

MODERN PROBLEMS REQUIRE MODERN MORTARS

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The Army's new mobile brigade combat team (MBCT) design embodies the imperative of transforming while in contact. Smaller, faster, and leaner than the legacy infantry brigade combat team (IBCT), the MBCT prioritizes dispersion, depth, speed, and layered lethality as the primary light formation for ground maneuver. A host of unmanned aerial systems — some currently fielding, some still in development — afford the MBCT an unprecedented degree of precision lethality and situational awareness at ranges previously accessible only to a division or higher. The capability that needs to catch up is mass, specifically the agile and responsive mass fires provided by organic mortar systems.

It would be inaccurate to say that evolutionary work is not being done to advance mortar capability. The Enhanced 81mm Mortar (E81) along with the Infantry Battalion Mortar System (IBMS) are quickly winding their way through the acquisitions process and offer an increase in mortar lethality not seen since the introduction of the M120 mortar system in 1991. Perhaps more evolutionary than qualitative lethality, these capabilities offer to fundamentally alter how mortars can be employed. The purpose of this article is to spark discussion on what those changes could look like to influence future iterations of transformation-in-contact (TiC) experimentation.

A parallel to the question of how to organize and employ modern mortars traces back to another crew-served weapon: the machine gun. During World War I, American divisions of the expeditionary force organized machine guns into unique machine-gun battalions, with one aligned to each two organic infantry brigades and a third retained as a divisional asset. Each machine-gun battalion consisted of four machine-gun companies of three platoons each, and each platoon possessed four machine guns. Machine-gun companies would typically attach to infantry battalions to support offensive

or defensive maneuver through massed suppressive direct or indirect fire. The Second World War with combatants' advances in mobility saw a return to maneuver warfare and the diffusion of machine guns of various types down to the battalion, company, platoon, and even squad levels. The infantry battalion would typically be equipped with two machine-gun platoons within a heavy weapons company, while rifle companies fielded two light machine-gun squads within a weapons platoon. Rifle squads themselves each fielded a Browning Automatic Rifle. The diffusion of machine guns from dedicated battalions in 1918 down to company, platoon, and even squad levels less than 30 years later reflected the value of their suppressive capability to small unit maneuver. All it took was a few small advances in technology adjacent a logical refinement in small unit tactical doctrine. This is the space our Army finds itself in presently with mortars: The technological advancements are here, but how should we evolve employment doctrine to best support small unit tactical action within ground maneuver?

Like the ubiquitous machine gun, mortar systems have been a staple for maneuver formations since they became small enough to be carried by Soldiers and light vehicles.



A mortar stowage kit system with 120mm mortar affixed is placed in a ISV-Utility instead of a trailer during a recent Joint Pacific Multinational Readiness Center rotation. (Photo by LTC John Leisinger)

Unlike the sheer destructive mass of field artillery, which can sometimes hinder small unit tempo due to ponderous coordination measures and lengthy emplacement times, mortar systems organic to the battalion and company offer responsive and dynamic fires, trading destructive volume for speed and agility of employment. Army Techniques Publication (ATP) 3-21.90, *Tactical Employment of Mortars*, succinctly states that “[mortars] provide commanders with organizationally responsive lethal indirect fire that all maneuver units in close combat need to defeat an enemy.” Doctrinally, mortars serve to destroy, neutralize, suppress, and isolate enemy forces; support direct fire engagements of enemy armor by reducing armored vehicles’ situational awareness and mobility; enable ground maneuver by providing freedom of movement; and cover friendly obstacles with indirect fire. Like the machine gun, the doctrinal purpose of mortars won’t necessarily change, but with technological advances, perhaps it’s time to relook the volume, type, and organization of mortars to do for tomorrow’s maneuver formations what the distribution of machine guns did for battalions, companies, and platoons 80 years ago.

Army Transformation

Looking to the near future in light of the new Army Warfighting Concept and the potential evolution of ground maneuver, light infantry formations will require organic means to leverage massed indirect fires more than ever. The MBCT gained unparalleled mobility through the introduction of the family of Infantry Squad Vehicles (ISVs) but lost organic control of tube artillery. Evolving employment concepts will possibly see MBCTs responsible for an area of operations akin to what a division previously would own, with up to 40 kilometers in depth from the MBCT’s forward line of troops to the coordinated fire line marking the start of the division’s deep area. While the MBCT certainly now has the mobility to control such an area, maneuver without fires is suicide, to quote the conventional wisdom. Indirect fires assets now held at the division-artillery level are not guaranteed to be in direct support of any given MBCT, especially if they find themselves as a supporting effort; the MBCT requires its own massed fires capability to realize its part in future ground maneuver.

Observations from recent TiC rotations at combat training centers (CTCs) reveal a hard truth: The current types and organization of mortar systems within the MBCT’s battalions and companies are insufficient. Infantry battalions are currently equipped with four 120mm M120 heavy mortars within the mortar platoon, which also maintains four M252 81mm medium mortars for use in situations unsuitable to the heavier M120. M120 mortars transported on mortar stowage kits (MSKs) either towed by ISVs or mounted directly in the back of ISV-Utility variants are too slow to emplace and displace, averaging several minutes for each action. Minutes to emplace means fires are not always responsive enough for a platoon requiring immediate suppression. Minutes to displace frequently results in neutralization by rapid enemy counterbattery fire, a risk geometrically increased by the

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growing presence of enemy intelligence, surveillance, and reconnaissance (ISR) and strike unmanned aircraft systems (UAS). Static mortar firing points established in support of deliberate operations fare little better, as their unique visual signature is quickly acquired by threat UAS.

The M252 81mm mortar is quicker to emplace and displace than the MSK-mounted M120, but at the cost of lethality. Current M120 mortars can range out to 7,000 meters with a high explosive (HE) mortar round delivering a 65-70 meter blast radius. Current M252 mortars on the other hand have a maximum range of 5,790 meters, producing only a 38-meter blast radius. Quicker still is the M224 60mm mortar, two of which are organized within a rifle company’s organic mortar section, ranging out to 3,490 meters and producing a 28-meter blast radius. Rifle company mortar sections, now equipped with an ISV, are certainly agile enough to support platoons in the close fight, and likely not high enough to the enemy’s high payoff target list to immediately warrant counterbattery fire, but at the tradeoff of limited range and destructive ability. Two 60mm mortars supporting three platoons maneuvering in an area that will likely eclipse the M224’s maximum range cannot guarantee the mass required for a platoon to fix, suppress, or neutralize a defending or attacking enemy force. Our adversaries face the same calculus; the People’s Liberation Army opts instead to issue six 60mm mortars to each light rifle company, with ranges exceeding those of our comparable M224. While a company-to-company comparison in a vacuum would be naïve, the relative comparison is clear.

One final disadvantage to our current mortar paradigm is magazine depth. While mortar rounds are relatively inexpensive and simple to produce (barring the more intricate precision-guided varieties), MBCTs remain light formations, and even with the introduction of the ISV, space remains limited to store bulky mortar rounds of any caliber. The MSK for example holds a mere 34 stowed rounds, enough for approximately four suppression missions, assuming the mortar squad eschewed all other round types for HE. Support vehicles to carry extra stowed rounds exist or are improvised, but this does no favors for the mortar element’s visual signature or emplacement and displacement times, which have already been identified as critical vulnerabilities in large-scale combat. Shifting briefly to a logistics perspective, three different calibers of mortar require three different supply chains of ammunition, each with their own varieties of HE, precision-guided rounds, smoke, and illumination. This arrangement seems to run counter to

the mentality of the MBCT, which was designed to make light infantry formations leaner and faster.

Enter the E81 and the IBMS. The Enhanced 81mm Mortar System is an evolution of the existing M252. The keys to the system's evolutionary nature are its design and ammunition, enabling the E81 to outrange the current M120. The developmental 81mm mortar rounds themselves demonstrate a larger blast radius than existing 120mm mortar rounds, indicating a holistic increase in lethality. What happens inside that blast radius is even more impressive; unlike the torn steel blast pattern produced by current mortar rounds wherein explosive force rends the steel shell to send twisted metal fragments in unpredictable lethality patterns, the E81's HE round employs a system to create a uniform and predictable lethality pattern. The mathematical comparison is clear: The experimental E81 outperforms all other current mortar systems in the U.S. arsenal.

The Infantry Battalion Mortar System is the capability that truly allows the E81 to surpass our current mortar systems. The IBMS is essentially an articulated armature with a non-settling baseplate securing the E81 to a vehicle, in the case of the MBCT that vehicle would be the ISV-Utility. The system is modular and includes stowage for 70 81mm mortar rounds (compared to the current M120 MSK's 34 stowed rounds). The articulated armature enables the mortar squad to leverage Lightweight Handheld Mortar Ballistic Computer (LHMBC) software on their organic devices, namely Android Team Awareness Kit (ATAK), to receive a fire mission, direct the E81 cannon to mechanically lay on the target, and then manually hang and fire the rounds. The use of a non-settling baseplate allows the IBMS to fire from terrain not suitable to current settling baseplate systems, such as uneven rocky ground, sodden areas, or pavement. The speed at which this can occur is the IBMS's key advantage; within seconds from receipt of a fire mission, a mortar squad equipped with the IBMS can emplace the system and fire the first round. Recall that the MSK-mounted M120 takes minutes for a trained mortar squad to accomplish the same. Adjustments to subsequent rounds are also much faster due to the mechanical nature of the IBMS's articulated cannon-aiming armature. From a survivability perspective, the IBMS can displace and be on the move within seconds of firing the last round. In the event the host vehicle becomes incapacitated or is unsuitable for a given mission, the E81 can be dismounted to fire from a traditional bipod, sacrificing rapid emplacement and displacement times for dismounted mobility but retaining its advantages in lethality.

The superiority of the developmental E81 and IBMS over current MSK-mounted M120 and dismounted M252 mortar systems in terms of lethality, survivability, and mobility seems undeniable. But this conclusion is not the purpose of this article. The E81 and IBMS are just a single capability, that if proven through continued TiC experimentation may come to replace all or some of our existing heavy and medium mortars. The discussion the Army needs to have instead is, if this or some related capability comes to fruition, will it simply

replace existing systems in their existing configurations? Or should we begin to relook the organization and basis of issue for mortar systems at battalion and even company levels to best optimize formational lethality, much like the evolution of machine guns resulted in their dispersion from unique battalions to ubiquitous systems down to the rifle squad level?

If the E81 and IBMS is adopted as a program of record, regardless of how it is distributed, the doctrinal role of mortars should not change. While it is true that advances in precision and near-precision weapon systems such as loitering munitions, Purpose Built Attritable Systems (PBAS), and long-range precision strike missiles are introducing a level of precision strike at the lower tactical level previously reserved for divisional or joint assets, these capabilities are unlikely to ever provide a commander one thing: mass. With the removal of tube artillery to the division level, brigade, battalion and company commanders have only their mortars to rely on to provide timely, agile massed fires to enable maneuver in a dynamic tactical environment. A strike missile may destroy the enemy command tank, but a brigade's magazine depth of these missiles will not enable the destruction of the enemy's entire armored company. A PBAS may vector into an enemy trench, destroying a machine gun preventing a friendly squad from maneuvering, but a Soldier can only operate one at a time. A loitering munition may destroy an enemy engineer asset maneuvering to reduce a friendly obstacle, but it is vulnerable to enemy electronic attack. A brigade's mortars possess significant magazine depth, even more so if the larger 120mm family of munitions is replaced with the smaller, lighter E81 family of advanced munitions. Mortars — firing as individual squads, sections, or a platoon — can send dozens of rounds downrange before a single PBAS can acquire a target. Mortars also cannot be jammed or grounded due to unfavorable environmental conditions. The advent of precision weapon systems at the brigade, battalion, and even company level is a welcome evolution, to be sure. But the role of the mortar in providing dynamic, responsive massed fires endures.

Organization

So what could the organization of mortars look like in the near future, given the E81 and IBMS are realized and commanders' arsenals include a variety of precision short- and long-range munitions? One might argue that although mortars remain essential, the introduction of various precision systems and increases to individual mortar systems' lethality and survivability indicate we need fewer mortars. After all, in a resource-constrained environment, shouldn't we seek to do more with less? The evolving state of ground maneuver, the likely increase to brigade, battalion, and company areas of operation, and initial observations from TiC formations at CTCs would seem to indicate that in fact we need more mortars. To be clear, insufficient observational data currently exists to authoritatively demand an increase of mortar systems and the 11C Soldiers who operate them, but we need to begin experimentation now with different config-

urations to optimize formational lethality once the E81 and IBMS, or similarly advanced systems, become available to the force.

One potential experimental mortar allocation is an increase of each battalion mortar platoon to six mortar squads equipped with IBMS systems, supplanting the current four-squad model equipped with MSK-mounted M120s and dismounted M252s. Potential efficiencies found in the automated nature of the IBMS could feasibly lower the requirement of a mortar squad from four Soldiers to three, leaving a delta of just two 11Cs per battalion mortar squad requiring a billpayer. This experimental formation would be optimized to operate in three mortar sections, enabling the battalion to plan for two sections in position and ready to fire at any given time, with a third section transitioning to a subsequent mortar firing point. Currently, mortar platoons at CTCs struggle to service dynamic fire missions as one section is in position ready to fire but dedicated to a pending deliberate fire mission while another is in transition. Or, occasionally, both sections are conducting survivability moves. Three mortar sections would largely mitigate this gap at the cost of two additional Soldiers per battalion. Hypothetically, three mortar sections enable the battalion to allocate one section per rifle company in direct support for operations where dynamic fires are more prevalent than deliberate fires, such as a movement to contact. An increase to six battalion mortar squads likewise optimizes the battalion to control the larger areas of operation portended by the Army Warfighting Concept, which the four-gun current mortar platoon would be unable to range should companies disperse.

The mobility and survivability of the IBMS supports another emerging gap within the MBCT: organic mass fires for the multi-functional reconnaissance company (MFRC). While IBCT cavalry squadrons possess organic 120mm mortars in each mounted troop, the current MFRC with its sole reconnaissance platoon depends upon adjacent battalions for mortar support. The MFRC would benefit enormously from an organic mortar section consisting of two IBMS to provide deliberate or dynamic fires in support of reconnaissance and security operations. This allocation would reduce brigade commanders' risk when deploying their reconnaissance platoon forward of the forward line of own troops (FLOT) to conduct reconnaissance or security tasks, knowing they have the ability to receive massed fires within seconds in the event of compromise or locating a high-value target.

At the rifle company level, we must likewise experiment with replacing or augmenting the existing 60mm M224 mortar with the IBMS. Currently, the rifle company mortar section transports their two M224s on two ISV-Utility variants;

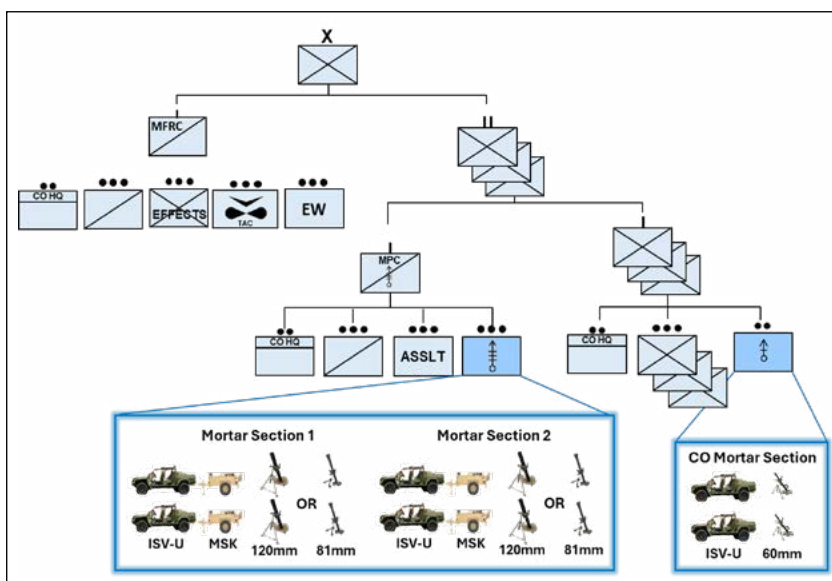


Figure 1 — Current MBCT Mortar Allocation

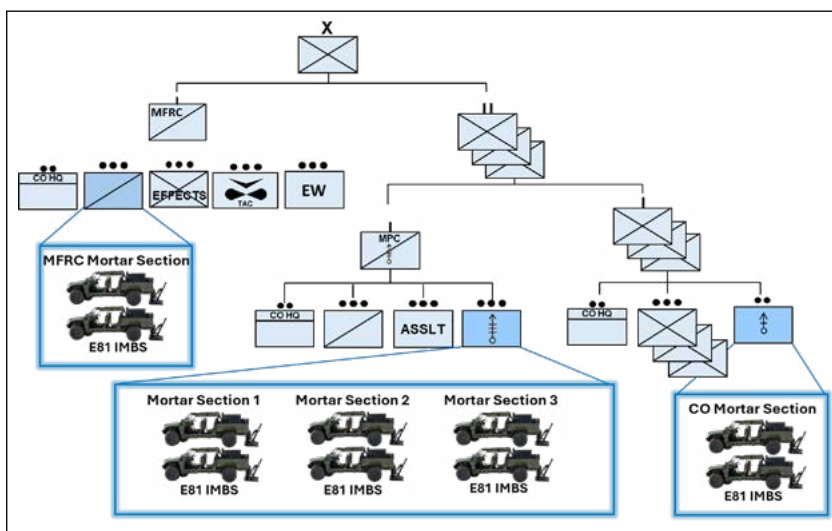


Figure 2 — Proposed Experimental MBCT Mortar Allocation

the platform is already required and authorized so why not modify it to be an IBMS? 60mm mortars should be retained for their versatility as a handheld system for close support and their mobility during airborne and air assault operations, but with the trend toward greater dispersion of companies and longer observable distances due to company-level medium-range reconnaissance (MRR) UAS, perhaps it's time to give rifle companies a bigger mortar. Equipping each rifle company with two IBMSs would not incur a manpower cost, as company mortar sections already consist of two teams of three 11C Soldiers. Standardizing the E81 as the primary mortar system across all brigade mortar formations vastly simplifies the supply chain for mortar ammunition. The transition of LHMBC functionality to a software application on ATAK flattens the coordination between mortar squads and the existing fire direction control centers. Technological advances are presenting us the opportunity to evolve how we organize and employ a capability that has existed for generations, and we need to consider the possibilities as our TIC continues.

So how could this proposed mortar organization experiment play out in a Joint Readiness Training Center (JRTC) TiC rotation? Replacing 12 heavy 120mm mortars, 12 medium 81mm mortars, and 18 light 60mm mortars with 38 medium E81-equipped IBMS would, on paper, more than double a brigade's quantifiable lethal capacity. The MFRC reconnaissance platoon is able to organically support its own reconnaissance and security tasks forward of the FLOT without decrementing an adjacent battalion's mortar capacity, or depending on long lead time precision weapon systems during a dynamic break-contact battle drill. Infantry battalions, now possessing six mortars instead of four, echelon their massed mortar fires with organic precision munitions targeted by scout platoons and long-range reconnaissance (LRR) UAS to shape the enemy long before rifle companies engage in direct fire contact. Precision weapons strike command and control (C2), fires, and sustainment targets, while massed mortar fire disrupts enemy concentrations, fixes maneuvering enemy companies, and suppresses close targets for hand-off to company fire and maneuver. Rifle companies, now equipped with a mortar that can range exceeding seven kilometers, have an organic massed fire capability to match their new organic MRR ISR capability, and are no longer entirely reliant on limited battalion heavy mortar support. Rifle companies begin suppressing and fixing enemy targets well outside direct fire ranges, freeing battalion's mortars to continue shaping at their maximum effective range. The risk from counterbattery fire, while never eliminated, is significantly reduced as every IBMS is on the move to a subsequent firing position within seconds after firing their last round. The brigade's 38 mortars, likely operating in 19 sections, are able to cover nearly every square kilometer of the JRTC training area. The opposing force (OPFOR) can't effectively suppress them because they transition too quickly and would struggle to impose a fires

prioritization dilemma upon brigade or battalion commanders, as each echelon has its own equally lethal massed fires. The OPFOR also can't take advantage of bad weather grounding UAS and most precision munitions, because mortars fly in any weather. The brigade's supply burden of past years, balancing movement of 81mm, 120mm, 105mm, and 155mm munitions to gun crews, is simplified to managing a single family of enhanced 81mm ammunition. If emerging precision weapon systems are a commander's sniper rifle, then mortars are the commander's shotgun: providing mass where it is most needed.

The technology enabling advancements in mortar lethality, survivability, and agility is here and being experimented with. Experimentation thus far only leads us to conclude that developmental mortar systems such as the E81 and IBMS far surpass current fielded mortar systems. Similar to the diffusion of machine guns to lower tactical levels once the technology supported it, the Army would benefit from experimenting with novel ways to organize and employ mortars to enable the MBCT to dominate the extended battlefield as the light ground maneuver component within a joint task force. Adopting the IBMS as a standard mortar system and increasing basis of issue to include rifle companies, enlarged battalion mortar platoons, and the MFRC would be a worthy experiment to test just how much more lethal the MBCT could become. It's not enough to replace existing mortar capabilities with a better system; we must evolve through experimentation how we organize and employ these systems to transform our formations' lethality before the next contact. We won't learn unless we try.

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Soldiers assigned to 1st Battalion, 502nd Parachute Infantry Regiment fire an 81mm mortar system during an exercise near Alexandroupolis, Greece, on 5 June 2025. (Photo by MAJ Joe Legros)