MOUT Weapons

The search for a new fire support weapon

GORDON L. ROTTMAN

With the emphasis today on military operations in urban terrain (MOUT), it is surprising that there are no fire support weapon systems now in the inventory or under development that are truly optimized for that environment. There are a number of compact, single-shot, shoulder-fired rocket launchers are available that can blast holes through heavy building construction materials. These are ideal weapons for Soldiers who must have a way to defeat hardened enemy fighting positions and blow breach holes in buildings to permit entry.

Current Weapons

Today's infantry has a variety of excellent weapons that are useful in MOUT. The 40mm Mk 19 Mod 3 grenade machine gun has more than sufficient range in built-up areas, a high rate of fire, and excellence in providing suppressive fire. But even with high explosive dual-purpose (HEDP) projectiles, it lacks sufficient penetration of concrete and masonry. It will penetrate 12 inches of pine logs, 16 inches of sand-filled cinder blocks (two layers), and 20 inches of sandbags (two layers). Their behind-the-target effects, however, are somewhat limited.

Other weapons capable of breaching and defeating enemy positions within defended buildings include the M136 (AT4) light antiarmor weapon (LAW) and the XM141 bunker defeat munition (BDM). The M136 has a high-explosive antitank (HEAT) warhead that makes it less than effective against fortified buildings. The BDM has an HEDP warhead, but it is a one-shot, disposable weapon like the M136. The BDM will penetrate 8 inches of reinforced concrete, 12 inches of brick (three layers), or 3 feet of tamped earth or sandbags (three layers) backed by 6-by-6-inch timbers. Besides destroying enemy positions, it can be used to breach walls for egress. The BDM has an effective range of 15-250 meters. The M98A1 Javelin surface attack guided missile system will defeat virtually any tank in the world, but it is extremely expensive to use for knocking out field fortifications.

There appears to be a sentiment among many that using high-velocity, rocket-propelled, guided or unguided weapons against MOUT targets is less than desirable. Whether the rocket's warhead is intended for antiarmor or anti-material (buildings, fortifications), such weapons are expensive, do not always provide the optimum terminal effect on the target, sometimes prevent firing from confined areas, and create a substantial backblast signature. The backblast also poses a hazard to the crew when fired at a high angle such as the upper floors of buildings.

A frequently suggested option it to resurrect the 106mm M40A1 recoilless rifle, which was the mainstay battalion-level antiarmor weapon until the introduction of the TOW system in the early 1970s. The Israelis and others still employ the 106mm and have used it effectively in MOUT. Provided with HEAT, high explosive plastic-tracer (HEP-T), and antipersonnel-tracer (AP-T) (flechette) rounds, it has been used effectively in MOUT operations by U.S. forces in Vietnam, the Dominican Republic, and other areas, but it also has limitations. It produces a major backblast signature and hazard, and this, coupled with its long barrel, restricts its use in built-up areas. Too, its design limits the way it can be mounted on a vehicle. It would be almost impossible to mount it on a HMMWV to allow 360-degree traverse, much less provide enough elevation to engage elevated targets. It would make little sense to field a weapon with inherently limited traverse. Its ammunition is heavy and difficult to manhandle.

What might be the most desirable characteristics for a highly mobile, vehicle-mounted, crew-served weapon capable of providing effective fire support in a MOUT environment? Preferably, this weapon would be effective for fire support in other environments such as deserts, plains, forests, jungles, hills, and mountains. Certainly no weapon can be ideal for all terrain and conditions, but one weapon can be effective for most.

The 40mm Mk 19 grenade machine gun is one weapon that can be useful in MOUT. The weapon has more than sufficient range in built-up areas, a high rate of fire and excellent at providing suppresive fire.

Terminal effects

The terminal effects are, of course, the most important consideration. The most common construction materials in urban environments are hollow cinder block, brick (backed or not backed by wood frame construction), comparatively thin and lightly reinforced concrete, stone, timber, and wood frame. Stone, concrete, and masonry walls separating property (such as courtyards and compounds), rubble barricades, multiple-layered sandbags, and wrecked civilian vehicles may be used as protective cover by the enemy. High-velocity HEAT rockets are not necessarily the most effective warhead to use against such targets. HEAT round behind-the-target (barrier) effects are less than desirable with only limited fragmentation, both from the warhead and secondary fragmentation for the barrier materials. The penetrating plasma jet is narrow and will injure only those in its immediate path while generating only limited blast over-pressure. Most HEAT warheads are relatively thin-walled, being essentially carriers for shaped charges. What we need is a more robustly constructed high explosive (HE) warhead on which a delay fuse may be fitted to allow it to punch through moderate building materials by kinetic energy and detonate behind the target barrier to inflict the maximum amount of damage by blast, fragmentation, and over-pressure. The availability of different types of projectiles is desirable as it provides additional target attack options and capabilities. Most rocket weapons and recoilless rifles are limited to HEAT or HEDP warheads.

A short-barrel, low-recoil weapon can easily be mounted on a vehicle and traversed without restriction in confined areas. The lack of a backblast reduces the firing signature and over-pressure in confined areas, prevents the possibility of crew injury, eliminates restrictions in its mounting and the directions in which it may be fired from a vehicle, and allows it to be fired at a high angle to engage targets well above ground level.

Range is not a major issue for weapons in MOUT, but a multi-purpose weapon with a sufficiently long range offers utility in other environments. Accuracy and a high rate of fire are certainly desirable characteristics for any weapon. Such a weapon, at one time, was in the U.S. armed forces inventory and was of comparatively low cost.

81mm Mk2 mortar

The 81mm Mk 2 Mod 1 direct-fire mortar was developed by the Navy's Bureau of Ordnance (at Naval Weapons Station, Crane, Indiana,) in the early 1960s. Its purpose was to provide offshore patrol boats with a comparatively lightweight direct and high-angle fire weapon capable of engaging both watercraft and targets ashore. This extremely useful weapon was adopted by the Coast Guard in 1962 and first mounted on large cutters serving as weather ships in the Atlantic and Pacific. One of their missions was to fire illumination flares to aid commercial and military aircraft that were forced to ditch at sea. The 81mm was tested in the Caribbean and found to be much more effective in this role than the 3-inch gun firing star shells and could be fired at a higher rate.

The Coast Guard was experiencing difficulties with its worn-out 20mm automatic cannons mounted on cutters. In 1964 the Coast Guard recommended that a .50-caliber machine gun be piggyback-mounted on the mortar. The prototype was built at the Coast Guard Yard, Curtis Bay, Maryland. This two-in-one gun provided a more flexible over-and-under mounting with two dissimilar weapons that required only one weapon station and one crew. This was a major benefit because of the space and manning limitations on small craft. It was discovered that the heavy mortar and its robust mount provided a very stable mounting, which allowed a high degree of control for the machine gun. A .50-caliber on a standard flexible mount is difficult to control because of the weapon's heavy recoil. The piggyback system was mounted on a flatbed truck and test fired at Dahlgren Proving Grounds, Virginia, in late 1964. Two were then mounted aboard a Coast Guard cutter at Norfolk, Va., for successful test firing at sea. The machinegun had to be reconfigured for right-hand feed, a simple field modification as the mortar's sight was on the left side. A 200-round machine gun ammunition container was fitted on the right side.

These mortars saw wide use on small Navy and Coast Guard craft in Vietnam. One mortar/machine gun combination was mounted on various coastal patrol and riverine craft, including fast patrol craft or "Swift boats," Point-class Coast Guard cutters, river monitors (modified LCM-6 landing craft, mechanized), assault support patrol boats, Osprey-class fast patrol torpedo boats, and Asheville-class patrol gunboats. There was at least one instance when an 81mm direct-fire mortar was mounted in the cargo bed of a ¾-ton cargo truck at a Special Forces camp in Vietnam.

The design of the direct-fire mortar was entirely different from any mortar previously in U.S. service. It consisted of a smoothbore 81mm barrel fitted on a carriage and a recoil slide. Locking levers were provided on the carriage to lock the mortar at a specified elevation and deflection, but it was mainly used as a free swinging (traverse and elevation) weapon. The barrel was fitted with a trigger firing mechanism on the base. An artillery-like recoil cylinder was fitted on top of the barrel. A basket arrangement was fitted on the barrel's base end to protect the gunner from the recoiling barrel, which was only 10 inches. This entire assembly was mounted on a fixed tripod fitted to a reinforced ring base fixed to the boat's deck.

The muzzle-loaded mortar was fired either by drop-fire or the trigger system. Adjustable elevation and traversing stops were provided on the tripod and carriage to prevent the weapons from firing into the boat or its structures. The mortar and machine gun could not be fired simultaneously, but an HE round might be direct-fired into a target, followed immediately by .50-caliber bursts.

Coast Guard-induced modifications provided an extended handle to traverse the mortar more effectively, and the bottom was cut out of the recoil protection basket so that expended .50-caliber cases, previously trapped in the basket, would not interfere with the mortar's recoil.

The barrel of the mortar was elevated to between 30 and 35 degrees, and the round was muzzle-loaded and then trigger-fired. It was not to be loaded for trigger-firing when elevated higher than 35 degrees, but it could be drop-fired from 35 to 71.5 degrees elevation. The drop-firing of mechanical time (MT) fused rounds was not authorized.

HE rounds were used for direct and high-angle fire against enemy watercraft and shore targets. White phosphorus (WP) could be used for the same purpose or to

lay smoke screens, either to blind the enemy or to screen friendly movements. WP rounds impacting on the surface of the water created a smoke screen between the boat and the enemy craft or the shore. Illumination rounds were ideal for providing illumination to identify suspect watercraft at night. In theory at least, the direct-fire mortar could engage helicopters at close ranges (approximately 1,000 meters) by firing HE rounds with variable time (VT) fuses to achieve an air burst. It is doubtful that this was ever tested, much less actually attempted, but it may still be viable.

The mortar was 65 inches long from the muzzle to the rear end of the recoil basket, and it had a height of 47 inches from the base of the tripod to the top of the machinegun (33 inches from base of tripod to centerline of 81mm barrel). The weapon stood higher, though, as it was normally mounted atop a raised base ring. The mortar and tripod weighed 593 pounds without the 84-pound machinegun. It had an effective direct-fire range of approximately 1,000 meters and, in the high-angle indirect fire mode, some 3,900 meters. Its direct-fire minimum safe range was 50 meters. Its rate of fire was 10 rounds per minute (rpm) trigger-fired and 18 rpm drop-fired. It could be elevated from 0 to 71.5 degrees and depressed from 0 to 30 degrees without depression stops. Its line-of-sight, open yoke-type sight, allowed accurate direct-fire and reasonably accurate indirect fire.

The 81mm Mk 2 Mod 1 mortar could be mounted in the cargo bed of an M998A1 or M1038A1 cargo/troop carrier HMMWV, with an add-on armor kit to allow 360-degree traverse. This might necessitate a steel reinforcing plate in the cargo bed to support the mount, but this would provide additional mine protection. A ready ammunition locker, protected from small arms fire and fragmentation, would be fitted in the forward end of the cargo bed, and .50-caliber ammunition racks could be fitted over the wheel wells. Although the Navy version did not have a shield, some were retrofitted and a shield might be advisable for close combat. One small crew operates two weapons with a broad range of capabilities from a single mobile weapons station, greatly increasing the system's capabilities. A crew of four would be required—squad leader/gunner, loader/fuse-setter, ammunition handler, and driver.

The effects of the different 81mm rounds — and the ability to employ them in the direct-fire role — make it an extremely versatile weapon for MOUT. Direct or indirect HE fire with super quick (SQ) fuses would be excellent against personnel and soft targets. Direct-fire hits on lightly armored and thin-skinned vehicles would also be effective. Multiple direct hits with SQ fusing could also be used to open breach holes in buildings and walls. HE set for 0.5-second delay would be extremely effective against buildings and field fortifications. The HE round is sufficiently robust (thick-walled) to penetrate masonry and other typical construction materials and detonate inside causing a tremendous amount of damage. When fired at a low-angle, delay-fused rounds can be skipped off the ground just short of a target to airburst above it. WP rounds may be used for close-in smoke screening, while delay-fused WP rounds can be used to penetrate building walls and create incendiary effects. Another means of creating an incendiary effect would be to set the MT fuse on illumination rounds to 10 seconds, fire it through a building window or other opening, and then eject the magnesium flare after the round impacted inside the building. Illumination rounds may be fired from the Mk 2 mortar in the normal manner as well.

A possible technique is to mount a small laser range finder on the mortar and a range scale with corresponding delay times for MT fuses fitted on a bracket beside the sight for the loader to set the fuse. The target is lased, the MT fuse set for the range, and the round trigger-fired to air burst over the target.

The Navy effectively employed HE rounds with variable time (VT) fuses from the direct-fire mortar with both direct and indirect fires. These were used to achieve air bursts over troops in the open and those concealed in open-topped firing positions and dense vegetation. WP air bursts in this manner were also effective to drive the enemy out of open positions and other cover. The Navy fielded the 81mm Mk 120 Mod 0 antipersonnel round in 1969. This unique round was used only in the direct-fire mortar. The blunt-nosed cartridge contained 1,300 1¼-inch long flechettes (small fin-stabilized darts) intended for direct fire on close-range targets, mainly personnel. It was loaded, then trigger-fired with a maximum effective range of 183 meters to defend against near ambushes on rivers and canals. It was also effective in stripping camouflage from concealed bunkers. When fired, the cartridge activated within 3 meters of the muzzle to spray flechettes in a shotgun-like blast. Such a round might fulfill the requirements for an antipersonnel round now being developed for the 105mm Stryker mobile gun.

The .50-caliber machine gun using armor-piercing incendiary ammunition would make this weapon system even more versatile, as it provides a direct fire capability that is effective against personnel, buildings, light field fortifications, thin-skinned vehicles, and helicopters. The fact that both mortar and machine gun can be elevated to 71.5 degrees makes the system especially useful in MOUT. A Mk 19 grenade machine gun could be mounted instead of a .50-caliber. Other options include the 25mm Objective Crew Served Weapon (36.6 lbs) or the 30mm ASP-30 combat support weapon (114.6 lbs). These weapons are highly effective in MOUT.

Whether or not the direct-fire mortar mounted on a HMMWV is employed as a replacement for the Stryker mortar carrier or to augment it is a moot point. The most effective means and at what echelon it would be assigned would have to be determined through field exercises and computer war-gaming. Three HMMWVs can be carried in a C-130 transport, six in a C-141B, eight in a C17A, and 15 in a C-5A. Two can be sling-loaded under a CH-47D and one under a UH-60A. The vehicle-mounted, direct-fire 81mm mortar and .50-caliber combination would be an ideal fire support system for light, airborne, and air assault infantry battalions in MOUT and virtually any other environment with perhaps four assigned to a battalion. Such a mobile system would greatly improve the firepower and target engagement capabilities of any light infantry unit.

Gordon L. Rottman is a retired master sergeant with active Special Forces, National Guard airborne infantry and LRRP, and Army Reserve Military Intelligence experience. He is currently a special operations scenario writer for Cubic Applications, Inc., Joint Readiness Training Center, Fort Polk, La. He has published 25 military history books. His e-mail is rottmagl@polk-emh2.army.mil.