

Techniques for Mortar Ammunition Planning

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Battalion mortar platoons and company mortar sections provide the most responsive fire assets for maneuver formations at the battalion level and below. Force design updates align direct support field artillery battalions to divisions under division artillery (DIVARTY). This allows division commanders to weigh their main efforts and shape their deep areas, potentially leaving brigades without responsive fire support if they are a low supporting effort. Large-scale combat operations (LSCO) require adequate fire support for the forces committed and immediately available fires for maneuver commanders to influence operations. This article provides recommendations for three challenges in ammunition planning within mortar platoons and sections to assist battalion and company fire support planning.

First, haul capacities must be understood at each echelon for dismounted, motorized, or mechanized operations. Understanding how many rounds a unit can carry will facilitate the prioritization of what rounds to carry. Secondly, doctrine precludes a detailed discussion of ammunition effects to derive appropriate unit basic loads (UBLs) to support the ground scheme of maneuver. Lastly, recommendations to build cohesion within maneuver battalions, regarding mortar ammunition planning, begin with creating a shared understanding of logistical capabilities and adequate doctrinal comprehension for the tactical employment of mortars. Integrating mortars into the fight, regardless of the echelon or unit type, starts with logistics.

Haul Capacity

Haul capacity can be defined as the weight or bulk of the cargo that a vehicle, aircraft, or transporter can safely carry. In this article, haul capacity refers to the number of mortar rounds a Soldier, vehicle, or formation can carry. Depending on the formation type, the haul capacity varies by the mode of transport. This section focuses on three aspects of haul capacity: the method of transport and haul capacity for battalion mortars, the method of transport and haul capacity for company mortars, and the involvement of the forward support company (FSC) with mortar ammunition planning. Understanding the haul capacity for mortars will shape the development of what specific rounds should be brought into combat.

Mortar platoons are organic to infantry and combined arms battalions (CABs). Mortar platoons within CABs employ four mortar vehicles within their headquarters and headquarters companies (HHCs). The haul capacity for each vehicle is 69 rounds of 120mm ammunition.¹ The total haul capacity for the entire platoon is then 276 mortar rounds. Stryker brigade combat team (SBCT) mortar platoons use four vehicles per HHC. Each vehicle hauls 60 rounds and the platoon can move 240 in total.² Infantry brigade combat team (IBCT) battalion HHCs use High Mobility Multipurpose Wheeled Vehicle (HMMWVs) with a corresponding trailer that can hold three ammunition racks with the associated mortar stowage kit. Each ammunition rack holds eight rounds, each vehicle

Rounds for the M121 120mm mortar system are prepared for a live-fire exercise in Bemowo Piskie, Poland, on 8 December 2022. (Photo by SGT Gavin K. Ching)



can haul 24 rounds, and the entire platoon can move 96 rounds.³ Each vehicle has a slightly different limitation when it comes to hauling ammunition. Additionally, depending on terrain restrictions, SBCTs and IBCTs can move their mortars dismounted. SBCTs can move medium mortars dismounted, and IBCTs can use medium or heavy mortars. This ability to shift to different mortar types is known as the arms room technique. SBCT and IBCT mortar platoons possess four medium and four heavy mortars but only have the requisite manpower to use four mortars at a time. Moving dismounted potentially lessens the haul capacity as individual mortar-men or riflemen will be hauling the ammunition.

Moving dismounted is exactly how company mortar-men haul light mortar ammunition. The six mortar-men within the section usually divide the ammunition amongst themselves. Each light mortar round weighs approximately 3.75 pounds, but it takes up 15x13x20 inches.⁴ My personal experience is that roughly 20 rounds can be shared amongst the section. However, companies have the ability to utilize some of the riflemen to haul mortar rounds. In some cases, this can increase the lethality of the company mortar section fourfold.

“The planning factor for unit basic loads for a battalion is one with the company, one with the FSC, and one stored at the brigade’s ammunition transfer and holding point. The [BN] S-4 will account for the basic loads, and the FSC and battalion should be able to transport all combat configured loads with organic assets.”⁵ Simply put, mortar haul capacity does not stop at the maneuver unit. FSCs and brigade support battalions (BSB) are responsible for holding two-thirds of the mortar ammunition during operations. Battalion and company fire support officers (FSOs), S-4s, the distribution platoon leader and platoon sergeant, HHC command team, and mortar leadership (platoon leader, platoon sergeant, and section leader) must come together to plan this breakdown. FSOs work in concert with the staff and commander to determine the desired effects that will help drive the apportionment of different mortar rounds.

Mortar Effects, Ammunition Types, and Apportionment

Army Techniques Publication (ATP) 3-21.90, *Tactical Employment of Mortars*, states that “combat experiences in World War II and Korea have shown that an onboard mix of 70-percent HE [high explosive], 20-percent white phosphorus, and 10-percent illumination ammunition is the most flexible.”⁶ These numbers provide commanders with options but are not mission-tailored. FSOs, at echelon, help develop fire support tasks (FSTs) to support the ground scheme of maneuver. The task portion of the FST is broken down into three separate parts: objective, formation, and function. The objective describes the targeting effect, and the formation is a specified element of the enemy.

The function is the enemy formation’s capability that should be stopped or allowed to happen.⁷ An example would be: FST1 - Neutralization of the enemy support-by-fire position to prohibit their ability to place direct fire on the breaching operation.

Many different effects can be achieved through mortars; however, the definitions of these effects mean different things to different organizations. Table 1 provides a detailed list of effects and their corresponding definitions from Field Manual 3-60, *Army Targeting*. Neutralization in the fire support community is defined as “in the context of the computed effects of field artillery fires renders a target ineffective for a short period of time, producing 10-percent casualties or materiel damage.”⁸ The tactical mission task of neutralizing means rendering “the enemy incapable of interfering with an operation.”⁹ The similarity between the two exists in the temporal cessation of hostile actions. However, for indirect fires, a certain number of men or materials must be damaged. Ten percent assists in tying the neutralization effect to a weaponizing solution. Computer programs, such as the Joint Munitions Effectiveness Manuals (JMEMs) or Joint Weaponizing Software (JWS), simulate the required number of rounds to deliver a neutralization effect. This software considers the shell/fuze combination, range, terrain, weather considerations, and enemy formation type.

Table 1 — Desired Effects (FM 3-60, Table C-1)

Task	Effect/Outcome
Attrit	To wear down or weaken (an opponent or enemy).
Compel	1) To force, drive, or constrain. 2) To make necessary.
Convince	1) To overcome by argument. 2) To bring to belief, consent, or a course of action (COA).
Damage	To reduce the soundness, effectiveness, or perfection of.
Deceive	To cause to believe what is not true.
Defeat	To render a force incapable of achieving its objectives.
Degrade	1) Damage done to the function is permanent, but only portions of the function were affected; that is, the function still operates, but not fully. 2) A function’s operation is permanently impaired, but the damage does not extend to all facets of the function’s operation.
Deny	1) To hinder the enemy the use of space, personnel, or facilities. It may include destruction, removal, contamination, or erection of obstructions. 2) Damage done to the function is only temporary, but all aspects of the function were affected. 3) A function’s operation is impaired over the short term, but the damage extends to all facets of the function’s operation.
Delay	1) To slow down the arrival of a unit on the “battlefield.” 2) An operation in which a force under pressure trades space for time by slowing down the enemy’s momentum and inflicting maximum damage on the enemy without, in principle, becoming decisively engaged.
Destroy	1) To damage the condition of the target so that it cannot function as intended nor be restored to a usable condition. 2) Damage done to the function is permanent, and all aspects of the function have been affected. 3) A function’s operation is permanently impaired, and the damage extends to all facets of the function’s operation.

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Table 1 — Desired Effects Cont'd

Task	Effect/Outcome
Diminish	1) To make less or cause to appear less. 2) To reduce the effectiveness of an activity. This is similar to degrade without the kinetic overtones.
Disrupt	1) To break apart, disturb, or interrupt a function. 2) Damage done to the function is temporary, and only portions of the function were affected. 3) A function's operation is impaired over the short term and the damage does not extend to all facets of the function's operation.
Divert	To restrict the enemy's capabilities to pursue a particular COA.
Enhance	To increase or make greater the capabilities of a force or a people.
Exploit	To gather information that will enable opposition ability to conduct operations to induce other effects.
Expose	1) To make known or cause to be visible to public view. 2) To make visible, to reveal something undesirable or injurious.
Harass	To disturb the rest of enemy troops, curtail their movement and lower morale by threat of loss.
Influence	1) To affect or change how someone or something develops. 2) To cause a change in the character, thought, or action of a particular entity.
Inform	To impart information or knowledge.
Manipulate	1) To influence or control someone to your advantage, often without that person knowing it. 2) Control or change information, information systems, and/or networks in gray or red cyberspace to create physical denial effects, using deception, decoying, conditioning, spoofing, falsification, and other similar techniques.
Negate/Neutralize	1) To render an enemy weapon system and maneuver units ineffective or unusable for a specific period of time. 2) To render ineffective, invalid, or unable to perform a particular task or function. 3) To counteract the activity or effect of.
Prevent	1) To deprive of hope or power of acting or succeeding. 2) To keep from happening, to avert.
Protect/Safeguard	1) To cover or shield from exposure, damage, or destruction. 2) To keep from harm, attack, injury, or exploitation. 3) To maintain the status or integrity of.
Suppress(ion)	1) Involves temporary or transient degradation of an actual or suspected enemy weapons system for the purpose of degrading its performance below the level needed to fulfill its mission objectives at a specific time for a specified duration. 2) Temporary or transient degradation by an opposing force of the performance of a weapons system below the level needed to fulfill its mission objectives.

ATP 3-21.90 provides a general guide that outlines how mortar ammunition can neutralize platoon-sized targets.¹⁰ However, this is not all-inclusive. Fire supporters possess the ability to calculate how many rounds, and with what fuze combinations, are required to destroy, neutralize, or suppress. This information can be calculated on software within the battalion fire support element's (FSE's) Advanced Field Artillery Tactical Database System (AFATDS). A radio call during step three of troop leading procedures (TLPs) or the creation of FSTs during course-of-action development will help determine the amount of HE required to destroy, neutralize, or suppress a certain type of enemy formation.

Importantly, not all HE rounds are fuzed the same way, provide the same effects, or range as far. ATP 3-21.90 highlights that leaders must be aware of what combinations of fuzes and ammunition will have the greatest effect on targets. Proximity, delay, and point-detonating fuzes all provide different effects in varying types of terrain, weather conditions, and against different enemy types. For example, an M934 heavy mortar HE round comes with an M734 multioption fuze. This fuze can provide proximity, delay, or point-detonating functions. If an M57 heavy mortar HE round with an M935 point-detonating fuze is on hand, it can be employed with that fuze setting. TC 3-22.90, Appendix A, covers in detail the different types of mortar rounds and the fuzes that come with them.

ATP 3-09.30, *Observed Fires*, provides a brief synopsis of mortar smoke planning data in Chapter 6 (see Table 2). When planning smoke missions for mortars, it is important to remember that all are white or red phosphorous, as opposed to some artillery that can deliver hexachloroethane smoke and white phosphorous (WP) rounds. From the data provided, in ideal weather conditions, one heavy mortar platoon can provide a 400-meter, 10-minute smoke screen with just 20 rounds. However, the weather is not always ideal. Several weather-specific factors contribute to planning quick smoke missions: temperature, wind speed, wind direction, humidity, cloud cover, time of day, and precipitation. Additionally, factors like terrain, threat disposition, and maneuver-target line need to be taken into consideration. All these considerations are calculated with the data from Table 2 and can be

Table 2 — Smoke Planning Data (ATP 3-09.30, Table 6-14)

Delivery System	Type Round	Time to Build Effective Smoke (minutes)	Average Burning Time (minutes)	Average Obscuration Length (meters) Per Round	
				Wind Direction	
				Cross	Head or Tail
155-mm	WP	1/2	1 to 1 1/2	150	50
	HC	1 to 1 1/2	4	350	75
	M825	1/2	5 to 10	350	100 to 200
105-mm	WP	1/2	1 to 1 1/2	75	50
	HC	1 to 1 1/2	3	250	50
120-mm	WP	1/2	2 1/2	100	60
81-mm	WP	1/2	1	100	40
	RP	1/2	2 1/2	100	40
60-mm	WP	1/2	1	75	40

Note. All rounds are fired as standard missions with parallel sheafs under favorable conditions.
Legend: HC—hexachloroethane mm—millimeter RP—red phosphorous WP—white phosphorous

computed digitally in a mortar fire control system (MFCS), lightweight handheld mortar ballistic computer (LHMBC), or manually. Providing current meteorological data from a field artillery battalion's Profiler computer to mortar digital systems (MFCS or LHMBC) will ensure that the appropriate amount of WP rounds are used to achieve the desired effects. Conducting ammunition forecasting for quick smoke missions with TLPs and the military decision-making process (MDMP) will ensure mortar formations can provide the desired effects.

The type of operation will determine the apportionment of mortar ammunition. Units that are conducting breaches, wet gap crossings, or any other operation that requires a significant amount of WP should consider carrying a larger amount of WP ammunition within their UBL than the 20-percent guideline. Holistically, mortar operations should be planned in conjunction with TLPs and MDMP to determine how many rounds are required to achieve the desired effects. Unit basic loads should be built in conjunction with FSOs to ensure the appropriate rounds are present on the mortar line, FSC, and BSB. To fully understand the proper apportionment of HE, illumination, and WP rounds a mortar section or platoon should haul, an analysis must occur first. What effect is to be achieved, against what enemy formation, and in what operating environment?

A Way Forward

This article recommends two ways to improve mortar ammunition planning. First, logistical planning for mortar employment must be a team effort. This team should consist of FSOs, mortar leaders, HHC command teams, battalion S-4s, and elements from the FSC. All three portions of mortar haul capacities must be understood. This is critical at the battalion and brigade levels to ensure that the FSC and BSB maintain the secondary and tertiary mortar ammunition required to sustain the fight. Continued dialogue must

occur between FSOs, HHCs, and FSCs during operations to ensure the ammunition that should be brought forward from logistical nodes. Secondly, we must understand each other's doctrine. TCs 3-20.33, 3-22.90, and 3-22.91; the Mortar Tabular Firing Tables; and ATPs 3-21.20 and 3-21.90 all provide imperative information for the employment of mortars at any echelon. ATPs 3-09.30 and 3-09.42 provide the knowledge of integrating fire supporters to the brigade and below. This list is not exhaustive, but it provides a baseline for anyone who wants to incorporate mortars into the fight.

Notes

- ¹ Training Circular 3-22.90, *Mortars*, March 2017, 5-41.
- ² *Ibid.*, 5-53.
- ³ *Ibid.*, 5-15.
- ⁴ Army Techniques Publication (ATP) 3-21.90 *Tactical Employment of Mortars*, October 2019, 6-7.
- ⁵ ATP 3-21.20, *The Infantry Battalion*, December 2017, H-13.
- ⁶ ATP 3-21.90, 6-6.
- ⁷ Field Manual (FM) 3-09, *Fire Support and Field Artillery Operations*, April 2020, A-3.
- ⁸ FM 1-02.1, *Operational Terms*, February 2024, 53.
- ⁹ *Ibid.*
- ¹⁰ ATP 3-21.90, Table A-1.

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Soldiers in 2nd Battalion, 69th Armor Regiment, 3rd Infantry Division, fire a 120mm mortar system on Fort Stewart, GA, on 6 October 2021. (Photo by SGT Trenton Lowery)

System	Mode	HE	WP/ RP	Illum	Effects	Remarks
Heavy Mortar (IBCT infantry battalion)	Towed	46	48	2	Neutralization of x3 ENY PLT dug in; Neutralization of x1 ENY INF PLT i/o; x1 Immediate Suppression Mission; x3 300m 10min SMK screen; x1 Lateral or Range Spread Illumination Mission	Heavy smoke consideration in open terrain
Heavy Mortar (IBCT infantry battalion)	Towed	68	22	4	Neutralization of x2 ENY PLT dug in; Neutralization of 1 ENY INF PLT i/o; x2 Immediate Suppression Mission; x1 300m 10min SMK screen; x2 Lateral or Range Spread Illumination Missions	Doctrinally recommended 70% HE, 20% WP, and 10% Illum breakdown in forest/jungle terrain
Light Mortar (IBCT company)	Section	14	6	0	x1 100m 3min SMK screen; 6 min of HE Suppression or x3 Immediate Suppression TGTs	Mortar section carrying ammunition only in open terrain
Light Mortar (IBCT company)	Section + Company	70	6	4	x1 100m 3min SMK screen; Neutralization of x1 ENY PLT dug in; 5 min of HE Suppression; x2 Lateral or Range Spread Illumination Missions	Mortar section w/ infantry company carrying ammunition in open terrain
<p>Note: Ammunition considerations here are given with standard meteorological conditions and from doctrinal adjudication templates. It is highly recommended to use MFCS, LHMBs, AFATDS, and JWS to forecast the necessary ammunition allocation to achieve desired effects.</p>						

Table 3 — Example Heavy and Light Mortar Ammunition Configurations

