC	*2	49	12	5	3	1	1	-1	-3	-4	-6	-8	-11	-13		
		BC	3K	550	119	56	34	23	17	11	7	5	4	2	1	1		
		0-1	ID	3	3	3	3	2	2	2	2	1	1	1				
		2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1			
		8-9	ID	8	8	7	7	7	6	6	5	4	4	3	2	1		
	BSCC		11	2	-2	-5	-7	-8	-10	-12	-13	-14	-16	-18	-21			
Burst on Sand or Ice	0-6	PEN	5.1	5.0	4.7	4.5	4.2	4.0	3.8	3.4	3.1	2.8	2.3	1.8	1.1	.6	Standing	4
		DC	3	3	3	3	3	3	3	3	2	2	2	2	1	1		
	7-8	PEN	5.5	5.4	5.2	5.1	4.9	4.7	4.5	4.2	3.9	3.6	3.2	2.7	1.9	1.3	Hands & Knees	2
		DC	4	4	4	4	4	4	4	4	3	3	3	2	2	1		
	9	PEN	5.6	5.5	5.3	5.1	5.0	4.8	4.7	4.4	4.1	3.9	3.5	3.0	2.2	1.6	Prone	1
		DC	5	5	5	5	5	5	5	4	4	4	4	3	3	2		
		BSHC	57	14	3	1	0	-2	-4	-6	-7	-9	-10	-12	-15	-17	Collapse Radius	1
		BSCC	*2	51	12	5	3	2	1	-1	-3	-4	-6	-8	-11	-13		
		BC	3K	563	135	39	22	14	10	6	4	3	2	1	1			
	Burst in a Flooded Rice Paddy	0-6	PEN	3.8	3.7	3.5	3.3	3.1	3.0	2.8	2.5	2.2	2.0	1.7	1.3	.7	Standing	4
			DC	3	2	2	2	2	2	2	2	2	2	2	1	1		
		7-8	PEN	4.5	4.4	4.2	4.0	3.9	3.7	3.6	3.3	3.1	2.8	2.5	2.1	1.4	1.0	Hands & Knees
DC			4	4	4	3	3	3	3	3	3	3	2	2	1	1	1	
9		PEN	4.6	4.5	4.4	4.2	4.1	4.0	3.8	3.6	3.4	3.2	2.9	2.4	1.7	1.3	Prone	1
		DC	5	5	4	4	4	4	4	4	4	4	3	3	2	1		
		BSHC	37	9	2	1	-2	-4	-5	-7	-9	-10	-12	-14	-17	-19	Collapse Radius	1
		BSCC	*2	50	12	5	3	2	1	-1	-3	-4	-6	-8	-11	-13		
		BC	3K	561	133	32	17	11	8	5	3	2	2	1				

MORTAR BURST DATA TABLE

6	107mm HE USA	Burst Data														Penetration and Critical Range			
		Range from Burst in 2 yard hexes																	
		0	1	2	3	4	5	6	8	10	12	15	20	30	40				
Airburst	0-6	PEN	6.0	6.0	5.8	5.5	5.2	4.9	4.6	4.0	3.5	3.0	2.5	1.7	.8	PEN	25		
		DC	3	3	3	3	2	2	2	2	2	2	1	1	1			PENF	9.6
		7-8	PEN	13	13	13	12	12	11	11	10	9.3	8.5	7.4	6.0	3.8	2.4		
		DC	6	6	6	6	6	5	5	5	5	4	4	3	2	2			
		9	PEN	18	18	18	17	17	16	16	15	14	13	12	9.9	6.9	4.8		
		DC	7	7	7	7	7	7	7	7	7	6	6	6	5	4	3		
		BSHC	36	33	27	20	15	11	8	5	3	2	1	1	-3	-5			
		BC	107	101	83	65	50	39	31	21	15	12	8	5	3	2			
		0-1	ID	5	5	4	4	3	3	3	2	1	1						
		2-7	ID	7	7	7	6	6	5	5	4	3	2	1					
	8-9	ID	10	10	10	9	8	8	7	6	4	3	2	1					
	BSCC	2	2	1	1	1	-1	-2	-4	-5	-6	-8	-10						
Burst on Earth	0-6	PEN	7.4	7.2	6.7	6.2	5.7	5.3	4.9	4.3	3.7	3.2	2.5	1.7	.8	Standing	4		
		DC	3	3	3	3	3	2	2	2	2	2	1	1	1			Kneel/Fire Over	2
		7-8	PEN	15	14	14	13	12	12	11	10	9.5	8.7	7.6	6.0	3.8	2.4		
		DC	6	6	6	6	6	6	5	5	5	4	4	3	2	2	Crawl	1	
		9	PEN	20	20	19	18	18	17	16	15	14	13	12	9.9	6.9			4.8
		DC	7	7	7	7	7	7	7	7	6	6	6	5	4	3			
		BSHC	*10	*3	63	28	15	10	7	3	2	1	1	-2	-5	-7	Collapse Radius	1	
		BSCC	*15	*4	94	42	23	15	10	5	3	2	1	0	-4	-6			
		BC	12K	1K	283	101	58	39	28	17	12	9	6	4	2	1			
		0-1	ID	6	6	5	5	5	4	4	3	3	3	2	1	1			
	2-7	ID	12	12	11	10	10	9	9	8	7	6	5	4	2	1			
	8-9	ID	22	21	20	19	19	18	17	16	14	13	11	9	6	4			
	BSCC	25	6	1	-2	-4	-5	-7	-9	-10	-12	-13	-15	-18	-20				
Burst on Rock	0-6	PEN	7.4	7.2	6.7	6.2	5.7	5.3	4.9	4.3	3.7	3.2	2.5	1.7	.8	Standing	3		
		DC	3	3	3	3	3	2	2	2	2	2	1	1	1			Kneel/Fire Over	2
		7-8	PEN	15	14	14	13	12	12	11	10	9.5	8.7	7.6	6.0	3.8	2.4		
		DC	6	6	6	6	6	6	5	5	5	4	4	3	2	2	Crawl	1	
		9	PEN	20	20	19	18	18	17	16	15	14	13	12	9.9	6.9			4.8
		DC	7	7	7	7	7	7	7	7	6	6	6	5	4	3			
		BSHC	*13	*3	83	37	20	13	9	5	3	2	1	-1	-4	-6	Collapse Radius	0	
		BSCC	*15	*4	94	42	23	15	10	5	3	2	1	0	-4	-6			
		BC	12K	1K	282	118	69	46	34	21	14	11	7	5	2	1			
		0-1	ID	1	1														
	2-7	ID	2	1	1	1	1	1	1	1									
	8-9	ID	3	3	3	2	2	2	2	1	1	1	1						
	BSCC	36	9	2	1	-2	-4	-5	-7	-9	-10	-12							
Burst on Sand or Ice	0-6	PEN	7.4	7.2	6.7	6.2	5.7	5.3	4.9	4.3	3.7	3.2	2.5	1.7	.8	Standing	7		
		DC	3	3	3	3	3	2	2	2	2	2	1	1	1			Kneel/Fire Over	4
		7-8	PEN	15	14	14	13	12	12	11	10	9.5	8.7	7.6	6.0	3.8	2.4		
		DC	6	6	6	6	6	6	5	5	5	4	4	3	2	2	Crawl	2	
		9	PEN	20	20	19	18	18	17	16	15	14	13	12	9.9	6.9			4.8
		DC	7	7	7	7	7	7	7	7	6	6	6	5	4	3			
		BSHC	*8	*2	48	21	12	7	5	3	1	1	-1	-3	-6	-8	Collapse Radius	4	
		BSCC	*16	*4	98	43	24	15	10	6	3	2	1	0	-3	-6			
		BC	12K	2K	295	133	78	42	30	18	12	9	6	4	2	1			
	Burst in a Flooded Rice Paddy	0-6	PEN	7.4	7.2	6.7	6.2	5.7	5.3	4.9	4.3	3.7	3.2	2.5	1.7	.8	Standing	6	
		DC	3	3	3	3	3	2	2	2	2	2	1	1	1	Kneel/Fire Over			4
		7-8	PEN	15	14	14	13	12	12	11	10	9.5	8.7	7.6	6.0		3.8	2.4	
		DC	6	6	6	6	6	6	5	5	5	4	4	3	2	2	Crawl	2	
		9	PEN	17	17	16	16	15	15	14	13	12	11	10	8.4	5.8			4.0
		DC	7	7	7	7	7	7	6	6	6	6	6	5	4	3			
		BSHC	*7	*2	42	18	10	6	4	2	1	1	-1	-4	-6	-9	Collapse Radius	4	
		BSCC	*16	*4	97	43	24	15	10	6	3	2	1	0	-3	-6			
		BC	12K	2K	294	132	60	39	28	17	11	8	6	3	2	1			

MORTAR BURST DATA TABLE

7	120mm HE USSR	Burst Data														Penetration and Critical Range		
		0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	9.5	9.4	9.2	8.9	8.6	8.2	7.8	7.1	6.4	5.7	4.8	3.7	2.1	1.2	PEN	28
		DC	4	4	4	4	4	4	4	3	3	3	3	2	1	1		
	7-8	PEN	20	20	19	19	19	18	17	16	15	14	13	11	7.9	5.6	BC Contact	494K
		DC	7	7	7	7	7	7	7	7	7	7	6	6	5	4		
	9	PEN	28	27	27	27	26	26	25	24	23	22	20	17	13	10		
		DC	9	9	9	9	9	9	8	8	8	8	8	8	7	6		
		BSHC	33	31	25	18	14	10	8	5	3	2	1	0	-4	-6		
		BC	113	107	87	68	52	41	33	22	16	12	9	6	3	2		
	0-1	ID	5	5	4	4	3	3	3	2	1	1						
	2-7	ID	7	7	7	6	6	5	5	4	3	2	1					
	8-9	ID	10	10	10	9	8	8	7	6	4	3	2	1				
		BSCC	2	2	2	1	1	0	-2	-3	-5	-6	-8	-10				
Burst on Earth	0-6	PEN	11	11	10	9.7	9.2	8.7	8.2	7.3	6.5	5.9	4.9	3.7	2.1	1.2	Standing	3
		DC	5	5	4	4	4	4	4	3	3	3	3	2	1	1		
	7-8	PEN	22	21	21	20	19	19	18	17	16	15	13	11	7.9	5.6	Hands & Knees	1
		DC	8	8	8	7	7	7	7	7	7	7	6	6	5	4		
	9	PEN	30	29	29	28	27	26	26	24	23	22	20	18	13	10	Prone	1
		DC	9	9	9	9	9	9	9	8	8	8	8	8	7	6		
		BSHC	*10	*2	60	26	15	9	6	3	2	1	1	-2	-5	-7	Collapse Radius	1
		BSCC	*14	*3	87	38	21	13	9	5	3	2	1	0	-4	-6		
		BC	13K	2K	296	106	61	41	30	18	12	9	6	4	2	1		
	0-1	ID	7	7	6	6	6	5	5	4	4	3	3	2	1			
	2-7	ID	14	14	13	13	12	11	11	10	9	8	7	5	3	2		
	8-9	ID	26	25	24	23	22	21	20	19	17	16	14	11	7	5		
BSCC		25	6	1	-2	-4	-5	-7	-9	-10	-12	-13	-15	-18	-20			
Burst on Rock	0-6	PEN	11	11	10	9.7	9.2	8.7	8.2	7.3	6.5	5.9	4.9	3.7	2.1	1.2	Standing	3
		DC	5	5	4	4	4	4	4	3	3	3	3	2	1	1		
	7-8	PEN	22	21	21	20	19	19	18	17	16	15	13	11	7.9	5.6	Hands & Knees	1
		DC	8	8	8	7	7	7	7	7	7	7	6	6	5	4		
	9	PEN	30	29	29	28	27	26	26	24	23	22	20	18	13	10	Prone	1
		DC	9	9	9	9	9	9	9	8	8	8	8	8	7	6		
		BSHC	*13	*3	78	34	19	12	8	4	3	2	1	-1	-4	-6	Collapse Radius	0
		BSCC	*14	*4	87	39	21	14	9	5	3	2	1	0	-4	-6		
		BC	13K	2K	284	124	73	49	36	22	15	11	8	5	2	2		
	0-1	ID	1	1	1	1												
	2-7	ID	2	2	2	1	1	1	1	1	1							
	8-9	ID	3	3	3	3	3	2	2	2	1	1	1					
BSCC		41	10	2	1	-2	-4	-5	-7	-9	-10	-11						
Burst on Sand or Ice	0-6	PEN	11	11	10	9.7	9.2	8.7	8.2	7.3	6.5	5.9	4.9	3.7	2.1	1.2	Standing	6
		DC	5	5	4	4	4	4	4	3	3	3	3	2	1	1		
	7-8	PEN	22	21	21	20	19	19	18	17	16	15	13	11	7.9	5.6	Hands & Knees	2
		DC	8	8	8	7	7	7	7	7	7	7	6	6	5	4		
	9	PEN	30	29	29	28	27	26	26	24	23	22	20	18	13	10	Prone	1
		DC	9	9	9	9	9	9	9	8	8	8	8	8	7	6		
		BSHC	*8	*2	46	20	11	7	5	2	1	1	-1	-3	-6	-8	Collapse Radius	4
		BSCC	*15	*4	90	40	22	14	10	5	3	2	1	0	-4	-6		
		BC	13K	2K	314	140	66	43	31	19	13	9	6	4	2	1		
	0-1	ID	1	1	1	1												
	2-7	ID	2	2	2	1	1	1	1	1	1							
	8-9	ID	3	3	3	3	3	2	2	2	1	1	1					
BSCC		41	10	2	1	-2	-4	-5	-7	-9	-10	-11						
Burst in a Flooded Rice Paddy	0-6	PEN	11	11	10	9.7	9.2	8.7	8.2	7.3	6.5	5.9	4.9	3.7	2.1	1.2	Standing	6
		DC	5	5	4	4	4	4	4	3	3	3	3	2	1	1		
	7-8	PEN	21	21	20	20	19	18	18	17	16	14	13	11	7.8	5.5	Hands & Knees	2
		DC	8	8	8	7	7	7	7	7	7	7	6	6	5	4		
	9	PEN	21	20	20	19	19	18	18	17	16	15	14	12	8.7	6.5	Prone	1
		DC	8	8	8	8	8	8	8	7	7	7	7	7	6	5		
		BSHC	*7	*2	42	18	10	6	4	2	1	1	-2	-4	-6	-9	Collapse Radius	4
		BSCC	*14	*4	90	40	22	14	10	5	3	2	1	0	-4	-6		
		BC	13K	2K	313	139	61	40	29	17	12	8	6	4	2	1		
	0-1	ID	1	1	1	1												
	2-7	ID	2	2	2	1	1	1	1	1	1							
	8-9	ID	3	3	3	3	3	2	2	2	1	1	1					
BSCC		41	10	2	1	-2	-4	-5	-7	-9	-10	-11						

MORTAR BURST DATA TABLE

8	160mm HE USSR		Burst Data														Penetration and Critical Range	
			Range from Burst in 2 yard hexes															
			0	1	2	3	4	5	6	8	10	12	15	20	30	40		
Airburst	0 - 6	PEN	25	24	24	24	23	23	22	21	20	18	17	14	11	7.8	PEN 50 PENF 24 BC Contact 1043K	
		DC	8	8	8	8	8	8	8	8	8	8	7	7	7	6		5
	7 - 8	PEN	38	38	38	37	37	36	36	34	33	32	30	27	22	18		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		8
	9	PEN	34	34	34	33	33	32	32	31	30	29	27	25	21	18		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		9
		BSHC	27	25	20	15	11	8	6	4	2	2	1	-1	-4	-6		
		BC	163	154	124	96	73	57	45	30	22	17	12	8	4	2		
	0 - 1	ID	5	5	4	4	3	3	3	2	1	1						
	2 - 7	ID	7	7	7	6	6	5	5	4	3	2	1					
	8 - 9	ID	10	10	10	9	8	8	7	5	4	3	2	1				
		BSCC	4	3	3	2	1	1	0	-2	-4	-5	-6	-8				
Burst on Earth	0 - 6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 3 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1 Collapse Radius 2	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		
	7 - 8	PEN	41	40	39	39	38	37	36	35	33	32	30	27	22	18		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		8
	9	PEN	36	35	35	34	33	33	32	31	30	29	27	25	21	18		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		9
		BSHC	*8	*2	49	21	12	7	5	3	1	1	0	-3	-6	-8		
		BSCC	*11	*3	69	30	17	11	7	4	2	1	1	-2	-5	-7		
		BC	27K	3K	380	152	85	56	40	24	17	12	8	5	3	2		
	0 - 1	ID	15	15	14	14	13	12	12	11	10	9	7	6	3	2		
	2 - 7	ID	30	29	28	27	26	25	24	22	20	19	16	13	9	6		
	8 - 9	ID	52	51	49	47	46	44	43	40	37	35	31	26	18	13		
	BSCC	36	9	2	1	-3	-4	-5	-8	-9	-10	-12	-14	-17	-19			
Burst on Rock	0 - 6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 3 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1 Collapse Radius 1	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		
	7 - 8	PEN	41	40	39	39	38	37	36	35	33	32	30	27	22	18		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		8
	9	PEN	36	35	35	34	33	33	32	31	30	29	27	25	21	18		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		9
		BSHC	*10	*3	62	27	15	10	6	3	2	1	1	-2	-5	-7		
		BSCC	*11	*3	70	31	17	11	7	4	2	1	1	-2	-5	-7		
		BC	26K	3K	436	179	102	68	49	30	20	15	10	6	3	2		
	0 - 1	ID	3	3	3	3	2	2	2	2	1	1	1					
	2 - 7	ID	6	5	5	5	4	4	4	3	3	2	2	1				
	8 - 9	ID	9	9	8	8	7	7	6	6	5	4	4	3	1			
	BSCC	79	19	4	2	1	-1	-3	-5	-6	-8	-9	-11	-14				
Burst on Sand or Ice	0 - 6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 6 Kneel/Fire Over 4 Hands & Knees 2 Crawl 2 Prone 1 Collapse Radius 5	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		
	7 - 8	PEN	41	40	39	39	38	37	36	35	33	32	30	27	22	18		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		8
	9	PEN	36	35	35	34	33	33	32	31	30	29	27	25	21	18		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		9
		BSHC	*6	*2	39	17	9	6	4	2	1	1	-2	-4	-7	-9		
		BSCC	*12	*3	73	32	18	11	8	4	2	2	1	-2	-5	-7		
		BC	26K	3K	485	203	91	58	42	25	17	12	8	5	3	2		
	0 - 1	ID	3	3	3	3	2	2	2	2	1	1	1					
	2 - 7	ID	6	5	5	5	4	4	4	3	3	2	2	1				
	8 - 9	ID	9	9	8	8	7	7	6	6	5	4	4	3	1			
	BSCC	79	19	4	2	1	-1	-3	-5	-6	-8	-9	-11	-14				
Burst in a Flooded Rice Paddy	0 - 6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 5 Kneel/Fire Over 3 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 4	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		
	7 - 8	PEN	33	33	32	31	31	30	29	28	27	26	24	22	18	14		
		DC	10	10	10	10	10	9	9	9	9	9	9	9	8	8		8
	9	PEN	30	30	29	29	28	28	27	26	25	24	23	21	17	14		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		8
		BSHC	*6	*1	36	16	9	5	4	2	1	1	-2	-4	-7	-9		
		BSCC	*12	*3	72	32	18	11	8	4	2	2	1	-2	-5	-7		
		BC	26K	3K	482	201	84	54	38	23	15	11	8	5	2	2		
	0 - 1	ID	3	3	3	3	2	2	2	2	1	1	1					
	2 - 7	ID	6	5	5	5	4	4	4	3	3	2	2	1				
	8 - 9	ID	9	9	8	8	7	7	6	6	5	4	4	3	1			
	BSCC	79	19	4	2	1	-1	-3	-5	-6	-8	-9	-11	-14				

MORTAR BURST DATA TABLE

9	240mm HE USSR	Burst Data															Penetration and Critical Range		
		Range from Burst in 2 yard hexes																	
		0	1	2	3	4	5	6	8	10	12	15	20	30	40				
Airburst	0-6	PEN	46	46	46	45	44	44	43	41	39	37	35	31	25	20	PEN 114 PENF 59 BC Contact 6327K		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	9		8	
	7-8	PEN	92	92	91	91	90	89	88	85	83	81	77	72	62	54			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	
	9	PEN	84	84	83	82	82	81	80	78	76	75	72	68	60	53			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	
	BSHC		28	27	21	16	12	9	6	4	3	2	1	-1	-4	-6			
	BC		447	416	324	239	175	132	103	67	48	36	25	16	8	5			
	0-1	ID	5	4	4	4	3	3	3	2	1	1							
	2-7	ID	7	7	7	6	6	5	4	3	3	2	1						
	8-9	ID	10	10	10	9	8	7	7	5	4	3	2	1					
		BSCC	6	6	4	3	2	2	1	0	-2	-3	-5	-7					
Burst on Earth	0-6	PEN	50	49	48	47	46	45	44	42	40	38	35	31	25	20	Standing 4 Kneel/Fire Over 2 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 5		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8			
	7-8	PEN	96	95	94	93	91	90	89	86	84	81	78	72	63	54			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	87	86	85	84	83	82	81	79	77	75	72	68	60	53			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	BSHC		*9	*2	59	26	14	9	6	3	2	1	1	-2	-5	-7			
	BSCC		*12	*3	75	33	18	12	8	4	3	2	1	-2	-4	-6			
	BC		149K	14K	2K	490	248	153	106	61	41	30	20	13	6	4			
	0-1	ID	32	31	30	28	27	26	25	23	21	19	17	14	9	6			
	2-7	ID	60	59	57	55	53	51	50	46	43	40	36	30	22	15			
	8-9	ID	103	101	98	96	93	90	87	82	78	73	67	58	43	32			
BSCC		92	23	5	2	1	0	-2	-4	-6	-7	-9	-11	-14	-16				
Burst on Rock	0-6	PEN	50	49	48	47	46	45	44	42	40	38	35	31	25	20	Standing 4 Kneel/Fire Over 3 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 3		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8			
	7-8	PEN	96	95	94	93	91	90	89	86	84	81	78	72	63	54			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	87	86	85	84	83	82	81	79	77	75	72	68	60	53			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	BSHC		*11	*3	69	30	17	11	7	4	2	1	1	-2	-5	-7			
	BSCC		*12	*3	76	34	19	12	8	4	3	2	1	-1	-4	-6			
	BC		146K	14K	2K	543	277	172	119	69	46	34	23	14	7	5			
	0-1	ID	5	5	4	4	4	4	3	3	2	2	1	1					
	2-7	ID	9	9	8	8	7	7	6	5	5	4	3	2	1				
	8-9	ID	14	14	13	12	12	11	11	9	8	8	6	5	3	1			
BSCC		*3	69	17	7	4	2	1	1	-2	-3	-5	-7	-10	-12				
Burst on Sand or Ice	0-6	PEN	50	49	48	47	46	45	44	42	40	38	35	31	25	20	Standing 6 Kneel/Fire Over 4 Hands & Knees 2 Crawl 2 Prone 2 Collapse Radius 9		
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8			
	7-8	PEN	96	95	94	93	91	90	89	86	84	81	78	72	63	54			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	87	86	85	84	83	82	81	79	77	75	72	68	60	53			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	BSHC		*3	*2	53	23	13	8	5	3	2	1	0	-3	-6	-8			
	BSCC		*12	*3	77	34	19	12	8	4	3	2	1	-1	-4	-6			
	BC		145K	14K	2K	585	260	159	109	63	42	30	21	13	6	4			
	Burst in a Flooded Rice Paddy	0-6	PEN	50	49	48	47	46	45	44	42	40	38	35	31	25		20	Standing 5 Kneel/Fire Over 3 Hands & Knees 2 Crawl 2 Prone 1 Collapse Radius 8
			DC	10	10	10	10	10	10	10	10	10	10	9	9	9		8	
		7-8	PEN	96	95	94	93	91	90	89	86	84	81	78	72	63		54	
DC			10	10	10	10	10	10	10	10	10	10	10	10	10	10			
9		PEN	87	86	85	84	83	82	81	79	77	75	72	68	60	53			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
BSHC		*8	*2	51	22	12	8	5	3	2	1	0	-3	-6	-8				
BSCC		*12	*3	77	34	19	12	8	4	3	2	1	-1	-4	-6				
BC		146K	14K	2K	581	247	151	104	60	40	29	20	12	6	4				

ARTILLERY BURST DATA TABLE

1	76mm HE USSR	Burst Data															Penetration and Critical Range	
		Range from Burst in 2 yard hexes																
			0	1	2	3	4	5	6	8	10	12	15	20	30	40		
Airburst	0-6	PEN	8.0	8.0	7.9	7.8	7.6	7.4	7.2	6.9	6.5	6.1	5.6	4.9	3.7	2.7	PEN	19
		DC	6	6	6	6	6	6	6	6	6	6	6	5	5	4		
	7-8	PEN	6.2	6.2	6.1	6.0	5.9	5.8	5.7	5.5	5.3	5.1	4.8	4.3	3.4	2.8	BC Contact	70K
		DC	10	10	10	10	10	9	9	9	9	9	9	8	7	6		
	9	PEN	5.5	5.5	5.4	5.4	5.3	5.2	5.1	4.9	4.8	4.6	4.3	3.9	3.3	2.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9		
		BSHC	3	3	2	2	1	1	-1	-3	-4	-5	-7	-9	-12	-14		
		BC	46	44	37	29	22	18	14	10	7	5	4	2	1	1		
		0-1 ID	5	5	5	4	4	4	3	3	2	2	1	1				
		2-7 ID	8	8	7	7	6	6	5	4	3	3	2	1				
	8-9 ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
	BSCC	1	1	0	0	-1	-2	-3	-5	-6	-8	-9	-11	-14				
Burst on Earth	0-6	PEN	3.9	3.8	3.7	3.5	3.4	3.3	3.2	3.0	2.8	2.6	2.3	2.0	1.4	1.0	Standing	3
		DC	4	4	4	4	4	4	3	3	3	3	3	2	2	1		
	7-8	PEN	3.8	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.0	2.9	2.7	2.4	1.8	1.4	Hands & Knees	1
		DC	8	8	8	8	8	7	7	7	7	7	6	5	3	2		
	9	PEN	3.7	3.7	3.6	3.5	3.4	3.4	3.3	3.2	3.0	2.9	2.7	2.4	2.0	1.6	Prone	1
		DC	9	9	9	9	9	9	9	8	8	8	7	6	3	2		
		BSHC	36	9	2	1	-2	-4	-5	-7	-9	-10	-11	-14	-16	-19	Collapse Radius	1
		BSCC	*1	32	8	4	2	1	1	-2	-4	-5	-7	-9	-12	-14		
		BC	3K	441	67	28	16	10	7	4	3	2	2	1				
		0-1 ID	3	3	3	2	2	2	2	2	1	1	1	1				
	2-7 ID	6	5	5	5	5	4	4	4	3	3	2	2	1	1			
	8-9 ID	10	10	9	9	8	8	7	7	6	6	5	4	2	1			
	BSCC	21	4	0	-2	-4	-6	-7	-9	-11	-12	-14	-16	-18	-21			
Burst on Rock	0-6	PEN	8.7	8.6	8.3	8.1	7.9	7.6	7.4	7.0	6.6	6.2	5.7	4.9	3.7	2.7	Standing	2
		DC	6	6	6	6	6	6	6	6	6	6	5	5	4	3		
	7-8	PEN	6.6	6.5	6.4	6.2	6.1	6.0	5.8	5.6	5.3	5.1	4.8	4.3	3.4	2.8	Hands & Knees	1
		DC	10	10	10	10	10	10	9	9	9	9	8	7	6	Crawl		
	9	PEN	5.8	5.7	5.6	5.5	5.4	5.3	5.2	5.0	4.8	4.6	4.4	4.0	3.3		2.7	Prone
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	7		
		BSHC	93	23	5	3	1	1	-2	-4	-5	-7	-8	-10	-13	-15	Collapse Radius	0
		BSCC	*1	30	7	3	2	1	-1	-3	-4	-6	-7	-9	-12	-14		
		BC	2K	376	82	39	24	16	12	7	5	4	3	2	1	1		
		0-1 ID	5	5	5	4	4	4	4	3	3	2	2	1	1			
	2-7 ID	8	8	8	7	7	6	6	5	5	4	3	3	1				
	8-9 ID	12	12	11	11	10	10	9	8	7	7	6	4	2				
	BSCC	13	2	-1	-4	-6	-7	-9	-11	-12	-14	-15	-17	-20				
Burst on Sand or Ice	0-6	PEN	2.4	2.4													Standing	6
		DC	3	3														
	7-8	PEN	2.7	2.7													Hands & Knees	2
		DC	6	6														
	9	PEN	2.8	2.7													Prone	1
		DC	7	7														
		BSHC															Collapse Radius	2
		BSCC	13	2														
		BC	2K	447	115	56	21	13	9	5	3	2	2	1	1			
	Burst in a Flooded Rice Paddy	0-6	PEN	2.0	1.9													Standing
DC			2	2													Kneel/Fire Over	
7-8		PEN	2.3	2.3														Hands & Knees
		DC	5	5													Crawl	
9		PEN	2.4	2.4														Prone
		DC	6	6														
		BSHC															Collapse Radius	2
		BSCC	13	2														
		BC	2K	449	114	30	16	10	7	4	3	2	1	1				

ARTILLERY BURST DATA TABLE

3	105mm HE USA		Burst Data														Penetration and Critical Range		
			Range from Burst in 2 yard hexes																
			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	21	20	20	20	19	19	18	17	16	15	14	12	8.8	6.5	PEN 32 PENF 15 BC Contact 251K		
		DC	8	8	8	8	8	8	7	7	7	7	7	6	5	4			
	7-8	PEN	16	16	16	16	16	15	15	14	14	13	12	11	8.7	6.9			
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			
	9	PEN	14	14	14	14	14	14	13	13	12	12	11	10	8.3	6.7			
		DC	9	9	9	9	8	8	8	8	8	8	8	8	7	7			
		BSHC	23	21	17	13	9	7	5	3	2	2	1	-2	-5	-7			
		BC	83	78	64	50	39	31	25	17	12	9	7	4	2	1			
		0-1 ID	5	5	5	4	4	4	3	3	2	1	1						
		2-7 ID	8	8	7	7	6	6	5	4	3	3	2	1					
		8-9 ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
		BSCC	2	2	2	1	1	-1	-2	-4	-5	-6	-8	-10	-13				
Burst on Earth	0-6	PEN	14	13	13	13	12	12	11	11	9.8	9.1	8.2	6.9	4.8	3.4	Standing 3 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1 Collapse Radius 1		
		DC	7	7	7	6	6	6	6	6	6	6	5	4	3	3			
	7-8	PEN	12	12	12	12	11	11	11	10	9.7	9.2	8.6	7.5	5.8	4.5			
		DC	8	8	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	12	11	11	11	11	11	10	9.8	9.4	9.0	8.4	7.5	6.0	4.9			
		DC	8	8	8	8	8	8	8	8	8	8	7	7	7	7			
		BSHC	*4	*1	28	12	7	4	3	2	1	-1	-3	-5	-7	-10			
		BSCC	*9	*2	58	26	13	9	6	4	2	2	1	-2	-5	-7			
		BC	7K	998	204	62	45	24	17	10	7	5	4	2	1	1			
		0-1 ID	6	6	5	5	5	4	4	4	3	3	2	2	1	1			
		2-7 ID	11	11	10	10	9	9	8	8	7	6	5	4	2	2			
		8-9 ID	20	19	19	18	17	16	16	14	13	12	11	8	5	4			
	BSCC	33	8	2	1	-2	-4	-5	-7	-9	-10	-12	-14	-17	-19				
Burst on Rock	0-6	PEN	23	22	21	21	20	20	19	18	17	16	14	12	8.9	6.5	Standing 2 Kneel/Fire Over 1 Hands & Knees 1 Crawl 1 Prone 0 Collapse Radius 0		
		DC	8	8	8	8	8	8	8	7	7	7	7	6	5	4			
	7-8	PEN	18	17	17	17	16	16	15	15	14	13	12	11	8.7	6.9			
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			
	9	PEN	15	15	15	15	14	14	14	13	13	12	11	10	8.3	6.8			
		DC	9	9	9	9	9	9	8	8	8	8	8	8	7	7			
		BSHC	*7	*2	46	20	12	7	5	3	2	1	-1	-3	-6	-8			
		BSCC	*9	*2	56	25	14	9	6	3	2	2	1	-2	-5	-7			
		BC	7K	932	173	78	47	32	23	14	10	7	5	3	2	1			
		0-1 ID	4	4	4	3	3	3	3	2	2	2	1	1					
		2-7 ID	7	6	6	6	5	5	5	4	4	3	3	2	1				
		8-9 ID	10	10	9	9	8	8	7	7	6	5	4	3	2	1			
	BSCC	32	8	2	1	-2	-4	-5	-7	-9	-10	-12	-14	-17	-19				
Burst on Sand or Ice	0-6	PEN	5.8	5.7	5.5	5.2	5.0	4.8	4.6	4.2	3.9	3.6	3.2	2.6	1.7	1.1	Standing 7 Kneel/Fire Over 4 Hands & Knees 3 Crawl 2 Prone 2 Collapse Radius 4		
		DC	4	4	4	4	4	3	3	3	3	3	3	2	1	1			
	7-8	PEN	6.7	6.6	6.4	6.2	6.0	5.9	5.7	5.4	5.1	4.8	4.4	3.8	2.8	2.1			
		DC	6	6	6	6	6	6	6	6	5	5	5	5	3	3			
	9	PEN	6.9	6.8	6.6	6.4	6.3	6.1	6.0	5.7	5.4	5.2	4.8	4.2	3.3	2.6			
		DC	7	7	7	7	7	7	7	7	8	8	7	7	6	5			
		BSHC	*2	53	13	6	3	2	1	-1	-2	-4	-5	-7	-10	-12			
		BSCC	*10	*2	61	27	15	10	7	4	2	2	1	-2	-5	-7			
		BC	7K	1K	217	101	61	28	19	11	8	6	4	2	1	1			
	Burst in a Flooded Rice Paddy	0-6	PEN	4.5	4.4	4.2	4.0	3.8	3.6	3.5	3.2	2.9	2.7	2.3	1.9	1.2		.8	Standing 6 Kneel/Fire Over 4 Hands & Knees 3 Crawl 2 Prone 2 Collapse Radius 4
			DC	3	3	3	3	3	3	3	3	2	2	2	1	1		1	
		7-8	PEN	5.4	5.3	5.2	5.0	4.9	4.7	4.6	4.3	4.1	3.8	3.5	3.0	2.2		1.6	
DC			6	5	5	5	5	5	5	5	5	5	4	4	3	2			
9		PEN	5.7	5.6	5.5	5.4	5.2	5.1	5.0	4.7	4.5	4.3	3.9	3.5	2.7	2.1			
		DC	8	8	8	8	8	8	8	7	7	7	7	6	5	4			
		BSHC	*1	32	8	4	2	1	1	-3	-4	-5	-7	-9	-12	-14			
		BSCC	*10	*2	61	27	15	10	7	4	2	2	1	-2	-5	-7			
		BC	7K	1K	217	101	39	24	17	10	7	5	3	2	1	1			

ARTILLERY BURST DATA TABLE

4	105mm HE USA delay fuse		Burst Data													Penetration and Critical Range			
			Range from Burst in 2 yard hexes																
			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	21	20	20	20	19	19	18	17	16	15	14	12	8.8	6.5	PEN	32	
		DC	8	8	8	8	8	8	7	7	7	7	7	6	5	4			PENF
	7-8	PEN	16	16	16	16	16	15	15	14	14	13	12	11	8.7	6.9	BC Contact	251K	
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			
	9	PEN	14	14	14	14	14	14	13	13	12	12	11	10	8.3	6.7			
		DC	9	9	9	9	8	8	8	8	8	8	8	8	8	7	7		
		BSHC	23	21	17	13	9	7	5	3	2	2	1	-2	-5	-7			
		BC	83	78	64	50	39	31	25	17	12	9	7	4	2	1			
	0-1	ID	5	5	5	4	4	4	3	3	2	1	1						
	2-7	ID	7	8	7	7	6	6	5	4	3	3	2	1					
	8-9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
		BSCC	2	2	2	1	1	-1	-2	-4	-5	-6	-8	-10	-13				
	Burst on Earth	0-6	PEN	1.2	1.2	1.1	1.0	1.0	.9									Standing	3
DC			1	1	1	1	1	1	1								Kneel/Fire Over		
7-8		PEN	1.8	1.8	1.7	1.6	1.6	1.5										Hands & Knees	1
		DC	2	2	2	2	2	2	2								Crawl		
9		PEN	2.1	2.1	2.0	2.0	1.9	1.8										Prone	1
		DC	4	4	3	3	3	3	3										
		BSHC															Collapse Radius	3	
		BSCC	2	2	2	1	1	0											
		BC	7K	1K	92	29	14	9	6	3	2	1	1	1					
0-1		ID	3	3	3	2	2	2	2	2	1	1	1	1					
2-7		ID	6	6	5	5	5	4	4	4	3	3	2	2	1				
8-9		ID	10	10	9	9	9	8	8	7	6	6	5	4	2	1			
		BSCC	*3	67	17	7	4	3	2	1	-2	-3	-4	-6	-9	-11			
Burst on Rock	0-6	PEN	23	22	21	21	20	20	19	18	17	16	14	12	8.9	6.5	Standing	2	
		DC	8	8	8	8	8	8	8	7	7	7	6	5	4	Kneel/Fire Over			1
	7-8	PEN	18	17	17	17	16	16	15	15	14	13	12	11	8.7		6.9	Hands & Knees	
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6	Crawl		0
	9	PEN	15	15	15	15	14	14	14	13	13	12	11	10	8.3	6.8		Prone	
		DC	9	9	9	9	9	9	8	8	8	8	8	8	7	7			
		BSHC	*7	*2	43	19	11	7	5	3	2	1	-1	-3	-6	-8	Collapse Radius	0	
		BSCC	*9	*2	55	24	14	9	6	3	2	2	1	-2	-5	-7			
		BC	7K	885	162	74	44	30	22	13	9	7	5	3	2	1			
	0-1	ID	5	5	4	4	4	3	3	3	2	2	2	1					
	2-7	ID	8	8	7	7	6	6	5	5	4	4	3	2	1				
	8-9	ID	12	12	11	10	10	9	9	8	7	6	5	4	2	1			
		BSCC	39	10	2	1	-2	-3	-5	-7	-8	-10	-11	-13	-16	-18			
Burst on Sand or Ice	0-6	PEN	.4														Standing	3	
		DC	1																Kneel/Fire Over
	7-8	PEN	.7	.7	.7	.6	.6										Hands & Knees	2	
		DC	1	1	1	1	1	1											Crawl
	9	PEN	.9	.9	.8	.8	.8										Prone	1	
		DC	1	1	1	1	1	1											
		BSHC															Collapse Radius	5	
		BSCC	39	10	2	1	0												
		BC	8K	1K	206	29	14	8	6	3	2	1	1	1					
	Burst in a Flooded Rice Paddy	0-6	PEN															Standing	2
			DC																
		7-8	PEN	.5	.5	.5	.4	.4										Hands & Knees	1
			DC	1	1	1	1	1	1										
9		PEN	.6	.6	.6	.6	.5										Prone	1	
		DC	1	1	1	1	1	1											
		BSHC															Collapse Radius	4	
		BSCC	39	10	2	1	0												
		BC	8K	1K	60	16	8	4	3	2	1	1							

ARTILLERY BURST DATA TABLE

5	105mm HEAT USA		Burst Data													Penetration and Critical Range			
			Range from Burst in 2 yard hexes																
			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	15	15	15	15	14	14	14	13	12	11	10	8.5	6.1	4.3	PEN	416	
		DC	7	7	7	7	7	7	7	6	6	6	6	5	4	3			
	7-8	PEN	12	12	12	12	11	11	11	11	9.9	9.3	8.7	7.6	5.9	4.6	BC Contact	140K	
		DC	7	7	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	10	10	10	10	10	9.8	9.6	9.3	8.9	8.5	7.9	7.1	5.7	4.5			
		DC	8	8	8	8	8	8	8	8	7	7	7	7	6	6			
	BSHC			12	12	9	7	5	4	3	2	1	1	-2	-4	-7	-9		
	BC			63	60	50	39	30	24	19	13	10	7	5	3	2	1		
	0-1 ID			5	5	5	4	4	4	3	3	2	2	1					
	2-7 ID			8	8	7	7	6	6	5	4	3	3	2	1				
	8-9 ID			11	11	10	10	9	8	7	6	5	4	3	2	1			
	BSCC			2	2	2	1	1	-1	-2	-4	-5	-6	-8	-10	-13			
Burst on Earth	0-6	PEN	17	17	16	15	15	14	14	13	12	11	10	8.6	6.1	4.3	Standing	-	
		DC	7	7	7	7	7	7	7	6	6	6	6	5	4	3			
	7-8	PEN	13	13	12	12	12	11	11	11	9.9	9.4	8.7	7.7	5.9	4.6	Kneel/Fire Over	-	
		DC	8	7	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	11	11	11	11	10	10	9.8	9.4	9.0	8.6	8.0	7.2	5.7	4.5	Hands & Knees	-	
		DC	8	8	8	8	8	8	8	8	7	7	7	7	6	6			
	BSHC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9	Collapse Radius	0
	BSCC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9		
	BC			4K	678	162	78	47	33	24	15	10	8	5	3	2	1		
	0-1 ID			5	5	5	4	4	4	4	3	3							
	2-7 ID			7	7	7	6	6	6	5	5	4							
	8-9 ID			10	9	9	9	8	8	7	7	6							
BSCC			1	-4	-9	-12	-14	-16	-17	-19	-21								
Burst on Rock	0-6	PEN	17	17	16	15	15	14	14	13	12	11	10	8.6	6.1	4.3	Standing	-	
		DC	7	7	7	7	7	7	7	6	6	6	6	5	4	3			
	7-8	PEN	13	13	12	12	12	11	11	11	9.9	9.4	8.7	7.7	5.9	4.6	Kneel/Fire Over	-	
		DC	8	7	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	11	11	11	11	10	10	9.8	9.4	9.0	8.6	8.0	7.2	5.7	4.5	Hands & Knees	-	
		DC	8	8	8	8	8	8	8	8	7	7	7	7	6	6			
	BSHC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9	Collapse Radius	-
	BSCC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9		
	BC			4K	678	162	78	47	33	24	15	10	8	5	3	2	1		
	0-1 ID			2	2	2	2	2	2	2	1								
	2-7 ID			3	3	3	3	3	2	2	2								
	8-9 ID			5	5	4	4	4	3	3	3								
BSCC			1	-5	-10	-13	-15	-16	-18	-20									
Burst on Sand or Ice	0-6	PEN	17	17	16	15	15	14	14	13	12	11	10	8.6	6.1	4.3	Standing	-	
		DC	7	7	7	7	7	7	7	6	6	6	6	5	4	3			
	7-8	PEN	13	13	12	12	12	11	11	11	9.9	9.4	8.7	7.7	5.9	4.6	Kneel/Fire Over	-	
		DC	8	7	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	11	11	11	11	10	10	9.8	9.4	9.0	8.6	8.0	7.2	5.7	4.5	Hands & Knees	-	
		DC	8	8	8	8	8	8	8	8	7	7	7	7	6	6			
	BSHC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9	Collapse Radius	1
	BSCC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9		
	BC			4K	678	162	78	47	33	24	15	10	8	5	3	2	1		
	0-1 ID			2	2	2	2	2	2	2	1								
	2-7 ID			3	3	3	3	3	2	2	2								
	8-9 ID			5	5	4	4	4	3	3	3								
BSCC			1	-5	-10	-13	-15	-16	-18	-20									
Burst in a Flooded Rice Paddy	0-6	PEN	17	17	16	15	15	14	14	13	12	11	10	8.6	6.1	4.3	Standing	-	
		DC	7	7	7	7	7	7	7	6	6	6	6	5	4	3			
	7-8	PEN	13	13	12	12	12	11	11	11	9.9	9.4	8.7	7.7	5.9	4.6	Kneel/Fire Over	-	
		DC	8	7	7	7	7	7	7	7	7	7	7	6	6	5			
	9	PEN	11	11	11	11	10	10	9.8	9.4	9.0	8.6	8.0	7.2	5.7	4.5	Hands & Knees	-	
		DC	8	8	8	8	8	8	8	8	7	7	7	7	6	6			
	BSHC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9	Collapse Radius	1
	BSCC			*6	*1	35	16	9	6	4	2	1	1	-2	-4	-7	-9		
	BC			4K	678	162	78	47	33	24	15	10	8	5	3	2	1		
	0-1 ID			2	2	2	2	2	2	2	1								
	2-7 ID			3	3	3	3	3	2	2	2								
	8-9 ID			5	5	4	4	4	3	3	3								
BSCC			1	-5	-10	-13	-15	-16	-18	-20									

ARTILLERY BURST DATA TABLE

6	122mm HE USSR		Burst Data														Penetration and Critical Range				
			Range from Burst in 2 yard hexes																		
			0	1	2	3	4	5	6	8	10	12	15	20	30	40					
Airburst	0 - 6	PEN	21	21	21	21	20	20	19	18	17	16	15	12	9.0	6.5	PEN	39			
		DC	8	8	8	8	8	8	7	7	7	7	7	6	5	4					
	7 - 8	PEN	24	24	24	23	23	23	22	21	20	20	18	16	13	10	PENF	19			
		DC	9	9	9	9	9	9	9	9	9	9	8	8	8	7					
	9	PEN	21	21	21	21	20	20	20	19	18	18	17	15	12	10	BC Contact	461K			
		DC	9	9	9	9	9	9	9	9	9	9	9	9	8	8					
	BSHC			26	25	20	15	11	8	6	4	3	2	1	-1	-4	-6				
	BC			110	103	85	66	51	40	32	22	16	12	8	5	3	2				
	0 - 1	ID	5	5	5	4	4	4	3	2	2	1	1								
	2 - 7	ID	8	8	7	7	6	6	5	4	3	3	2	1							
	8 - 9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1						
	BSCC			3	3	2	2	1	1	-1	-3	-4	-6	-7	-9	-12					
Burst on Earth	0 - 6	PEN	12	11	11	10	10	9.7	9.3	8.7	8.0	7.5	6.7	5.5	3.8	2.6	Standing	4			
		DC	6	6	6	6	6	6	6	5	5	5	4	4	3	2					
	7 - 8	PEN	12	12	12	11	11	11	11	10	9.5	9.0	8.3	7.3	5.6	4.3	Kneel/Fire Over	2			
		DC	7	7	7	7	7	7	7	7	7	7	6	6	5	5					
	9	PEN	12	12	12	12	11	11	11	10	9.8	9.4	8.8	7.8	6.3	5.0	Hands & Knees	1			
		DC	8	8	8	8	8	8	8	8	8	7	7	7	7	7					
	BSHC			*5	*1	28	13	7	5	3	2	1	-1	-2	-5	-7	-9	Collapse Radius	2		
	BSCC			*11	*3	68	30	17	11	8	4	3	2	1	-1	-4	-6				
	BC			13K	2K	290	82	46	30	21	13	9	6	4	3	1	1				
	0 - 1	ID	5	5	4	4	4	4	3	3	3	2	2	1	1						
	2 - 7	ID	10	10	9	9	8	8	7	7	6	5	5	3	2	1					
	8 - 9	ID	17	17	16	16	15	14	14	12	11	10	9	7	5	3					
BSCC			*1	25	6	3	2	1	-1	-3	-5	-6	-8	-10	-13	-15					
Burst on Rock	0 - 6	PEN	23	23	22	22	21	20	20	18	17	16	15	13	9.1	6.6	Standing	2			
		DC	8	8	8	8	8	8	8	7	7	7	7	6	5	4					
	7 - 8	PEN	26	25	25	24	24	23	23	22	21	20	18	16	13	11	Kneel/Fire Over	1			
		DC	9	9	9	9	9	9	9	9	9	9	8	8	8	7					
	9	PEN	22	22	22	21	21	20	20	19	19	18	17	15	13	10	Hands & Knees	1			
		DC	9	9	9	9	9	9	9	9	9	9	9	9	8	8					
	BSHC			*9	*2	53	24	13	9	6	3	2	1	1	-2	-5	-7	Collapse Radius	1		
	BSCC			*10	*3	64	29	16	10	7	4	3	2	1	-2	-4	-7				
	BC			13K	1K	237	104	61	41	30	18	13	9	6	4	2	1				
	0 - 1	ID	4	4	4	3	3	3	3	2	2	2	1	1							
	2 - 7	ID	7	6	6	6	5	5	5	4	4	3	3	2	1						
	8 - 9	ID	10	10	9	9	8	8	8	7	6	5	5	3	2	1					
BSCC			57	14	4	2	1	-2	-3	-5	-7	-8	-10	-12	-15	-17					
Burst on Sand or Ice	0 - 6	PEN	3.9	3.8	3.7	3.5	3.3	3.2	3.0	2.8	2.5	2.3	2.0	1.6	1.0	.6	Standing	7			
		DC	3	3	3	3	3	3	2	2	2	2	2	1	1	1					
	7 - 8	PEN	5.3	5.2	5.0	4.9	4.7	4.6	4.4	4.2	3.9	3.7	3.3	2.8	2.1	1.5	Kneel/Fire Over	5			
		DC	5	5	5	5	5	5	5	4	4	4	4	3	3	2					
	9	PEN	5.8	5.7	5.6	5.4	5.3	5.2	5.0	4.8	4.5	4.3	4.0	3.5	2.7	2.1	Hands & Knees	3			
		DC	6	6	6	6	6	6	6	6	6	6	6	6	5	3					
	BSHC			86	21	5	2	1	-1	-2	-4	-6	-7	-8	-10	-13	-15	Collapse Radius	6		
	BSCC			*11	*3	71	31	18	11	8	4	3	2	1	-1	-4	-6				
	BC			12K	2K	302	135	80	33	23	13	9	6	4	3	1	1				
	0 - 1	ID	2.7	2.7	2.5	2.4	2.3	2.2	2.1	1.9	1.7	1.5	1.3	1.0							
	2 - 7	ID	2	2	2	2	2	2	2	1	1	1	1	1							
	8 - 9	ID	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.6	3.4	3.2	2.9	2.6							
BSCC			*11	*3	71	31	18	11	8	4	3	2	1	0							
Burst in a Flooded Rice Paddy	0 - 6	PEN	2.7	2.7	2.5	2.4	2.3	2.2	2.1	1.9	1.7	1.5	1.3	1.0			Standing	5			
		DC	2	2	2	2	2	2	2	1	1	1	1	1							
	7 - 8	PEN	3.9	3.8	3.7	3.6	3.4	3.3	3.2	3.0	2.8	2.6	2.4	2.0			Kneel/Fire Over	4			
		DC	4	4	4	4	4	4	4	3	3	3	3	2							
	9	PEN	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.6	3.4	3.2	2.9	2.6			Hands & Knees	2			
		DC	7	7	7	6	6	6	6	6	6	5	5	4							
	BSHC																	Collapse Radius	6		
	BSCC			*11	*3	71	31	18	11	8	4	3	2	1	0						
	BC			12K	2K	301	134	39	24	16	9	6	4	3	2	1	1				

ARTILLERY BURST DATA TABLE

7	122mm HEAT USSR		Burst Data														Penetration and Critical Range	
			Range from Burst in 2 yard hexes															
			0	1	2	3	4	5	6	8	10	12	15	20	30	40		
Airburst	0-6	PEN	11	11	11	10	10	10	10	9.7	9.4	9.1	8.6	7.9	6.6	5.6	PEN 13H PENF - BC Contact 203K	
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
	7-8	PEN	8.1	8.1	8.1	8.0	7.9	7.8	7.8	7.6	7.4	7.2	6.9	6.5	5.7	5.0		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	7.1	7.1	7.1	7.1	7.0	6.9	6.9	6.7	6.6	6.4	6.2	5.9	5.2	4.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	BSHC		2	2	1	1	-1	-2	-3	-5	-6	-7	-9	-11	-14	-16		
	BC		75	71	58	46	36	28	23	15	11	8	6	4	2	1		
	0-1	ID	5	5	5	4	4	4	3	3	2	1	1					
	2-7	ID	8	8	7	7	6	6	5	4	3	3	2	1				
	8-9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1			
	BSCC		3	3	2	2	1	1	-1	-3	-5	-6	-7	-9	-12			
Burst on Earth	0-6	PEN	11	11	11	11	11	10	10	9.8	9.5	9.1	8.7	7.9	6.7	5.6	Standing - Kneel/Fire Over - Hands & Knees - Crawl - Prone - Collapse Radius 1	
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
	7-8	PEN	8.4	8.4	8.3	8.2	8.1	8.0	7.8	7.6	7.4	7.2	7.0	6.5	5.7	5.0		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	7.4	7.3	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.2	4.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	BSHC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BSCC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BC		6K	864	195	92	56	38	28	17	12	9	6	4	2	1		
	0-1	ID	5	5	5	4	4	4	4	3	3	2						
	2-7	ID	7	7	7	6	6	5	5	5	4	4						
	8-9	ID	10	9	9	8	8	8	7	6	6	5						
BSCC		2	-3	-8	-11	-13	-15	-16	-18	-19	-21							
Burst on Rock	0-6	PEN	11	11	11	11	11	10	10	9.8	9.5	9.1	8.7	7.9	6.7	5.6	Standing - Kneel/Fire Over - Hands & Knees - Crawl - Prone - Collapse Radius 0	
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
	7-8	PEN	8.4	8.4	8.3	8.2	8.1	8.0	7.8	7.6	7.4	7.2	7.0	6.5	5.7	5.0		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	7.4	7.3	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.2	4.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	BSHC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BSCC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BC		6K	864	195	92	56	38	28	17	12	9	6	4	2	1		
	0-1	ID	2	2	2	2	1	1	1	1	1							
	2-7	ID	3	3	2	2	2	2	2	1	1							
	8-9	ID	4	4	3	3	3	3	2	2	2							
BSCC		1	-4	-9	-12	-14	-15	-17	-19	-20								
Burst on Sand or Ice	0-6	PEN	11	11	11	11	11	10	10	9.8	9.5	9.1	8.7	7.9	6.7	5.6	Standing - Kneel/Fire Over - Hands & Knees - Crawl - Prone - Collapse Radius 1	
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
	7-8	PEN	8.4	8.4	8.3	8.2	8.1	8.0	7.8	7.6	7.4	7.2	7.0	6.5	5.7	5.0		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	7.4	7.3	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.2	4.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	BSHC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BSCC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BC		6K	864	195	92	56	38	28	17	12	9	6	4	2	1		
	0-1	ID	2	2	2	2	1	1	1	1	1							
	2-7	ID	3	3	2	2	2	2	2	1	1							
	8-9	ID	4	4	3	3	3	3	2	2	2							
BSCC		1	-4	-9	-12	-14	-15	-17	-19	-20								
Burst in a Flooded Rice Paddy	0-6	PEN	11	11	11	11	11	10	10	9.8	9.5	9.1	8.7	7.9	6.7	5.6	Standing - Kneel/Fire Over - Hands & Knees - Crawl - Prone - Collapse Radius 1	
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
	7-8	PEN	8.4	8.4	8.3	8.2	8.1	8.0	7.8	7.6	7.4	7.2	7.0	6.5	5.7	5.0		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	7.4	7.3	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.2	4.7		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	BSHC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BSCC		77	19	5	2	1	-1	-2	-4	-6	-7	-9	-11	-14	-16		
	BC		6K	864	195	92	56	38	28	17	12	9	6	4	2	1		
	0-1	ID	2	2	2	2	1	1	1	1	1							
	2-7	ID	3	3	2	2	2	2	2	1	1							
	8-9	ID	4	4	3	3	3	3	2	2	2							
BSCC		1	-4	-9	-12	-14	-15	-17	-19	-20								

ARTILLERY BURST DATA TABLE

8	130mm HE USSR	Burst Data														Penetration and Critical Range			
		Range from Burst in 2 yard hexes																	
			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	21	21	21	21	21	20	20	19	19	18	17	16	14	12	PEN	66	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9			9
	7-8	PEN	16	16	16	16	16	16	16	16	15	15	14	14	13	12	10	BC Contact	603K
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	14	14	14	14	14	14	14	14	13	13	13	13	12	11	9.5		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	3	3	3	2	1	1	-1	-2	-4	-5	-7	-8	-11	-13			
		BC	125	118	96	75	57	45	36	24	17	13	9	6	3	2			
	0-1	ID	5	5	5	4	4	4	3	2	2	1	1						
	2-7	ID	8	8	7	7	6	6	5	4	3	3	2	1					
	8-9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
		BSCC	3	3	2	2	1	1	-1	-3	-4	-5	-7	-9	-12				
Burst on Earth	0-6	PEN	9.7	9.6	9.4	9.2	9.1	8.9	8.7	8.4	8.1	7.8	7.3	6.6	5.5	4.5	Standing	4	
		DC	9	9	9	9	8	8	8	8	8	8	8	8	8	8			8
	7-8	PEN	9.6	9.5	9.4	9.3	9.2	9.0	8.9	8.7	8.4	8.2	7.9	7.3	6.4	5.6	Hands & Knees	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			Crawl
	9	PEN	9.3	9.2	9.1	9.0	8.9	8.8	8.7	8.5	8.3	8.1	7.8	7.4	6.5	5.8	Prone	1	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	45	11	3	1	-1	-3	-4	-6	-8	-9	-11	-13	-16	-18	Collapse Radius	4	
		BSCC	*1	35	9	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			
		BC	16K	2K	344	92	50	32	23	13	9	7	5	3	1	1			
	0-1	ID	4	4	4	3	3	3	3	2	2	2	1	1					
	2-7	ID	8	8	7	7	7	6	6	5	5	4	4	3	2	1			
	8-9	ID	14	14	13	13	12	12	11	10	9	8	7	6	4	2			
BSCC		*2	59	15	7	4	2	2	1	-2	-3	-5	-7	-10	-12				
Burst on Rock	0-6	PEN	22	22	22	21	21	21	20	20	19	18	18	16	14	12	Standing	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9			Kneel/Fire Over
	7-8	PEN	17	17	16	16	16	16	16	15	15	15	14	13	12	10	Hands & Knees	1	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			Crawl
	9	PEN	15	15	14	14	14	14	14	14	13	13	13	12	11	9.5	Prone	0	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*1	25	6	3	2	1	-1	-3	-5	-6	-8	-10	-13	-15	Collapse Radius	1	
		BSCC	*1	33	8	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			
		BC	16K	2K	258	110	64	43	31	19	13	10	7	4	2	1			
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1						
	2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1					
	8-9	ID	8	8	7	7	7	6	6	5	5	4	3	3	1	1			
BSCC		*1	32	8	4	2	1	1	-3	-4	-5	-7	-9	-12	-14				
Burst on Sand or Ice	0-6	PEN	5.5	5.4	5.3	5.2	5.1	5.0	4.9	4.7						Standing	6		
		DC	10	10	10	10	10	9	9	9								Kneel/Fire Over	4
	7-8	PEN	6.3	6.3	6.2	6.1	6.0	5.9	5.8	5.6						Hands & Knees	3		
		DC	10	10	10	10	10	10	10	10								Crawl	2
	9	PEN	6.5	6.4	6.4	6.3	6.2	6.1	6.0	5.9						Prone	2		
		DC	10	10	10	10	10	10	10	10									
		BSHC															Collapse Radius	8	
		BSCC	*1	32	8	4	2	1	1	0									
		BC	16K	2K	352	154	90	32	21	12	8	6	4	2	1	1			
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1						
	2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1					
	8-9	ID	8	8	7	7	7	6	6	5	5	4	3	3	1	1			
BSCC		*1	32	8	4	2	1	1	-3	-4	-5	-7	-9	-12	-14				
Burst in a Flooded Rice Paddy	0-6	PEN	4.4	4.3	4.2	4.2	4.1	4.0	3.9	3.7						Standing	5		
		DC	9	9	9	9	9	9	9	8								Kneel/Fire Over	3
	7-8	PEN	5.3	5.3	5.2	5.1	5.0	4.9	4.9	4.7						Hands & Knees	2		
		DC	10	10	10	10	10	10	10	10								Crawl	2
	9	PEN	5.6	5.5	5.5	5.4	5.3	5.2	5.2	5.0						Prone	2		
		DC	10	10	10	10	10	10	10	10									
		BSHC															Collapse Radius	7	
		BSCC	*1	32	8	4	2	1	1	0									
		BC	16K	2K	349	152	39	23	16	9	6	4	3	2	1	1			
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1						
	2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1					
	8-9	ID	8	8	7	7	7	6	6	5	5	4	3	3	1	1			
BSCC		*1	32	8	4	2	1	1	-3	-4	-5	-7	-9	-12	-14				

ARTILLERY BURST DATA TABLE

9	152mm HE USSR	Burst Data														Penetration and Critical Range		
		Range from Burst in 2 yard hexes																
			0	1	2	3	4	5	6	8	10	12	15	20	30	40		
Airburst	0-6	PEN	24	24	24	24	23	23	22	21	20	18	17	14	11	7.8	PEN 65	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		PENF 34
	7-8	PEN	36	36	36	36	35	34	34	33	31	30	28	26	21	17	BC Contact 957K	
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		
	9	PEN	32	32	32	31	31	31	30	29	28	27	26	24	20	17		
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9		
		BSHC	33	31	24	18	14	10	8	5	3	2	2	1	-3	-5		
		BC	156	147	119	92	70	55	44	29	21	16	11	7	4	2		
	0-1	ID	5	5	5	4	4	4	3	2	2	1	1					
	2-7	ID	8	8	7	7	6	6	5	4	3	3	2	1				
8-9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
	BSCC	4	4	3	2	2	1	1	-2	-3	-5	-6	-8	-11				
Burst on Earth	0-6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 4	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		Kneel/Fire Over 2
	7-8	PEN	39	38	37	37	36	35	34	33	32	30	29	26	21	17	Hands & Knees 1	
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		Crawl 1
	9	PEN	34	34	33	32	32	31	31	30	29	27	26	24	20	17	Prone 1	
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9		
		BSHC	*8	*2	48	21	12	8	5	3	2	1	-1	-3	-6	-8	Collapse Radius 3	
		BSCC	*14	*3	85	38	21	14	9	5	3	2	2	-1	-3	-6		
		BC	25K	3K	440	134	74	48	35	21	14	10	7	4	2	1		
	0-1	ID	7	6	6	6	5	5	5	4	4	3	3	2	1	1		
2-7	ID	13	13	12	12	11	11	10	9	8	7	6	5	3	2			
8-9	ID	23	23	22	21	20	19	19	17	16	15	13	10	7	5			
	BSCC	*1	33	8	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			
Burst on Rock	0-6	PEN	27	26	26	25	24	23	23	21	20	19	17	15	11	7.8	Standing 2	
		DC	8	8	8	8	8	8	8	8	8	7	7	7	6	5		Kneel/Fire Over 1
	7-8	PEN	39	38	37	37	36	35	34	33	32	30	29	26	21	17	Hands & Knees 1	
		DC	10	10	10	10	10	10	10	10	10	10	9	9	9	8		Crawl 1
	9	PEN	34	34	33	32	32	31	31	30	29	27	26	24	20	17	Prone 0	
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9		
		BSHC	*11	*3	71	32	18	11	8	4	3	2	1	-1	-4	-6	Collapse Radius 1	
		BSCC	*13	*3	82	37	21	13	9	5	3	2	1	-1	-4	-6		
		BC	25K	3K	382	159	91	60	44	27	18	14	9	6	3	2		
	0-1	ID	2	2	2	2	2	2	2	1	1	1	1					
2-7	ID	4	4	4	4	3	3	3	3	2	2	2	1					
8-9	ID	7	7	7	6	6	5	5	4	4	3	3	2	1	1			
	BSCC	*1	26	7	3	2	1	-1	-3	-5	-6	-8	-10	-13	-15			
Burst on Sand or Ice	0-6	PEN	9.8	9.6	9.3	8.9	8.6	8.3	7.9	7.4	6.8	6.3	5.6	4.6	3.1	2.1	Standing 8	
		DC	6	6	6	5	5	5	5	5	4	4	4	3	3	2		Kneel/Fire Over 5
	7-8	PEN	12	12	12	11	11	11	10	9.8	9.3	8.8	8.1	7.1	5.5	4.2	Hands & Knees 3	
		DC	7	7	7	7	7	7	7	7	7	7	6	6	5	4		Crawl 3
	9	PEN	13	13	12	12	12	11	11	11	10	9.8	9.1	8.2	6.5	5.2	Prone 2	
		DC	8	8	8	8	8	8	8	8	8	8	7	7	7	6		
		BSHC	*4	*1	28	12	7	4	3	2	1	-1	-2	-5	-7	-10	Collapse Radius 9	
		BSCC	*14	*4	89	40	22	14	10	6	4	2	2	1	-3	-5		
		BC	24K	3K	463	196	113	75	39	23	15	11	7	5	2	1		
	Burst in a Flooded Rice Paddy	0-6	PEN	6.5	6.4	6.1	5.8	5.6	5.4	5.1	4.7	4.3	4.0	3.5	2.8	1.9	1.2	Standing 6
DC			4	4	4	4	4	4	4	4	3	3	3	3	2	1	1	
7-8		PEN	8.6	8.4	8.2	8.0	7.7	7.5	7.3	6.9	6.5	6.2	5.7	4.9	3.7	2.8	Hands & Knees 3	
		DC	7	6	6	6	6	6	6	6	6	6	6	5	4	3		Crawl 2
9		PEN	9.4	9.3	9.1	8.8	8.6	8.4	8.2	7.9	7.5	7.1	6.7	5.9	4.7	3.7	Prone 2	
		DC	7	7	7	7	7	7	7	7	7	7	7	6	6	6		
		BSHC	*3	83	21	9	5	3	2	1	-1	-2	-4	-6	-9	-11	Collapse Radius 8	
		BSCC	*14	*4	88	39	22	14	10	6	4	2	2	1	-3	-5		
		BC	24K	3K	462	195	112	47	32	19	12	9	6	4	2	1		

ARTILLERY BURST DATA TABLE

10	152mm HE USSR new	Burst Data														Penetration and Critical Range			
		Range from Burst in 2 yard hexes																	
		0	1	2	3	4	5	6	8	10	12	15	20	30	40				
Airburst	0-6	PEN	26	26	26	25	25	24	23	22	21	20	18	15	11	8.3	PEN	68	
		DC	8	8	8	8	8	8	8	8	8	8	7	7	7	6			5
	7-8	PEN	51	51	50	50	49	48	47	46	44	42	40	37	30	25	PEN	34	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9			
	9	PEN	45	45	44	44	43	43	42	41	40	38	36	34	28	24	BC Contact	1668K	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			9
			BSHC	33	31	25	19	14	10	8	5	3	2	2	1	-3	-5		
			BC	208	195	157	120	91	70	56	37	27	20	14	9	5	3		
	0-1		ID	5	5	5	4	4	4	3	2	2	1	1					
	2-7		ID	8	8	7	7	6	6	5	4	3	3	2	1				
	8-9		ID	11	11	10	10	9	8	7	6	5	4	3	2	1			
			BSCC	4	4	3	2	2	1	1	-2	-3	-5	-6	-8	-11			
Burst on Earth	0-6	PEN	29	28	27	26	26	25	24	23	21	20	18	16	11	8.3	Standing	4	
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			5
	7-8	PEN	44	44	43	42	41	40	39	38	36	35	33	30	24	20	Kneel/Fire Over	3	
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9			
	9	PEN	40	40	39	38	38	37	36	35	34	33	31	28	24	20	Hands & Knees	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9			
			BSHC	*7	*2	45	20	11	7	5	3	2	1	-1	-3	-6	-8	Collapse Radius	5
			BSCC	*14	*3	87	39	22	14	10	5	3	2	2	1	-3	-5		
			BC	41K	4K	643	188	100	64	45	27	18	13	9	6	3	2		
	0-1		ID	7	7	6	6	6	5	5	4	4	3	3	2	1	1		
	2-7		ID	14	13	13	12	12	11	11	10	9	8	7	5	3	2		
	8-9		ID	25	24	23	22	21	21	20	18	17	15	14	11	7	5		
		BSCC	*2	62	16	7	4	3	2	1	-2	-3	-5	-7	-10	-12			
Burst on Rock	0-6	PEN	29	28	27	26	26	25	24	23	21	20	18	16	11	8.3	Standing	3	
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			5
	7-8	PEN	54	53	52	51	50	49	48	46	45	43	40	37	30	25	Kneel/Fire Over	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9			
	9	PEN	47	47	46	45	44	43	43	41	40	39	37	34	28	24	Hands & Knees	1	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			9
			BSHC	*11	*3	69	31	17	11	8	4	3	2	1	-1	-4	-6	Collapse Radius	2
			BSCC	*13	*3	84	37	21	13	9	5	3	2	1	-1	-4	-6		
			BC	42K	4K	540	212	118	77	55	33	23	17	12	7	4	2		
	0-1		ID	3	3	2	2	2	2	2	2	1	1	1					
	2-7		ID	5	5	5	4	4	4	3	3	3	2	2	1				
	8-9		ID	8	8	8	7	7	6	6	5	5	4	4	3	1	1		
		BSCC	*2	41	10	5	3	2	1	-2	-3	-5	-6	-8	-11	-13			
Burst on Sand or Ice	0-6	PEN	9.8	9.6	9.2	8.9	8.5	8.2	7.9	7.3	6.7	6.2	5.5	4.5	3.1	2.1	Standing	9	
		DC	6	6	5	5	5	5	5	5	4	4	4	4	3	2			2
	7-8	PEN	13	13	12	12	12	11	11	10	9.9	9.4	8.6	7.6	5.8	4.5	Kneel/Fire Over	6	
		DC	7	7	7	7	7	7	7	7	7	7	6	6	5	5			
	9	PEN	14	14	13	13	13	13	12	12	11	11	10	9.0	7.2	5.8	Hands & Knees	4	
		DC	8	8	8	8	8	8	8	8	8	8	8	8	7	7			6
			BSHC	*4	91	23	10	6	4	3	1	1	-2	-3	-5	-8	-10	Collapse Radius	13
			BSCC	*14	*4	90	40	22	14	10	6	4	2	2	1	-3	-5		
			BC	40K	4K	657	264	148	98	51	29	19	14	9	6	3	2		
	0-1		ID	6.7	6.6	6.3	6.0	5.8	5.5	5.3	4.9	4.5	4.1	3.6	2.9	1.9	1.2		
	2-7		ID	4	4	4	4	4	4	4	3	3	3	3	2	1	1		
	8-9		ID	9.3	9.1	8.9	8.6	8.4	8.2	7.9	7.5	7.1	6.7	6.1	5.3	4.0	3.0		
		BSCC	*14	*4	89	40	22	14	10	6	4	2	2	1	-3	-5			
		BC	40K	4K	657	263	148	61	42	24	16	11	8	5	2	1			
Burst in a Flooded Rice Paddy	0-6	PEN	6.7	6.6	6.3	6.0	5.8	5.5	5.3	4.9	4.5	4.1	3.6	2.9	1.9	1.2	Standing	7	
		DC	4	4	4	4	4	4	4	4	3	3	3	3	2	1			1
	7-8	PEN	9.3	9.1	8.9	8.6	8.4	8.2	7.9	7.5	7.1	6.7	6.1	5.3	4.0	3.0	Kneel/Fire Over	5	
		DC	7	7	7	6	6	6	6	6	6	6	6	5	4	3			
	9	PEN	10	10	10	9.8	9.6	9.4	9.2	8.7	8.3	7.9	7.4	6.6	5.2	4.1	Hands & Knees	3	
		DC	8	8	8	8	7	7	7	7	7	7	7	7	6	6			
			BSHC	*2	60	15	7	4	2	2	1	-2	-3	-5	-7	-10	-12	Collapse Radius	12
			BSCC	*14	*4	89	40	22	14	10	6	4	2	2	1	-3	-5		
			BC	40K	4K	657	263	148	61	42	24	16	11	8	5	2	1		

ARTILLERY BURST DATA TABLE

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155mm HE
USA

Burst Data

Range from Burst in 2 yard hexes

Penetration and
Critical Range

				0	1	2	3	4	5	6	8	10	12	15	20	30	40				
Airburst	0 - 6	PEN	26	26	25	25	24	24	23	22	21	19	18	15	11	8.3	PEN 61 PENF 31 BC Contact 1147K				
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6		5			
	7 - 8	PEN	40	40	40	39	39	38	37	36	35	33	32	29	24	19					
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9					
	9	PEN	35	35	35	35	34	34	33	32	31	30	29	26	22	19					
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9					
	BSHC		33	31	25	18	14	10	8	5	3	2	2	1	-3	-5					
	BC		171	161	130	100	76	59	47	32	23	17	12	8	4	3					
	0 - 1	ID	5	5	5	4	4	4	3	2	2	1	1								
	2 - 7	ID	8	8	7	7	6	6	5	4	3	3	2	1							
	8 - 9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1						
		BSCC	4	4	3	2	2	1	1	-2	-3	-5	-6	-8	-11						
	Burst on Earth	0 - 6	PEN	28	28	27	26	25	24	24	22	21	20	18	15	11		8.3	Standing 4 Kneel/Fire Over 2 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 3		
			DC	8	8	8	8	8	8	8	8	8	8	8	7	7		6		5	
		7 - 8	PEN	42	42	41	40	40	39	38	37	35	34	32	29	24		19			
DC			10	10	10	10	10	10	10	10	10	10	10	9	9	9					
9		PEN	37	37	36	36	35	34	34	33	32	30	29	26	22	19					
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9					
BSHC		*8	*2	48	21	12	8	5	3	2	1	-1	-3	-6	-8						
BSCC		*14	*3	86	38	21	14	10	5	3	2	2	-1	-3	-6						
BC		29K	3K	495	149	82	53	38	23	15	11	8	5	2	2						
0 - 1		ID	7	7	6	6	6	5	5	4	4	4	3	2	1	1					
2 - 7		ID	14	14	13	12	12	11	11	10	9	8	7	5	3	2					
8 - 9		ID	25	24	23	22	22	21	20	18	17	15	14	11	7	5					
		BSCC	*2	38	9	4	2	2	1	-2	-4	-5	-6	-8	-11	-13					
Burst on Rock		0 - 6	PEN	28	28	27	26	25	24	24	22	21	20	18	15	11	8.3	Standing 2 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 0 Collapse Radius 1			
			DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6			5	
	7 - 8	PEN	42	42	41	40	40	39	38	37	35	34	32	29	24	19					
		DC	10	10	10	10	10	10	10	10	10	10	10	8	9	9	9				
	9	PEN	37	37	36	36	35	34	34	33	32	30	29	26	22	19					
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9					
	BSHC		*11	*3	71	32	18	11	8	4	3	2	1	-1	-4	-6					
	BSCC		*13	*3	83	37	21	13	9	5	3	2	1	-1	-4	-6					
	BC		29K	3K	428	175	99	66	47	29	20	15	10	6	3	2					
	0 - 1	ID	3	3	2	2	2	2	2	1	1	1	1								
	2 - 7	ID	5	4	4	4	4	3	3	3	2	2	2	1							
	8 - 9	ID	8	7	7	7	6	6	5	5	4	4	3	2	1	1					
		BSCC	*1	30	7	3	2	1	-1	-3	-4	-6	-7	-9	-12	-14					
	Burst on Sand or Ice	0 - 6	PEN	11	11	10	9.8	9.4	9.1	8.8	8.1	7.5	7.0	6.2	5.2	3.5	2.4		Standing 8 Kneel/Fire Over 5 Hands & Knees 4 Crawl 3 Prone 2 Collapse Radius 10		
			DC	6	6	6	6	6	5	5	5	5	4	4	4	3	2				
7 - 8		PEN	13	13	13	12	12	12	11	11	10	9.8	9.0	7.9	6.1	4.8					
		DC	8	8	8	7	7	7	7	7	7	7	7	6	6	5					
9		PEN	14	14	13	13	13	13	12	12	11	11	10	9.1	7.3	5.9					
		DC	8	8	8	8	8	8	8	8	8	8	8	7	7	6					
BSHC		*5	*1	28	13	7	5	3	2	1	-1	-2	-5	-7	-9						
BSCC		*14	*4	89	40	22	14	10	6	4	2	2	1	-3	-5						
BC		28K	3K	517	216	123	82	43	25	17	12	8	5	3	2						
Burst in a Flooded Rice Paddy		0 - 6	PEN	7.1	7.0	6.7	6.4	6.2	5.9	5.7	5.2	4.8	4.4	3.9	3.2	2.1	1.4	Standing 7 Kneel/Fire Over 4 Hands & Knees 3 Crawl 2 Prone 2 Collapse Radius 9			
			DC	5	4	4	4	4	4	4	4	4	3	3	3	2	1				
		7 - 8	PEN	9.4	9.3	9.0	8.8	8.5	8.3	8.1	7.6	7.2	6.8	6.3	5.5	4.2	3.2				
			DC	7	7	7	7	7	6	6	6	6	6	6	5	4	4				
		9	PEN	10	10	10	9.7	9.5	9.3	9.1	8.7	8.3	7.9	7.4	6.6	5.2	4.2				
			DC	8	8	8	8	8	7	7	7	7	7	7	7	7	7				
	BSHC		*3	83	21	9	5	3	2	1	-1	-2	-4	-6	-9	-11					
	BSCC		*14	*4	88	39	22	14	10	6	4	2	2	1	-3	-5					
	BC		28K	3K	517	215	122	52	36	21	14	10	7	4	2	1					

ARTILLERY BURST DATA TABLE

13	155mm HE USA new		Burst Data														Penetration and Critical Range	
			Range from Burst in 2 yard hexes															
			0	1	2	3	4	5	6	8	10	12	15	20	30	40		
Airburst	0-6	PEN	24	24	24	23	23	22	21	20	19	18	16	14	9.8	7.1	PEN 61 PENF 31 BC Contact 1722K	
		DC	8	8	8	8	8	8	8	7	7	7	7	6	6	4		
	7-8	PEN	48	48	48	47	47	46	45	43	42	40	38	34	28	23		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		
	9	PEN	47	47	47	46	46	45	44	43	41	40	38	35	29	25		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9		
		BSHC	34	31	25	19	14	11	8	5	3	2	2	1	-3	-5		
		BC	212	199	159	122	92	71	56	38	27	21	14	9	5	3		
	0-1	ID	5	5	5	4	4	4	3	2	2	1	1					
	2-7	ID	8	8	7	7	6	6	5	4	3	3	2	1				
8-9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
	BSCC	4	4	3	2	2	1	1	-2	-3	-4	-6	-8	-11				
Burst on Earth	0-6	PEN	26	26	25	24	24	23	22	21	19	18	16	14	9.9	7.1	Standing 4 Kneel/Fire Over 3 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 4	
		DC	8	8	8	8	8	8	8	7	7	7	6	6	4			
	7-8	PEN	51	51	50	49	48	47	46	44	42	41	38	34	28	23		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		
	9	PEN	49	49	48	47	47	46	45	43	42	40	38	35	29	25		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9		
		BSHC	*8	*2	49	22	12	8	5	3	2	1	1	-3	-5	-7		
		BSCC	*14	*4	89	40	22	14	10	6	4	2	2	1	-3	-5		
		BC	42K	4K	653	194	104	66	47	28	19	14	9	6	3	2		
	0-1	ID	8	8	7	7	6	6	6	5	4	4	3	3	1	1		
2-7	ID	15	15	14	14	13	13	12	11	10	9	8	6	4	2			
8-9	ID	28	27	26	25	24	23	22	21	19	17	15	13	8	6			
	BSCC	*2	50	13	6	3	2	1	-1	-3	-4	-5	-7	-10	-12			
Burst on Rock	0-6	PEN	26	26	25	24	24	23	22	21	19	18	16	14	9.9	7.1	Standing 3 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1 Collapse Radius 1	
		DC	8	8	8	8	8	8	8	7	7	7	6	6	4			
	7-8	PEN	51	51	50	49	48	47	46	44	42	41	38	34	28	23		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		
	9	PEN	49	49	48	47	47	46	45	43	42	40	38	35	29	25		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9		
		BSHC	*12	*3	73	32	18	12	8	5	3	2	1	-1	-4	-6		
		BSCC	*14	*3	86	38	21	14	10	5	3	2	2	-1	-3	-6		
		BC	43K	4K	559	219	122	80	57	34	24	17	12	7	4	2		
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1					
2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1	1				
8-9	ID	9	9	8	8	7	7	6	6	5	4	4	3	2	1			
	BSCC	*1	36	9	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			
Burst on Sand or Ice	0-6	PEN	13	12	12	11	11	11	10	9.3	8.6	8.0	7.1	5.8	3.9	2.7	Standing 9 Kneel/Fire Over 6 Hands & Knees 4 Crawl 3 Prone 3 Collapse Radius 13	
		DC	6	6	6	6	6	6	6	5	5	4	4	3	2	2		
	7-8	PEN	16	15	15	15	14	14	14	13	12	12	11	9.3	7.2	5.5		
		DC	8	8	8	8	8	7	7	7	7	7	7	7	6	5		
	9	PEN	17	17	16	16	15	15	15	14	14	13	12	11	8.7	7.0		
		DC	9	9	8	8	8	8	8	8	8	8	8	8	7	7		
		BSHC	*5	*1	28	13	7	5	3	2	1	-1	-2	-4	-7	-9		
		BSCC	*15	*4	92	41	23	15	10	6	4	3	2	1	-3	-5		
		BC	41K	4K	671	269	151	99	71	31	21	15	10	6	3	2		
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1					
2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1	1				
8-9	ID	9	9	8	8	7	7	6	6	5	4	4	3	2	1			
	BSCC	*1	36	9	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			
Burst in a Flooded Rice Paddy	0-6	PEN	8.2	8.0	7.7	7.4	7.0	6.7	6.5	5.9	5.4	5.0	4.4	3.6	2.3	1.5	Standing 7 Kneel/Fire Over 5 Hands & Knees 3 Crawl 3 Prone 2 Collapse Radius 12	
		DC	5	5	5	4	4	4	4	4	3	3	3	3	2	1		
	7-8	PEN	11	11	11	10	10	9.7	9.5	8.9	8.4	8.0	7.3	6.3	4.8	3.6		
		DC	7	7	7	7	7	7	7	6	6	6	6	6	4	4		
	9	PEN	12	12	12	12	11	11	11	10	9.8	9.4	8.7	7.7	6.1	4.8		
		DC	8	8	8	8	8	8	8	7	7	7	7	7	6	6		
		BSHC	*3	84	21	9	5	3	2	1	-1	-2	-4	-6	-9	-11		
		BSCC	*15	*4	91	41	23	15	10	6	4	3	2	1	-3	-5		
		BC	41K	4K	671	268	150	67	46	26	17	12	8	5	3	2		
	0-1	ID	3	3	3	2	2	2	2	2	1	1	1					
2-7	ID	5	5	5	4	4	4	4	3	3	2	2	1	1				
8-9	ID	9	9	8	8	7	7	6	6	5	4	4	3	2	1			
	BSCC	*1	36	9	4	2	1	1	-2	-4	-5	-7	-9	-12	-14			

ARTILLERY BURST DATA TABLE

14	180mm HE USSR	Burst Data															Penetration and Critical Range		
		Range from Burst in 2 yard hexes																	
		0	1	2	3	4	5	6	8	10	12	15	20	30	40				
Airburst	0-6	PEN	46	46	46	45	44	44	43	41	40	38	36	32	26	21	PEN 125 PENF 69 BC Contact 2292K		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		8	
	7-8	PEN	50	50	50	49	49	48	47	46	45	43	42	39	33	29			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	
	9	PEN	44	44	44	43	43	42	42	41	40	39	37	35	31	27			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	
		BSHC	34	32	26	19	14	11	8	5	4	3	2	1	-3	-5			
		BC	247	231	185	140	105	81	64	43	31	23	16	10	5	3			
		0-1 ID	5	5	5	4	4	4	3	2	2	1	1						
		2-7 ID	8	8	7	7	6	6	5	4	3	3	2	1					
		8-9 ID	11	11	10	10	9	8	7	6	5	4	3	2	1				
		BSCC	5	4	4	3	2	2	1	-1	-3	-4	-5	-7	-10				
Burst on Earth	0-6	PEN	49	49	48	47	46	45	44	42	40	38	36	32	26	21	Standing 4 Kneel/Fire Over 3 Hands & Knees 2 Crawl 1 Prone 1 Collapse Radius 6		
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	8			
	7-8	PEN	52	52	51	50	49	49	48	47	45	44	42	39	33	29			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	46	45	45	44	44	43	42	41	40	39	38	35	31	27			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*8	*2	50	22	13	8	6	3	2	1	1	-2	-5	-7			
		BSCC	*15	*4	92	41	23	15	10	6	4	3	2	1	-3	-5			
		BC	56K	6K	791	226	119	75	53	31	21	15	11	7	3	2			
		0-1 ID	7	7	6	6	6	5	5	4	4	3	3	2	1	1			
		2-7 ID	14	13	13	12	12	11	10	10	9	8	7	5	3	2			
		8-9 ID	25	24	23	22	21	20	20	18	17	15	13	11	7	5			
	BSCC	*4	98	25	11	6	4	3	2	1	-1	-3	-5	-8	-10				
Burst on Rock	0-6	PEN	49	49	48	47	46	45	44	42	40	38	36	32	26	21	Standing 2 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1 Collapse Radius 2		
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	8			
	7-8	PEN	52	52	51	50	49	49	48	47	45	44	42	38	33	29			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	46	45	45	44	44	43	42	41	40	39	38	35	31	27			
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*12	*3	74	33	18	12	8	5	3	2	1	-1	-4	-6			
		BSCC	*14	*4	88	39	22	14	10	6	4	2	2	1	-3	-5			
		BC	57K	5K	660	252	138	89	64	38	26	19	13	8	4	3			
		0-1 ID	2	2	2	2	2	2	2	1	1	1	1						
		2-7 ID	4	4	4	4	3	3	3	3	2	2	2	1					
		8-9 ID	8	7	7	6	6	6	5	5	4	4	3	2	1	1			
	BSCC	*3	71	18	8	4	3	2	1	-1	-3	-4	-6	-9	-11				
Burst on Sand or Ice	0-6	PEN	16	16	15	15	14	14	14	13	12	12	11	9.2	7.0	5.3	Standing 9 Kneel/Fire Over 6 Hands & Knees 4 Crawl 3 Prone 3 Collapse Radius 16		
		DC	8	8	8	8	7	7	7	7	7	7	7	7	6	6		5	
	7-8	PEN	19	18	18	18	17	17	17	16	15	15	14	13	11	8.7			
		DC	9	9	9	9	9	9	9	9	9	9	9	9	9	8		8	
	9	PEN	19	19	19	18	18	18	18	17	17	16	15	14	12	10			
		DC	10	10	10	10	10	10	10	10	10	10	10	9	9	9			
		BSHC	*5	*1	32	14	8	5	4	2	1	1	-2	-4	-7	-9			
		BSCC	*15	*4	95	42	24	15	11	6	4	3	2	1	-3	-5			
		BC	54K	6K	812	316	174	113	60	34	23	16	11	7	3	2			
	Burst in a Flooded Rice Paddy	0-6	PEN	12	12	11	11	11	10	9.9	9.4	8.8	8.3	7.6	6.6	4.9		3.6	Standing 7 Kneel/Fire Over 5 Hands & Knees 3 Crawl 3 Prone 2 Collapse Radius 14
			DC	7	7	7	7	7	7	6	6	6	6	6	5	4		4	
		7-8	PEN	15	14	14	14	14	13	13	13	12	12	11	9.8	8.1		6.6	
DC			9	9	9	9	9	9	9	8	8	8	8	8	8	7			
9		PEN	16	15	15	15	15	14	14	14	13	13	12	11	9.5	8.0			
		DC	10	10	10	10	10	10	10	9	9	9	9	9	9	10			
		BSHC	*4	*1	26	12	7	4	3	2	1	-1	-3	-5	-8	-10			
		BSCC	*15	*4	94	42	23	15	10	6	4	3	2	1	-3	-5			
		BC	55K	6K	812	315	173	75	51	29	19	14	9	6	3	2			

ARTILLERY BURST DATA TABLE

15	8 inch HE USA	Burst Data														Penetration and Critical Range		
		0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0 - 6	PEN	36	36	35	35	34	33	33	31	30	28	26	23	18	14	PEN 102 PENF 54	
		DC	9	9	9	9	9	9	9	9	9	9	9	8	8	7		
	7 - 8	PEN	63	63	63	62	61	60	60	58	56	54	52	48	40	34	BC Contact 2836K	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	56	55	55	55	54	53	53	51	50	49	47	43	38	32		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	38	36	28	21	16	12	9	6	4	3	2	1	-3	-5		
		BC	278	260	207	156	117	90	71	47	34	25	18	11	6	4		
		0 - 1	ID	5	5	5	4	4	4	3	2	2	1	1				
		2 - 7	ID	8	8	7	7	6	6	5	4	3	2	1				
		8 - 9	ID	11	11	10	10	9	8	7	6	5	4	3	2	1		
			BSCC	5	5	4	3	2	2	1	-1	-2	-3	-5	-7	-10		
Burst on Earth	0 - 6	PEN	39	38	37	36	35	34	33	32	30	29	26	23	18	14	Standing 4 Kneel/Fire Over 2 Hands & Knees 2 Crawl 1 Prone 1	
		DC	9	9	9	9	9	9	9	9	9	9	9	8	8	7		
	7 - 8	PEN	66	66	65	63	62	61	60	58	56	55	52	48	40	34	Collapse Radius 5	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	58	58	57	56	55	54	53	52	50	49	47	44	38	33		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	*11	*3	67	30	17	11	7	4	3	2	1	-1	-4	-6		
		BSCC	*16	*4	*1	44	25	16	11	6	4	3	2	1	-3	-5		
		BC	70K	7K	893	266	141	90	63	37	25	19	13	8	4	3		
		0 - 1	ID	11	11	10	10	9	9	8	7	7	6	5	4	2	1	
		2 - 7	ID	22	21	20	20	19	18	17	16	14	13	12	9	6	4	
		8 - 9	ID	39	38	37	35	34	33	31	29	27	25	23	19	13	9	
	BSCC		*2	54	14	6	3	2	2	-1	-2	-4	-5	-7	-10	-12		
Burst on Rock	0 - 6	PEN	39	38	37	36	35	34	33	32	30	29	26	23	18	14	Standing 3 Kneel/Fire Over 2 Hands & Knees 1 Crawl 1 Prone 1	
		DC	9	9	9	9	9	9	9	9	9	9	9	8	8	7		
	7 - 8	PEN	66	66	65	63	62	61	60	58	56	55	52	48	40	34	Collapse Radius 2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	9	PEN	58	58	57	56	55	54	53	52	50	49	47	44	38	33		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	*14	*3	87	39	22	14	10	5	3	2	2	-1	-3	-5		
		BSCC	*16	*4	98	44	25	16	11	6	4	3	2	1	-3	-5		
		BC	70K	6K	813	304	164	106	75	45	30	22	15	10	5	3		
		0 - 1	ID	2	2	2	2	2	2	1	1	1	1					
		2 - 7	ID	4	4	4	4	3	3	3	3	2	2	2	1			
		8 - 9	ID	7	7	7	6	6	6	5	5	4	4	3	2	1	1	
	BSCC		*2	60	15	7	4	2	2	1	-2	-3	-5	-7	-10	-12		
Burst on Sand or Ice	0 - 6	PEN	39	38	37	36	35	35	33	32	30	29	26	23	18	14	Standing 7 Kneel/Fire Over 5 Hands & Knees 3 Crawl 3 Prone 2	
		DC	9	9	9	9	9	9	9	9	9	9	9	8	8	7		
	7 - 8	PEN	47	47	46	45	44	44	43	41	40	38	36	33	28	23	Collapse Radius 14	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	9		
	9	PEN	44	44	43	42	42	41	40	39	38	37	35	33	28	24		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	*8	*2	50	22	13	8	6	3	2	1	1	-2	-5	-7		
		BSCC	*17	*4	*1	46	26	17	12	6	4	3	2	1	-3	-5		
		BC	66K	7K	940	357	194	99	68	39	26	19	13	8	4	3		
	Burst in a Flooded Rice Paddy	0 - 6	PEN	31	30	29	29	28	27	26	25	24	22	20	18	14	10	Standing 7 Kneel/Fire Over 5 Hands & Knees 3 Crawl 3 Prone 2
			DC	9	9	9	9	9	9	9	8	8	8	8	8	7	6	
		7 - 8	PEN	32	32	31	31	30	30	29	28	27	26	24	22	18	15	Collapse Radius 13
DC			10	10	10	10	10	10	10	10	10	9	9	9	9	8		
9		PEN	32	32	31	31	30	30	29	28	27	26	25	23	20	17		
		DC	10	10	10	10	10	10	10	10	10	10	10	10	9	9		
		BSHC	*7	*2	45	20	11	7	5	3	2	1	-1	-3	-6	-8		
		BSCC	*17	*4	*1	46	26	17	11	6	4	3	2	1	-3	-5		
		BC	67K	7K	940	356	194	92	63	37	24	18	12	7	4	2		

ARTILLERY BURST DATA TABLE

16

16 inch HE USA naval

Burst Data

Range from Burst in 2 yard hexes

Penetration and Critical Range

			0	1	2	3	4	5	6	8	10	12	15	20	30	40			
Airburst	0-6	PEN	136	136	135	135	134	133	132	130	128	126	122	117	107	98	PEN	783	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	7-8	PEN	103	103	103	103	102	102	101	100	99	97	95	92	86	81	PENF	478	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	91	91	90	90	90	89	89	88	87	86	84	82	77	73	BC Contact	21454K	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	31	29	23	18	13	10	7	4	3	2	1	0	-4	-6			
		BC	1K	938	704	497	349	254	192	120	83	61	42	26	13	8			
		0-1	ID	5	4	4	4	3	3	3	2	1	1						
		2-7	ID	7	7	7	6	6	5	4	3	3	2	1					
		8-9	ID	10	10	10	9	8	7	7	5	4	3	2	1				
			BSCC	11	11	8	6	4	3	2	1	1	0	-2	-4				
	Burst on Earth	0-6	PEN	140	139	138	137	135	134	133	131	128	126	123	117	107	98	Standing	4
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		7-8	PEN	105	105	104	104	103	102	102	100	99	98	96	92	86	81	Kneel/Fire Over	2
DC			10	10	10	10	10	10	10	10	10	10	10	10	10	10			
9		PEN	92	92	91	91	90	90	89	88	87	86	85	82	77	73	Hands & Knees	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*9	*2	58	25	14	9	6	3	2	1	1	-2	-5	-7	Collapse Radius	14	
		BSCC	*13	*3	82	36	20	13	9	5	3	2	1	-1	-4	-6			
		BC	521K	44K	4K	1K	474	273	180	98	64	45	30	19	9	6			
		0-1	ID	32	31	30	28	27	26	25	23	21	20	17	14	9	6		
		2-7	ID	62	61	59	57	55	53	51	48	45	42	38	32	22	16		
		8-9	ID	109	108	105	102	99	96	93	88	83	78	72	62	46	35		
			BSCC	*9	*2	56	25	14	6	6	3	2	1	1	-3	-5	-7		
Burst on Rock		0-6	PEN	140	139	138	137	135	134	133	131	128	126	123	117	107	98	Standing	3
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	7-8	PEN	105	105	104	104	103	102	102	100	99	98	96	92	86	81	Kneel/Fire Over	2	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	9	PEN	92	92	91	91	90	90	89	88	87	86	85	82	77	73	Hands & Knees	1	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*11	*3	71	31	17	11	7	4	2	1	1	-2	-5	-7	Collapse Radius	6	
		BSCC	*13	*3	80	35	20	12	8	5	3	2	1	-1	-4	-6			
		BC	517K	41K	4K	1K	539	314	208	114	74	53	36	22	11	7			
		0-1	ID	7	7	7	6	6	5	5	4	4	3	3	2	1			
		2-7	ID	13	13	12	12	11	10	10	9	8	7	6	4	2	1		
		8-9	ID	22	22	21	20	19	18	17	16	14	13	11	9	5	3		
			BSCC	*15	*4	94	41	23	15	10	5	3	2	1	0	-4	-6		
	Burst on Sand or Ice	0-6	PEN	140	139	138	137	135	134	133	131	128	126	122	117	107	98	Standing	7
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
7-8		PEN	105	105	104	104	103	102	102	100	99	96	96	92	86	81	Kneel/Fire Over	5	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
9		PEN	92	92	91	91	90	90	89	88	87	86	85	82	77	73	Hands & Knees	4	
		DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
		BSHC	*8	*2	49	22	12	7	5	3	1	1	0	-3	-6	-8	Collapse Radius	32	
		BSCC	*14	*3	86	38	21	13	9	5	3	2	1	-1	-4	-6			
		BC	488K	44K	5K	1K	649	295	191	103	66	47	31	19	9	6			
Burst in a Flooded Rice Paddy		0-6	PEN	140	139	138	137	135	134	133	131	128	126	123	117	107	98	Standing	6
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		7-8	PEN	105	105	104	104	103	102	102	100	99	98	96	92	86	81	Kneel/Fire Over	4
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		9	PEN	92	92	91	91	90	90	89	88	87	86	85	82	77	73	Hands & Knees	3
			DC	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		BSHC	*8	*2	48	21	12	7	5	3	1	1	-1	-3	-6	-8	Collapse Radius	28	
		BSCC	*14	*3	85	37	21	13	9	5	3	2	1	-1	-4	-6			
		BC	495K	45K	5K	1K	642	279	181	97	63	44	30	18	9	6			

WHITE PHOSPHORUS DATA TABLE

Shell Index	White Phosphorus Data																	
	Range from Burst in 2 yard hexes																	
	C	0	1	2	3	4	5	6	7	8	9	10	11	12	14	16	20	
1 Mortar Shell 60mm	BWPHC	*23	*6	*1	35	16	9	6										
	PD Body	13	13	12	11	9	8	6										
	PD Limb	3	3	3	3	3	2	2										
	PDs TS 0	69H	304	13	1													
	PDs TS 4	51K	23H	100	4	1												
	PDs TS 7	233K	10K	455	20	3	1											
2 Mortar Shell 81mm 82mm	BWPHC	*24	*6	*1	37	17	9	6	4	3	2	2	1					
	PD Body	75	74	73	69	65	60	55	50	45	40	34	29					
	PD Limb	12	12	11	11	11	10	9	9	8	7	7	6					
	PDs TS 0	26K	12H	51	2													
	PDs TS 4	196K	87H	384	17	3	1											
	PDs TS 7	889K	39K	17H	77	12	3	1	1									
3 Mortar Shell 107mm	BWPHC	*36	*9	*2	56	25	14	9	6	5	3	3	2	2	2	1	1	-2
	PD Body	427	424	419	408	396	384	371	357	343	328	313	297	281	265	233	201	138
	PD Limb	41	41	41	40	39	38	37	36	35	34	33	32	30	29	27	24	18
	PDs TS 0	190K	84H	371	16	3	1											
	PDs TS 4	1M	63K	28H	123	20	5	2	1									
	PDs TS 7	6M	284K	13K	554	89	24	9	4	2	1	1						
4 Mortar Shell 120mm	BWPHC	*38	*9	*2	59	26	15	9	7	5	4	3	2	2	2	1	1	-2
	PD Body	427	424	419	408	396	384	371	357	343	328	313	297	281	265	233	201	138
	PD Limb	41	41	41	40	39	38	37	36	35	34	33	32	30	29	27	24	18
	PDs TS 0	212K	94H	413	18	3	1											
	PDs TS 4	2M	70K	31H	137	22	6	2	1									
	PDs TS 7	7M	317K	14K	618	100	27	10	4	2	1	1						
5 Artillery Shell 105mm	BWPHC	*40	*10	*3	63	28	16	10	7	5	4	3	3	2	2	1	1	-2
	PD Body	427	424	419	408	396	384	371	357	343	328	313	297	281	265	233	201	138
	PD Limb	41	41	41	40	39	38	37	36	35	34	33	32	30	29	27	24	18
	PDs TS 0	235K	10K	458	20	3	1											
	PDs TS 4	2M	78K	34H	151	24	7	2	1	1								
	PDs TS 7	8M	351K	16K	685	111	30	11	5	2	1	1						
6 Artillery Shell 122mm	BWPHC	*56	*14	*4	88	39	22	14	10	7	6	4	4	3	2	2	1	1
	PD Body	673	670	663	648	633	616	599	581	563	544	524	504	483	462	419	376	289
	PD Limb	57	57	56	56	55	54	52	51	50	49	48	46	45	44	41	37	31
	PDs TS 0	600K	27K	12H	52	8	2	1										
	PDs TS 4	4M	198K	88H	387	62	17	6	3	1	1							
	PDs TS 7	20M	898K	40K	18H	283	77	28	12	6	3	2	1	1	1			
7 Artillery Shell 130mm	BWPHC	*65	*16	*4	*1	45	25	16	11	8	6	5	4	3	3	2	2	1
	PD Body	823	819	811	794	777	758	739	719	698	676	654	631	608	585	536	487	388
	PD Limb	66	66	65	64	63	62	61	60	59	57	56	54	53	52	48	45	38
	PDs TS 0	900K	40K	18H	78	13	3	1	1									
	PDs TS 4	7M	298K	13K	581	94	26	9	4	2	1	1						
	PDs TS 7	30M	1M	60K	26H	424	116	43	19	9	5	3	2	1	1			
8 Artillery Shell 152mm 155mm	BWPHC	*98	*24	*6	*2	68	38	24	17	12	10	8	6	5	4	3	2	2
	PD Body	12H	12H	12H	11H	11H	11H	11H	10H	10H	995	968	940	911	882	822	761	637
	PD Limb	85	85	85	83	82	81	80	78	77	76	74	73	71	69	66	62	55
	PDs TS 0	2M	106K	47H	208	34	9	3	1	1								
	PDs TS 4	18M	797K	35K	16H	251	69	25	11	6	3	2	1	1				
	PDs TS 7	82M	4M	159K	70H	11H	311	114	50	25	14	8	5	3	2	1	1	
9 Artillery Shell 180mm	BWPHC	*147	*37	*9	*2	*1	57	37	25	19	14	11	9	8	6	5	4	2
	PD Body	19H	19H	18H	18H	18H	17H	17H	17H	17H	16H	16H	15H	15H	15H	14H	13H	11H
	PD Limb	119	119	118	116	115	113	112	110	109	107	105	104	102	100	96	92	84
	PDs TS 0	7M	307K	14K	600	97	27	10	4	2	1	1						
	PDs TS 4	52M	2M	102K	45H	724	198	73	32	16	9	5	3	2	1	1		
	PDs TS 7	235M	10M	460K	20K	33H	898	329	145	72	40	23	15	9	6	3	2	1
10 Artillery Shell 8 inch	BWPHC	*158	*40	*10	*2	*1	62	40	27	20	15	12	10	8	7	5	4	2
	PD Body	24H	24H	24H	24H	23H	23H	23H	22H	22H	21H	21H	20H	20H	20H	19H	18H	16H
	PD Limb	143	143	142	141	139	138	136	134	133	131	129	127	125	123	119	115	106
	PDs TS 0	10M	425K	19K	830	134	37	13	6	3	2	1	1					
	PDs TS 4	72M	3M	140K	62H	10H	274	101	44	22	12	7	4	3	2	1	1	
	PDs TS 7	326M	14M	636K	28K	45H	12H	455	200	100	55	32	20	13	9	4	2	1



PHOENIX COMMAND™

Artillery System

"Artillery is the God of War." - Stalin

This Artillery System is designed for use with the **Phoenix Command Combat System**. It allows players to add the full range of Indirect Fire weaponry to Phoenix Command, and includes:

Fire Missions, from the first Ranging shot, through Adjusting Fire, to sustained Fire For Effect by individual weapons or complete Batteries.

Forward Observers, with everything necessary for calling in fire, including Forward Observer and Battery errors, Weather corrections, and Forward Observer Skill.

Direct Fire, for the defense of Fire Bases and other last-ditch actions.

Defensive Positions, showing the effects of artillery fire on Buildings, Foxholes, and Trenches, as well as in Forests and Jungles.

Air and Ground Bursts, and their effects in various situations.

Complete Weapon Data for a wide range of Guns, Howitzers, Mortars, and Rockets from World War II to the present, including British, German, Soviet, and United States weapons.

Illustrated and developed with the same techniques as other **Phoenix Command** products, this System is compatible with the entire **PC** line and includes everything necessary to add Artillery Fire Missions to the game.

The Revolution in Game Design Continues!



LEADING EDGE
G A M E S

