

WWII ONLINE

Allied and Axis

105mm Howitzer How-To Guide



US M2A1 HOWITZER – Upper Left
FR M2A1 HOWITZER – Bottom Left
UK M2A1 HOWITZER – Upper Right
DE leFH 18/40 HOWITZER – Bottom Right

DATE OF LAST EDIT: **12.07.2022**

RED COLORED TEXT = NEW OR UPDATED INFORMATION

GREEN COLORED TEXT = PREVIOUS UPDATED INFORMATION

INDEX

SECTION	PAGE
Introduction	3
Aiming Devices	4
Keymapper	4
Important Keys	4
The Gun HUD	5
Pro Tips	6
Crew Positions	7
Using the howitzer	8
Gun Recoil	9
Pitch and Roll Consistency	9
Vertical Interval	10
Firing the Howitzer	12
Direct Fire	13
Different Charged Shells and Why It Matters	14
Smoke Shells	15
High-Explosive Shells	15
Lethality	15
Anti-Tank Shells	16
You and Your Forward Observer	16
Time of Flight	16
Reload Times	16
Forward Observer Quick Tips	17
Registering the Gun	17
Adjustments of Fire	17
Mass Batteries	19
Preparing the Battery for Success	20
Single-Point Concentration of Fire	22
Lateral Adjust Table (Meters to Mils) – 81mm mortar	23
Lateral Adjust Table (Meters to Mils) – 105mm howitzer	24
Town Elevation Guide v1.31.x 110522	25

INTRODUCTION

For many years in WWII ONLINE, the ability to provide a true 'fire-support' role has been limited to a direct fire role no matter the type of platform (either gun-crewed or self-propelled). The indirect fire role initially introduced was limited to the 50mm mortar with a maximum range of 500m. It was only recently with the introduction of the 81mm self-propelled mortar platforms that the indirect fire range dramatically increased from 2,400 meters to 3,000 meters in-game.

With the introduction of light or medium artillery (as classified by the various WWII combatants), the 105mm howitzers will introduce long-range lethality which the WWIIOL gaming community has NOT experienced before. With the potential to engage targets indirectly from ranges greater than 11,000 meters, a whole different way of thinking in strategies/counterstrategies. In time practical and tactical expertise will be explored, developed, and used. From a mindset perspective, the 105mm howitzers are NOT a front-line weapon system even though they will appear in the spawn lists of front-line towns. An artillery gun too close to the front lines is easy prey for enemy infantry.

With these new howitzers, the extreme range to engage targets is a startling realization when considering that each grid square is 20km by 20km and, in theory, these guns have the capability to engage the enemy half a grid square away. However, to bring that lethality to bear, it is critically important to understand the simplified complexities (a unique phrase as CRS endeavored to NOT develop a simple "point and click" system) of the platform while working with a Forward Observer.

As with most things in WWIIOL, teamwork, coordination, and patience will be key to maximizing artillery lethality and fun.

AIMING DEVICES

A helpful hint if you will use any of these devices to adjust the howitzer's pitch, roll, azimuth to target, or range.

Mouse: use of a lower DPI if you have a mouse that can switch quickly & easily between different settings

Joystick: intuitive to use but can be difficult at times to properly align the gun

Arrow Keys: can be used but may not be as precise as the Mouse or Joystick

KEYMAPPER

- Customize gun controls by pulling up the in-game map (M-key)
- Select the KEYMAPPER tab
- Select AT & AAA GUNS

Listed below is a recommended keymap if you plan to use the ARROW KEYS for artillery.

WEAPON CONTROLS	SECONDARY KEYMAP (LEFT-SIDE)	SECONDARY KEYMAP (RIGHT-SIDE)
Turret traverse	Left Arrow	Right Arrow
Turret elevate	Down Arrow	Up Arrow

IMPORTANT KEYS

You can access the following functions through these keys:

IMPORTANT KEYS	FUNCTION	POSITION
0-key from keypad	Gunsight view	Position #2 / Gunner
G-key	Azimuth bearing and range	Position #1 / Driver
M-key	Map key	At any position
Z-key	Deploy and un-deploy	Position #2 / Gunner

The Gun HUD

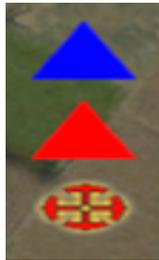
Vehicle - Azimuth: 52.3° Pitch: -0.1° Roll: 0.1°
Gun Barrel - Azimuth: 52.3° (929mils) Angle: 5.0° (88mils) Range Est: 3582m
Active Target - B1 Azimuth: 51.2° (910mils) Distance: 3582m

Introduction

As an artillerist in WWIIOL, your success will depend upon watching very closely the upper left-hand corner of your monitor for critical information.

This INTERACTIVE display is your gun layer, firing solution calculator, and Fire Direction Control – all rolled into one. When the MISSION LEADER makes active a WAYPOINT TYPE or a CONTACT REPORT:

- RALLY POINT (R#)
- ATTACK POINT (A#)
- BOMBARD POINT (B#)



What it does

The Gun HUD automatically calculates the firing solution (ACTIVE TARGET NAME, AZIMUTH, and DISTANCE). Activate a new or previous mark and it immediately calculates the new active target information.

This feature allows the gunner to:

- view the new Active Target information on the HUD
- orient and relay the howitzer to the proper azimuth
- adjust pitch and roll (if needed)
- adjust range
- fire

Unless it is a radical adjustment, the gunner can accomplish the above within seconds once you become familiar with the controls.

How to use it

Vehicle - Azimuth: 52.3° Pitch: -0.1° Roll: 0.1°
Gun Barrel - Azimuth: 52.3° (929mils) Angle: 5.0° (88mils) Range Est: 3582m
Active Target - B1 Azimuth: 51.2° (910mils) Distance: 3582m

When you spawn into the howitzer, you need to be aware of the Gun HUD window which by default is in the upper left-hand corner of your screen. Three lines of information are presented to you, and some information from the Gun HUD is visible from each position. Remember that each display line is changed by manning the appropriate position(s).

Line 1 (Position #3): Vehicle bearing orientation on the map, provides an azimuth in degrees, and indicates the current pitch and roll of the gun.

Vehicle - Azimuth: 52.3° Pitch: -0.1° Roll: 0.1°

- Having a non-zeroed Pitch and Roll will radically impact your firing solution. If your Forward Observer does NOT see or hear your rounds, this is the FIRST place to look for a solution.
- Remember to use your mouse, joystick, or arrow keys to adjust the Pitch and Roll.

Line 2 (Position #2): Gun bearing orientation will include the azimuth in degrees and MILS, and the range based upon the gun angle.

Gun Barrel - Azimuth: 52.3° (929mils) Angle: 5.0° (88mils) Range Est: 3582m

Line 3 (Position #2): Target bearing orientation to an ACTIVE target (by default it will orient to Mission Target) which will include the azimuth in degrees and MILS and Distance (range in meters ONLY).

Active Target - B1 Azimuth: 51.2° (910mils) Distance: 3582m

PRO TIPS

#1	You do not need to label each WAYPOINT created, the system automatically places a number with it.
#2	Use ATTACK POINTS for initial ranging to a target (time permitting), once the gun is registered onto the target then place a BOMBARD POINT (B#).
#3	It is helpful to have your FO on your mission but not required.
#4	The Forward Observer needs to stay alive to have the most impact.

CREW POSITIONS

Position #1	<p>Driver (“Vehicle” data on the Gun HUD)</p>  <ul style="list-style-type: none">● Move the gun short distances for towing or repositioning● Gun HUD will show “Vehicle – Azimuth – Pitch - Roll”● From Position #1, you can only control the azimuth● Use range function (G-key) for range and bearing information (if needed for direct fire)● Use binocular feature for aiming and scouting
Position #2	<p>Gunner (“Gun Barrel” data on the Gun HUD Display)</p>  <ul style="list-style-type: none">● Orient the gun on the <u>horizontal plane</u> (Gun Barrel – Azimuth) to the target● Orient the gun on the <u>vertical plane</u> (Angle and Range) to hit the target● Select the proper charged ammunition and type based upon the mission <p><u>Open Sight (more details under “Direct Fire”)</u></p> <ul style="list-style-type: none">● Press (0-key) on your 10-key portion of keyboard to access the open sight● No aiming pip is displayed (rough aiming point is the left-hand margin of the 4th text channel) <p>TIP – with practice and remembering the pitch angles on your Gun HUD Display will allow you to attain some skill in short-range engagements</p>
Position #3	<p>Commander (Vehicle – Pitch and Roll ONLY)</p>  <ul style="list-style-type: none">● Level the pitch and roll on the horizontal plane (KEY for accurate fire)● This is where your keybinds, joystick, or mouse pays dividends are you adjust the Pitch & Roll prior to firing

USING THE HOWITZER

Okay, so I have spawned in the howitzer so how do I effectively use it?

- Whether you are pre-planning possible target(s) a waypoint is most likely needed.
 - o road intersections
 - o spawn depots
 - o forward bases
 - o targets of opportunity
- Make the WAYPOINT TYPE (Rally, Attack, or Bombard) ACTIVE by 'mouse hover' over the mark, and when the menu option comes up, select 'Active'. CONTACT REPORTS can be made active, too!



- Once active, the Gun HUD will update the firing data from the default (previous) Target to the ACTIVE mark

The beauty of the Gun HUD Display system is once you have identified several targets, you can:

- switch between existing targets
- mark them active
- immediately receive the correct firing data
- engage the new target once the gun is oriented and fire

From the example below (see next page), as targets approach a given BOMBARD mark, simply make the appropriate mark active as the howitzer receives the firing solution to that specific target. When a new threat or target is sighted, make active the nearest BOMBARD mark and adjust fire (if needed) in working with the Forward Observer.



Gun Recoil

Also referred to as ‘gun jump”, due to recoil the gun will need to be relayed in degrees (MILS), Pitch and Roll between each round fired. If not, expect your rounds to NOT be on target, and even with good feedback from your FO, your rounds will not be accurate as your error increases with EACH round fired.

Pitch & Roll Consistency

As you begin firing rounds and making lateral adjustments you may notice the gun requires more time and attention to correct the pitch and roll after each round. **How do you prevent this?**

If you have accurately zeroed your gun to the target, make note of the Gun Azimuth on the Gun HUD and redeploy the “Vehicle” (Position #3) to match the Gun Azimuth. This helps alleviate most of the gun recoil when firing which allows you to fire more efficiently as you concentrate on the range and lateral adjustments. If the gun is firing at a 45-degree angle across the wheeled axis of the gun you will be forced to make more and more adjustments on the pitch and roll which dramatically slows down your rate of fire.

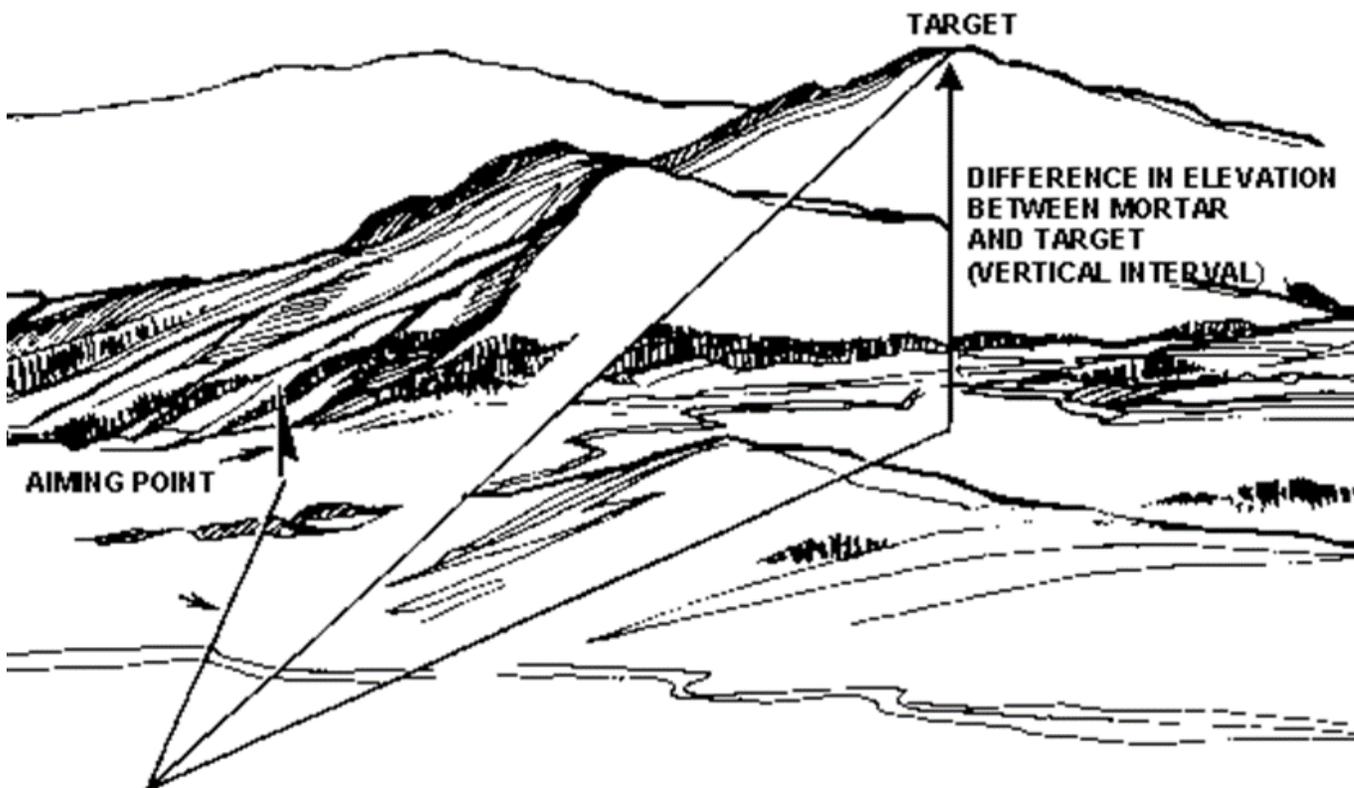


In the picture above the gun has been traversed laterally to the left to illustrate. It may not seem like a huge deal until you start firing and very quickly you will notice how frequently you will need to adjust the pitch and roll between each round.

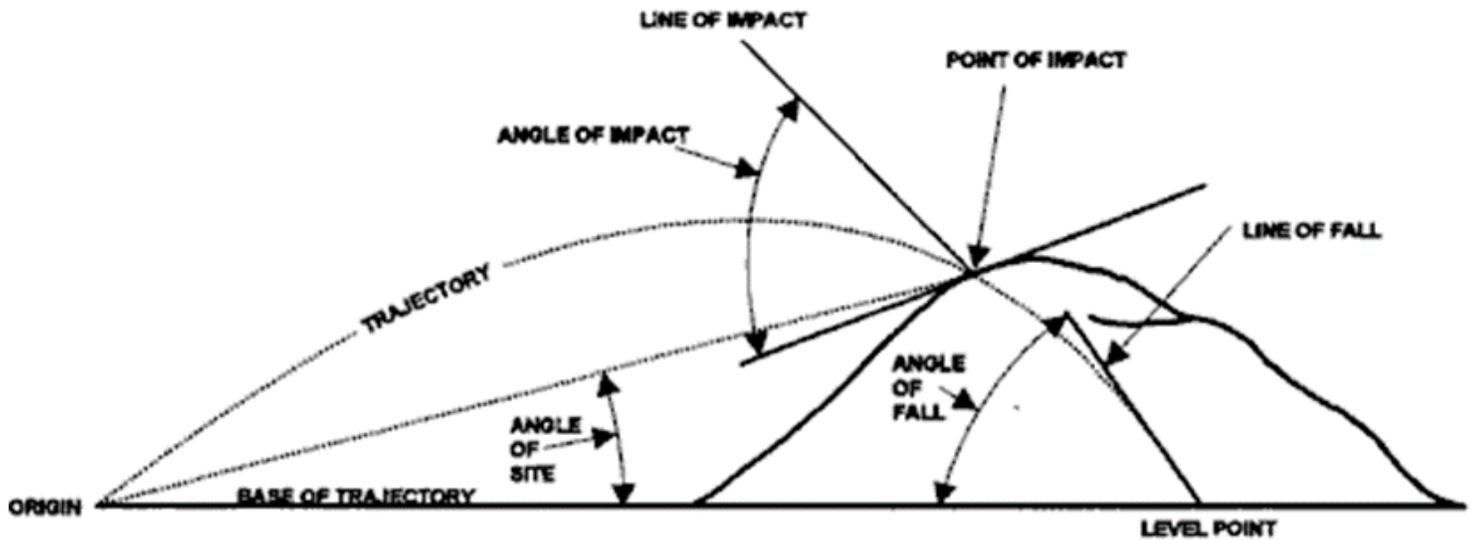
Save yourself the headache and align your gun as much as you can. The more targets and fire missions you receive will likely require you to redeploy/deploy multiple times. Remember you will NOT need to move meters for these corrections are only in degrees/MILS which even at great distances are minute but significant on where your shells will land.

Vertical Interval

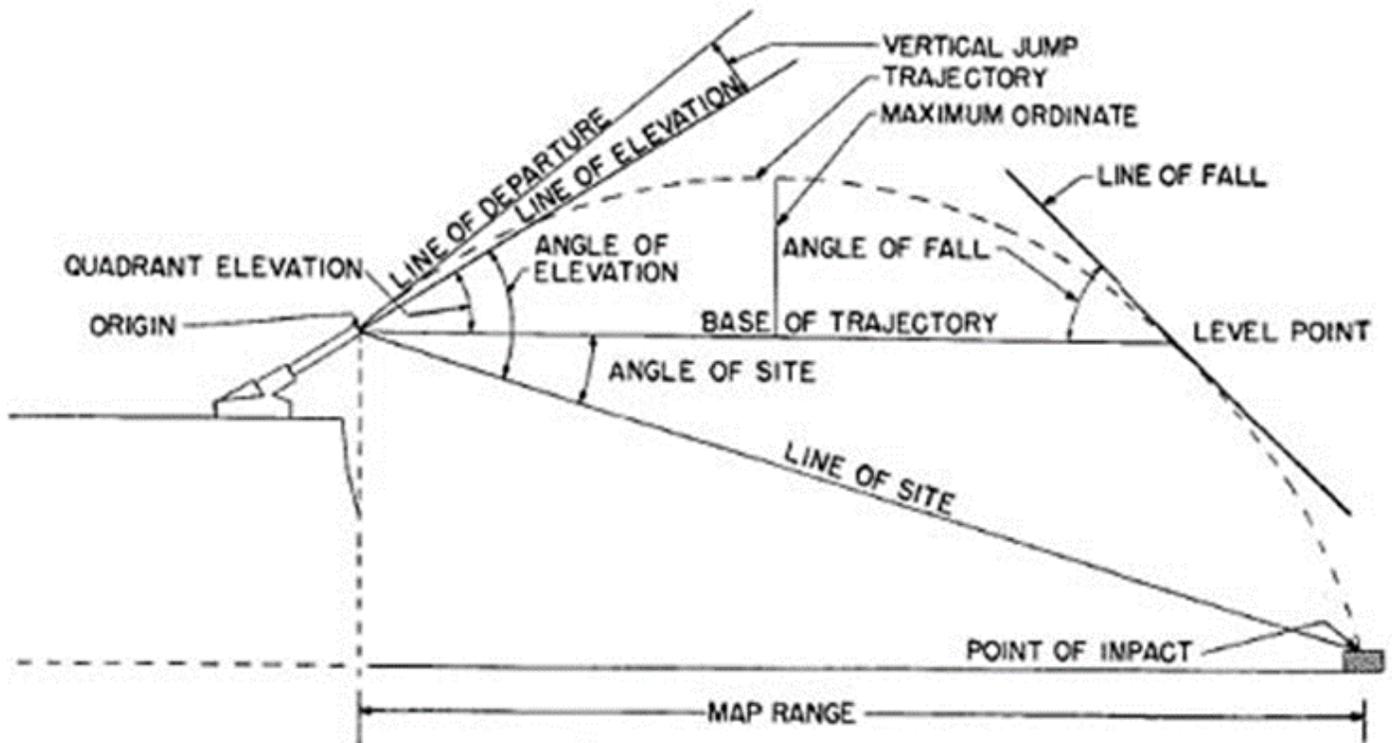
What is Vertical Interval or VI as it is sometimes called? It is simply the difference in elevation between your firing position and the target. The Vertical Interval will impact your estimated range to target.



When firing **UPHILL** . . . the increasing elevation of the terrain interrupts or intercepts the normal trajectory of the shell, which **shortens** the predicted range based upon the angle of firing. In the picture below, you will see the shell trajectory meet the terrain at the point of impact despite the line of fall.



When firing **DOWNHILL** . . . the decreasing elevation of the terrain allows the normal trajectory of the shell to **lengthen** the predicted range of the shell based upon the angle of firing, continuing in its line of fall until the point of impact.



How do you compensate for the difference between your firing point and the target's elevation? The formula below solves this problem.

Vertical Interval Formula

- Elevation difference from Point A and Point B = X meters
- $X \text{ meters} / 2 = Y \text{ adjustment}$
- Short to target = ADD Y adjustment
- Long to target = SUBTRACT Y adjustment

EXAMPLE: You are firing from an UNKNOWN elevation and the Gun HUD is showing your target is at 10,000 meters.

STEP 1	Arty fires round once FO can observe target
STEP 2	FO observes round and advised round is SHORT 500 meters
STEP 3	500 meters divided by 2 = 250 meters
STEP 4	SHORT on target = ADD 250 meters in range
STEP 5	Arty ranges to 10,250 meters and fires
STEP 6	FO observes rounds and communicates adjustments (if needed)

Firing the Howitzer

1. Push the gun to the desired location (Position #1) and orient to target
2. Deploy (Z-key) gun trail spades
3. From Position #3 correct pitch and roll to 0.0°
4. from Position #2 fine-tune your Gun Barrel Azimuth (mils) and Range orientation to MATCH the Active Target Azimuth (mils) and Distance
5. Select the appropriate round (and ammunition charge that matches the range of target)
6. Recheck Gun Barrel Azimuth and Range = Active Target Azimuth and Distance
7. Fire

(Repeat as needed)

- Recheck pitch and roll to 0.0°
- Recheck Gun Barrel Azimuth (mils) and Range orientation to MATCH the Active Target Azimuth (mils) and Distance
- Fire
- Repeat

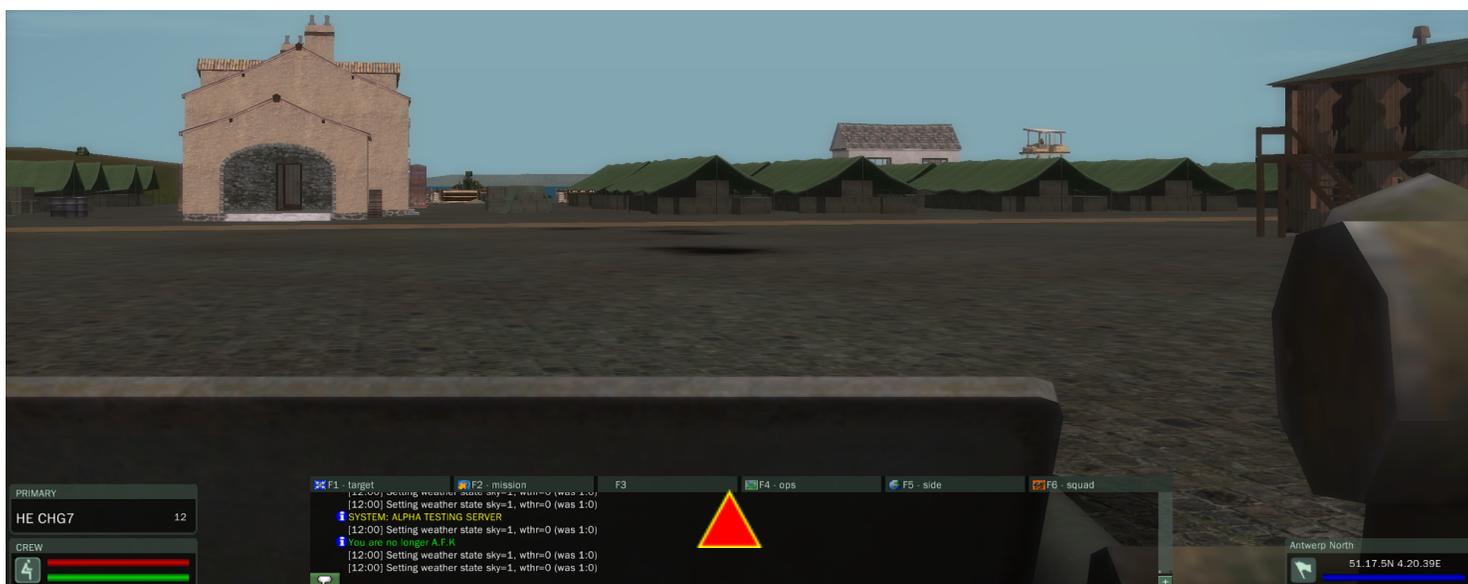
Direct Fire

- Accessed through the 0-key on the 10-keypad
- No aiming pip

Allied 105mm Howitzer Direct Gun Sight	
TARGET RANGE	GUN ANGLE °
50M	-2.0°
75M	-1.5°
100M	-1.0°

** NOTE – these are rough approximations **

Figure 1 Allied 105mm Howitzer Direct Gun Sight



German 105mm Howitzer Direct Gun Sight	
TARGET RANGE	GUN ANGLE °
50M	-1.0°
75M	-0.6
100M	-0.2°

** NOTE – these are rough approximations **



Figure 2 - DE 105mm Direct Fire View (no pip)

Different Charged Shells and Why It Matters

What are “charged” shells and how does that impact the howitzer?

Historically in artillery, standardized weighted bags of powder in singular or in increasing numbers, these charges provide an accurate and pre-determined range of distance in which a shell can be fired.

When combined with the gun angle variable, this allows the howitzer to effectively strike a target at range with particular charge(s) in a predictable manner. The greater the number of charges within the shell, the greater the distance the shell can cover. The inverse would be true with a lesser number of shells providing a decreasing distance. CRS anticipates implementing “charged” shells in the future.

Smoke Shells

This shell will reach the minimum and maximum range for the gun platform. There are sufficient rounds carried by each howitzer to provide an effective tactical smoke screen but resupply will be needed.

From left to right, the British and French howitzers fire WHITE smoke, US howitzer fires VIOLET smoke, and the German howitzer fires LAVENDER smoke (or the smog from my 1973 Pontiac Catalina on a cold day).



High-Explosive Shells

FACTION	RANGE (M)
Allied	11,275
German	12,325

Lethality

Lethality	<p>It is important to remember there are multiple variables in determining lethality.</p> <ul style="list-style-type: none">● Game engine limitations on shell fragments (20-plus-year-old graphics engine on a single core)● Standing target versus a prone, terrain, and/or objects in the path of the shell fragment● Game reality versus ‘Hollywood’
Expectations	<p>A standing infantryman has an increased probability of being wounded within 20+ meters of the impact area. Repeat, wounded is NOT killed. This is historically accurate so lower your expectations as this is NOT an HLL-type howitzer.</p>

Anti-Tank Shells

Currently, the howitzers do NOT have modeled antiarmor (AP or HEAT) shells. It has not yet been determined if the towed howitzers will have that capability in the future.

You and Your Forward Observer

WWIOL is not a pool table environment, so it is critical to properly level the gun platform prior to firing and with each following round.

The Gun HUD Display will show various data in TENTHS, degrees, and mils. This data will help ensure your rounds are reasonably accurate (the target elevation is an unknown variable) while you adjust based on feedback from your Forward Observer.

The bearing/range function allows Position #1 (Driver) to determine a bearing (direction to target) from the location of the gun. This function is more applicable when attempting to locate and identify a target from a CONTACT REPORT on the map and NOT a known point such as a building, bridge, or road intersection.

Time of Flight

It takes approximately **30 seconds** from when the round has been fired until it impacts the target.

Reload Times

The howitzer takes approximately 10 seconds to reload between rounds.

Forward Observer Quick Tips

If you have a massed battery that is attempting to get oriented and range onto the objective here is the FIRST and most IMPORTANT rule, only ONE gun fires from a battery. Once the proper elevation has been established, the remainder of the guns can make adjustments based from the registered gun.

If you have MORE than one set of guns firing onto the target (very likely), it is important to try and determine from which general quadrant the gun or battery of guns is firing towards the target. Example: Tex64 battery firing from the SW to the target. Ideally, each howitzer should identify themselves versus firing blindly with smoke rounds and calling out for who can see what, etc. This quickly becomes confusing to everyone which random or organized guns are firing randomly into the target area.

Registering the Gun

- Find a position where you can observe a good portion of the town or target area.
- If your primary target is obstructed by terrain, foliage, or the enemy - FEAR NOT! You can still register the gun (determine the elevation of the general target area) and help your team.
- Locate via your binoculars a relatively flat piece of terrain that is near the target area which you can easily see rounds landing.
- Place a contact mark and make sure the gun can see the mark on their HUD map.
- When the gun is fired, mark where the initial round(s) land and provide adjustments for the gun.
- Repeat as needed
- Once the rounds land within 100m of the registration target, the gun is registered. Remember this is ONLY to determine the elevation difference between the gun and the target area.
- Once the elevation difference has been determined, the Gun HUD will provide accurate azimuths to all selected targets.

Adjustments of Fire

Hallelujah!! I see friendly artillery fire firing onto a target, intersection, etc so how do I help provide the CORRECT info for the gun or battery?

Bracketing the Target

- Remember to be **BOLD in your corrections of fire!** This HELPS because timid or incremental adjustments waste TIME, SHELLS, and potentially forfeit the element of surprise.
- If you observe a round(s) several hundred meters SHORT of the target tell the gun to add range to ensure the next round(s) go LONG over the target. Don't worry about the overshoot, if you can only HEAR the round(s) and cannot see them then you have OVERSHOT.
- Tell the gun to split the difference in range between the short and long rounds and fire again. EXAMPLE: 1st round is 7800M and short, 2nd round was +400m (8200M), 3rd round -200m (splitting the difference of 400), and observe round(s).
- At this point, the rounds should be viewable and you can begin to make final range adjustments if needed.

Lateral Adjustments

To help provide accurate lateral adjustments, let the gun know they are X-number of meters left or right of the target. If the gun is using the Lateral Adjustment Tables (LAT) for the 81MM mortar or 105MM howitzer, your input will quickly allow the gun to put rounds on the target. If the gun is unaware of the tables, you can provide the necessary information.

Here's how:

Ask for the range to target; hopefully, you have already registered the gun and know the elevation of the target. If not, repeat the "Registering the Gun" process. Once that is complete, get the range of the target from the gun.

You should see the gun rounds in the target area so adjustments need to be made to the left or right . . .

EXAMPLE

- Take the gun range and find the corresponding range on the left-hand margin of the LAT.
- The verified range is **8900M** and is closest to the 9000M bracket..
- You observe the rounds require an adjustment of approximately **100M** to the left.
- The table below shows the gun must orient **11 MILS** (ideally **12 MILS**, see NOTE below) to the left.
- NOTE: It is recommended to round UP to an even number as this helps when battery fire is used.

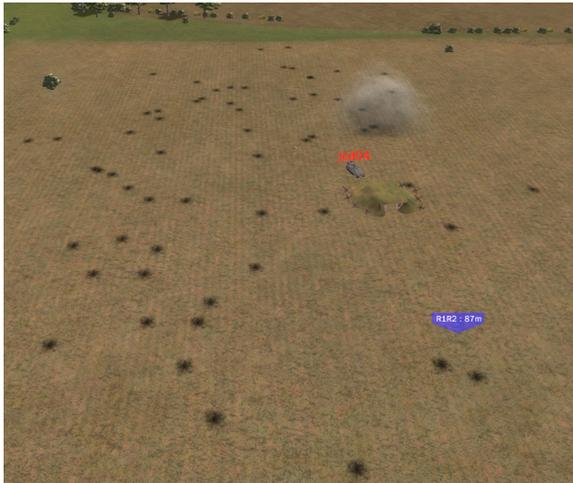
HORIZONTAL PLANE - LEFT & RIGHT

RANGE (M)	5	10	25	50	100	250	500	
7000	1	1	4	7	14	36	71	MILS
7250	1	1	3	7	14	34	69	MILS
7500	1	1	3	7	13	33	67	MILS
7750	1	1	3	6	13	32	64	MILS
8000	1	1	3	6	12	31	62	MILS
8250	1	1	3	6	12	30	61	MILS
8500	1	1	3	6	12	29	59	MILS
8750	1	1	3	6	11	29	57	MILS
9000	1	1	3	6	11	28	56	MILS

Massed Batteries

The entire premise behind massing your guns is to fire your rounds into a target “box” and fill it with many rounds as quickly as possible. If you have registered your primary gun in regards to the elevation, everything else should fall into place. You need to be diligent in your range and lateral adjustments which is further benefitted by a dedicated or knowledgeable Forward Observer to quickly orient the guns onto the next target.

The below images were produced by only TWO 105s on a short fire mission of several minutes. Mass your guns and FILL THE BOX!



Preparing the Battery for Success

It is recommended that batteries have a space of 25 meters between each gun as this helps with round dispersion within the target “box”, resupply, towing, and IVC (in-game communication) due to the limits of proximity-based voice communication. At 20+ meters you will begin to hear a slight drop-off in IVC proximity chat. You can use contact reports to quickly determine when you are 25 meters away from an adjacent gun.

Let us assume that the difference between each gun is 25 meters with the designated REGISTRY GUN in red.

SAMPLE PROBLEM - Battery Configuration A / Battery Configuration B:

- Target range: 8900M (vertical interval has solved, see page 19 - Lateral Adjustment Table insert)
- Gun Azimuth (**Registry Gun, second from left**): 6400 MILS to Target
- Battery frontage: 100M wide (25M separation x 4 guns with NO lateral adjustments)
- Lateral MILS Adjustment: 12 (cross-reference range of 9000M to the 100M column. Rounding up from 11 to 12 MILS makes for easy math when providing target info.)
- Target type: open terrain and not a fixed point so forming a “kill box” is the best strategy for the battery

SAMPLE SOLUTION - Battery Configuration A:

The 12 MILS lateral adjustment are shared across the battery to ensure accurate rounds into the “kill box”.

From left to right and firing laterally at VARYING MILS:

- Gun 1 will fire 6394 to 6396 MILS (3 MILS)
- **Gun 2** 6397 to 6399 MILS (3 MILS)
- Gun 3 6400 to 0002 MILS (3 MILS)
- Gun 4 0003 to 0005 MILS (3 MILS)

The battery will fire individually at VARYING ranges between 8850M to 9050M

This will produce a “kill box” of 100M in WIDTH and 100M in DEPTH

Battery Configuration A



OR

SAMPLE SOLUTION - Battery Configuration B:

The 12 MILS lateral adjustment are shared across the battery to ensure accurate rounds into the “kill box”.

From left to right and firing laterally at VARYING MILS:

First Row

- Gun 1 will fire 6394 to 6397 MILS (4 MILS)
- Gun 2 6398 to 0001 MILS (4 MILS)
- Gun 3 0002 to 0005 MILS (4 MILS)

Second Row

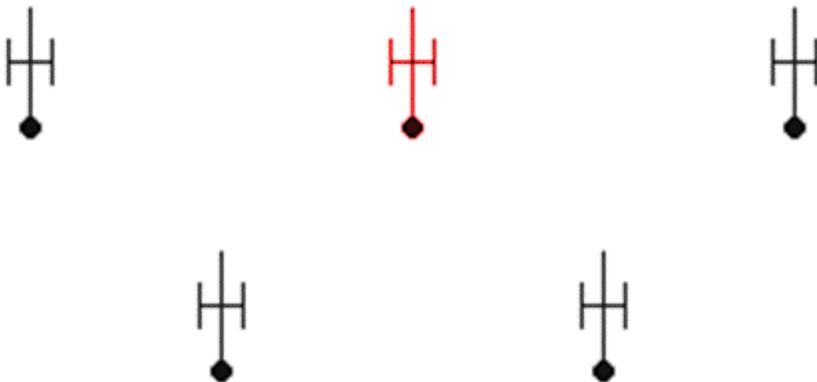
- Gun 4 6396 to 6399 MILS (split MILS difference of Gun 1 & Gun 2 ($6398-6394=4 / 2 = 6396$ MILS as starting point))
- Gun 5 0000 to 0003 MILS (split MILS difference of Gun 2 & Gun 3 ($0002-6398=4 / 2 = 0000$ MILS as starting point))

The battery will fire individually at VARYING ranges between 8850M to 9050M

- First Row firing at 9000M to 9050M
- Second Row firing at 8850M to 9000M

This will produce a “kill box” of 100M in WIDTH and 100m in DEPTH

Battery Configuration B (25M separation between each gun and between each row)



Single-Point Concentration of Fire

This could be a depot, an army base, etc where all guns are firing on a fixed target for a small “kill box”. The dispersion from each round will allow for some coverage but this is an effective method to quickly bring a large number of shells on a single point.

SAMPLE PROBLEM - Battery Configuration A / Battery Configuration B:

- Target range: 8900M (vertical interval has solved, see page 19 - Lateral Adjustment Table insert)
- Gun Azimuth (**Registry Gun, second from left**): 6400 MILS
- Battery frontage: Not applicable in this scenario
- Lateral MILS Adjustment: Not applicable in this scenario
- Target type: single point (depot, army base)

SAMPLE SOLUTION - Battery Configuration A / Battery Configuration B:

ALL guns fire at 6400 MILS at the range of 8900M. In Battery Configuration B Second Row will ADD 25M (6425 MILS)

TEAMWORK PERSONIFIED (CHECKLIST FOR SUCCESS)

This is one way for the Forward Observer (FO) and the artillery piece to work together:

Step 1	FO	ID and locate TGT, place contact report
Step 2	Arty	Read TGT Azimuth, Range, Gun Angle from Gun HUD (elevation between 2 points matters!)
Step 3	FO	Observe fire, place new contact marks of viewed fire (if needed)
Step 4	Arty	Adjust/Orient from NEW FO mark and fires (or coordinate fire with other guns)
Step 5	FO	Observe fire, place new contact marks of viewed fire (if needed)
Step 6	Arty	Adjust/Orient from NEW FO mark and fires (or coordinate fire with other guns)
Optional	FO	Repeat if needed, place new contact marks of viewed fire
Optional	Arty	Repeat if needed, Adjust/Orient and fire (or coordinate fire with other guns)

LATERAL ADJUSTMENT TABLE (METERS TO MILS)

81MM MORTARS

HORIZONTAL PLANE - LEFT & RIGHT

RANGE (M)	5	10	25	50	100	250	500	
250	20	40	100	200	400	1000	1999	MILS
500	10	20	50	100	200	500	1000	MILS
750	7	13	33	67	133	333	666	MILS
1000	5	10	25	50	100	250	500	MILS
1250	4	8	20	40	80	200	400	MILS
1500	3	7	17	33	67	167	333	MILS
1750	3	6	14	29	57	143	286	MILS
2000	2	5	12	25	50	125	250	MILS
2250	2	4	11	22	44	111	222	MILS
2500	2	4	10	20	40	100	200	MILS
2750	2	4	9	18	36	91	182	MILS
3000	2	3	8	17	33	83	167	MILS

LATERAL ADJUSTMENT TABLE (METERS TO MILS)

105MM HOWITZER

HORIZONTAL PLANE - LEFT & RIGHT

RANGE (M)	5	10	25	50	100	250	500	
250	20	40	100	200	400	1000	1999	MILS
500	10	20	50	100	200	500	1000	MILS
750	7	13	33	67	133	333	666	MILS
1000	5	10	25	50	100	250	500	MILS
1250	4	8	20	40	80	200	400	MILS
1500	3	7	17	33	67	167	333	MILS
1750	3	6	14	29	57	143	286	MILS
2000	2	5	12	25	50	125	250	MILS
2250	2	4	11	22	44	111	222	MILS
2500	2	4	10	20	40	100	200	MILS
2750	2	4	9	18	36	91	182	MILS
3000	2	3	8	17	33	83	167	MILS
3250	2	3	8	15	31	77	154	MILS
3500	1	3	7	14	29	71	143	MILS
3750	1	3	7	13	27	67	133	MILS
4000	1	2	6	12	25	62	125	MILS
4250	1	2	6	12	24	59	118	MILS
4500	1	2	6	11	22	56	111	MILS
4750	1	2	5	11	21	53	105	MILS
5000	1	2	5	10	20	50	100	MILS
5250	1	2	5	10	19	48	95	MILS
5500	1	2	5	9	18	45	91	MILS
5750	1	2	4	9	17	43	87	MILS
6000	1	2	4	8	17	42	83	MILS
6250	1	2	4	8	16	40	80	MILS
6500	1	2	4	8	15	38	77	MILS
6750	1	1	4	7	15	37	74	MILS

Table continues on next page

HORIZONTAL PLANE - LEFT & RIGHT

RANGE (M)	5	10	25	50	100	250	500	
7000	1	1	4	7	14	36	71	MILS
7250	1	1	3	7	14	34	69	MILS
7500	1	1	3	7	13	33	67	MILS
7750	1	1	3	6	13	32	64	MILS
8000	1	1	3	6	12	31	62	MILS
8250	1	1	3	6	12	30	61	MILS
8500	1	1	3	6	12	29	59	MILS
8750	1	1	3	6	11	29	57	MILS
9000	1	1	3	6	11	28	56	MILS
9250	1	1	3	5	11	27	54	MILS
9500	1	1	3	5	11	26	53	MILS
9750	1	1	3	5	10	26	51	MILS
10000	0	1	2	5	10	25	50	MILS
10250	0	1	2	5	10	24	49	MILS
10500	0	1	2	5	10	24	48	MILS
10750	0	1	2	5	9	23	46	MILS
11000	0	1	2	5	9	23	45	MILS
11250	0	1	2	4	9	22	44	MILS
11500	0	1	2	4	9	22	43	MILS
11750	0	1	2	4	9	21	43	MILS
12000	0	1	2	4	8	21	42	MILS
12250	0	1	2	4	8	20	41	MILS
12500	0	1	2	4	8	20	40	MILS
12750	0	1	2	4	8	20	39	MILS
13000	0	1	2	4	8	19	38	MILS

****NOTE****

Mils corrections of >3200 mils, re-orient gun, range, and fire.

Platform	Max Range (M)
M2A1 105mm	11,275
leFH 18/40	12,325

TOWN ELEVATION GUIDE

 [WWIOL Elevation Guide v1.36.19 \(12.04.22\).pdf](#)